B.M.S. COLLEGE OF ENGINEERING, BENGALURU
Autonomous institute, Affiliated to VTU

ACADEMIC COUNCIL

MINUTES OF 26th MEETING

28.02.2026

B.M.S. COLLEGE OF ENGINEERING, BENGALURU

Autonomous institute, affiliated to VTU

ACADEMIC COUNCIL | MEETING # 26 | 28.02.2026 | MINUTES

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B.M.S. COLLEGE OF ENGINEERING, BENGALURU

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ACADEMIC COUNCIL | MEETING # 26 | 28.02.2026 | MINUTES

LIST OF ANNEXURES

B.M.S. COLLEGE OF ENGINEERING, BENGALURU

Autonomous institute, affiliated to VTU

ACADEMIC COUNCIL | MEETING # 26 | 28.02.2026 | MINUTES

MINUTES OF THE MEETING OF TWENTY SIXTH ACADEMIC COUNCIL HELD ON 28.02.2026, BOARD ROOM-2, PLATINUM JUBILEE BLOCK, BMSCE.

MEMBERS PRESENT:

Dr. Bheemsha Arya	Chairman	Dr. M.K.Nalini	Member
Dr. Seshachalam D.	Member	Dr. K. Balachandra	Member
Dr. L. Ravikumar	Member	Dr. Chethan A. Nayak	Member
Dr. G. R. Sinha	Member	Dr. Saisha V.	Member
Dr. K. N. Subramanya	Member	Dr. R. Jayagowri	Member
Dr. G. T. Raju	Member	Dr. Preethi K. Mane	Member
Dr. Ramesh Babu H. S.	Member	Dr. Dakshayini M.	Member
Mr. Venkata Rangam T.	Member	Dr. K. Veerabhandrappa	Member
Mr. Ankur Dang	Member	Dr. Indiramma M.	Member
Dr. Rajeshwari Hegde	Member	Dr. Shambhavi B.R.	Member
Dr. S. B. Bhanuprashanth	Member	Dr. G. R. Prasad	Member
Dr. Savithri Bhat	Member	Dr. R. Ashok Kumar	Member
Dr. C. Lakshminarayana	Member	Dr. Suresh B. L.	Member
Dr. Chandasree Das	Member	Dr. Nagashree K. L.	Member
Dr. J. Sharana Basavaraja	Member	Dr. Rangaswamy	Member
Dr. Sureka Naagesh	Member	Dr. Minu Zachariah	Member
Dr. H. M. Shivaprasad	Member	Dr. S. Uma	Member
Dr. R.S. Geetha	Member	Dr. G. Saravanakumar	Member
Dr. K. P. Lakshmi	Member	Dr. Shubha Muralidhar	Member
Dr. Shailaya V.N.	Member	Dr. Veena N. Hegde	Member
Dr. Kavitha Sooda	Member	Dr. Gowrishankar	Member Secretary

At the outset, Dr. Bheemsha Arya, Principal – BMSCE and Chairman, Academic Council, extended a warm and cordial welcome to all the members of 26th Academic Council Meeting.

The Principal then requested the Member Secretary to take up the agenda items listed for information, ratification, and approval.

SECTION 1: ITEMS FOR CONFIRMATION

1.1 CONFIRMATION OF THE MINUTES OF 25th ACADEMIC COUNCIL MEETING HELD ON 01.08.2025.

The minutes of the 25th Academic Council Meeting held on 01.08.2025 were confirmed.

1.2 ACTION TAKEN REPORT ON THE DECISIONS OF 25th ACADEMIC COUNCIL MEETING

The Dean (Academic) presented the Action Taken Report (ATR) on the decisions of the 25th Academic Council Meeting, and the Council reviewed and approved the report with the following recommendations:

1. Industry Collaboration for Research Support: The institution should actively engage with industries to obtain support for Ph.D. scholars, including the provision of research fellowships to encourage and promote high-quality research activities.
2. Enhancement of Research Fellowship: The Council suggested exploring the possibility of enhancing the research fellowship for full-time research scholars from ₹20,000 to ₹30,000, particularly for scholars who publish Q1 category research papers.
3. Seed Money for Faculty Research: It was recommended that dedicated seed funding be reserved to support faculty members towards pursuing innovative and high-impact research projects.
4. Selection of Best Research Scholar: The process of selecting the Best Research Scholar Award should involve external evaluators to ensure transparency, credibility, and fairness in the evaluation process.
5. Best Research Department Award: The Council recommended introducing a Best Research Department Award to promote healthy competition among departments and to encourage excellence in research activities.
6. Entrepreneurship Programs through Wadhwani Foundation: Dr. G. R. Sinha, Provost (Vice Chancellor), GSFC University, Vadodara, Gujarat, informed the Council that the Wadhwani Foundation offers specialized programs for young entrepreneurs free of cost. These programs aim to educate and empower students to realize their potential and encourage them to choose entrepreneurship as a career, while also providing support for startup initiatives.
7. Skill Enhancement Courses with Exit Certification: It was suggested that Skill Enhancement Courses up to 8 credits may be introduced. These courses would enable students who exit the B.E. program after completion of the first, second, or third year to obtain a certificate, thereby recognizing their acquired skills.
8. Structured Skill Development Framework: The Council recommended training students with progressive skill sets at each stage of the program, structured as follows:
    - First Year: Basic Skills
    - Second Year: Domain-Specific Skills
    - Third Year: Interdisciplinary Skills
    - Fourth Year: Research Skills

    This framework aims to ensure holistic skill development and academic progression throughout the program.

SECTION 2: ITEMS FOR INFORMATION

2.1 STATUS OF ACCREDITATION (UG & PG PROGRAMS)

The Dean (Academics) informed the Council regarding the status of Accreditation of Undergraduate and Postgraduate programs. Further, Vice Principal (Aca) brought to the notice of the Council that, the Civil Engineering department has applied for appeal challenging the decision of NBA i.e., for reconsideration of accreditation period from 3 years to 6 years.

1. UG Programs:

As per the NBA letter dated 22.01.2026, the following three UG Programs were **further accredited** by NBA during the expert team visit held from 05.12 2025 to 07.12.2025:

SNo	Name of the Program	Accreditation Validity	
		From	To
1	B.E. in Civil Engineering	01.07.2025	31.12.2028
		Applied for Appeal challenging the decision of NBA i.e., for reconsideration of accreditation period from 3 years to 6 years	
2	B.E. in Industrial Engineering & Management	01.07.2025	31.12.2028
3	B.E. in Electronics and Telecommunication Engineering	01.07.2025	31.12.2027

2. Applying for re-accreditation / fresh accreditation of the following UG and PG programs:

SNo	UG Program	Accreditation Validity	
		From	To
1	UG - Electronics and Communication Engineering	01.07.2023	30.06.2026
2	UG - in Artificial Intelligence and Machine Learning	First Time accreditation	
SNo	PG Program	From	To
3	PG - Construction Technology	01.07.2023	30.06.2026
4	PG - Computer Science & Engineering	01.07.2023	30.06.2026
5	PG - Power Electronics	01.07.2023	30.06.2026

As the accreditation validity of the above-mentioned programs is only until 30.06.2026, the Institution has decided to apply for Re-accreditation / First-Time Accreditation under the National Board of Accreditation (NBA).

Accordingly, the Heads of Departments (HODs) and NBA Coordinators of the respective programs have been instructed to prepare the pre-qualifiers and submit them to the committee for review.

Furthermore, they have been advised to initiate the preparation of the Self-Assessment Reports (SARs) simultaneously for the concerned UG and PG programs. The tentative timeline for submission of the SARs is April, 2026.

2.2 GRADUATION DAY-2

The Dean (Academic) briefed that the College has organized Graduation Day-2 for the batch of 2025 Undergraduate and Postgraduate students on 01.03.2026 awarding degree certificates to **685** students of autonomous batch in B.E., M.Tech., MCA and MBA students graduated during the academic year 2025. Sri. L.K. Atheeq, IAS, Chairman, Bengaluru Business corridor, Govt. of Karnataka will be the Chief Guest for the event.

Principal requested all the members of academic council to grace the occasion.

2.3 REPORT ON EXTERNAL ACADEMIC AUDIT FOR THE AY 2024-25

The Dean (Academic) informed the Council that the external peer team review for the academic year 2024-25 was conducted on 24.01.2026. This audit was conducted by Prof. Srinivas Talabattula of IISc Bengaluru, Prof. Rajeshwari Sreenivasa of KSOU Mysore and Dr. H. A. Sanjay, Principal, BMSIT, Bengaluru.

The Committee Recommended the following points for further improvements;

1. The Institution may take benchmarking its curriculum against foreign universities.
2. Faculty centric activities need to be conducted to strengthen interdisciplinary research.
3. Faculty should be actively encouraged to enhance research publications and secure research grants through professional bodies such as IEEE.
4. Faculty need to be encouraged to register in MOOCs in relevant domain.
5. The institute may consider developing targeted strategies to increase the enrolment of research scholars across all disciplines, with particular emphasis on core branches such as CV, ME, EE, etc.
6. Organizing workshops to help students navigate and pursue higher studies.

While on the subject, the Vice Principal (Aca) informed the Council that all the above points have been addressed and a plan of action has been prepared for implementation.

The principal brought to the notice of the Council that;

- Institution is in the process of developing in-house MOOC courses and creating an archive of these courses. The objective is to provide students access to a wide variety of courses across different domains.
- Institution has signed a MoU with the NPTEL Nodal Centre to establish an NPTEL Examination Centre at BMSCE.

Prof. G. R. Sinha suggested organizing motivational talks by young IAS officers to encourage students to prepare for competitive examinations and to create awareness about opportunities for pursuing higher studies in India and abroad.

2.4 ACADEMIC CALENDAR - EVEN SEMESTSER FOR THE AY 2025-26

The Dean (Academic) briefed the Council academic calendar for Undergraduate and Postgraduate programs for the even semester i.e., UG – 2nd, 4th, 6th and 8th semesters; PG – 2nd and 4th semesters for the academic year 2025-26 was placed before the Council for information. As per the calendar, classes for 6th and 8th semester were commenced from 19.01.2026 and classes for 2nd and 4th semester were started on 23.02.2026.

The Council noted the matter. The approved Academic Calendar for even semester (UG and PG) 2025-26 is provided in **Annexure-I**.

2.5 INDUCTION PROGRAM FOR FIRST YEAR STUDENTS ADMITTED IN THE ACADEMIC YEAR 2025-26

The Dean (FYB) informed the Council that the Induction Program is conducted in two phases for first year students admitted during the academic year 2025-26.

Phase-1: Conducted before commencement of First year classes.
Phase-2: Conducted for second semester students (from 23rd to 27th February, 2026).

The Council noted the matter.

2.6 BOARD OF STUDIES (BoS) MEETINGS HELD FROM AUGUST 2025, TILL DATE

The dates of BOS Meetings held from August 2025 till date was shared with the Council members for information. The minutes of various departments/cluster BOS meeting is provided in **Annexure-II.**

SECTION 3: ITEMS FOR RATIFICATION

3.1 LIST OF STUDENTS DISCONTINUED UG / PG PROGRAMS (AY 2025-26)

The Council noted and ratified the list of students who have cancelled their admissions, during the academic year 2025-26. (since 25th AC Meeting i.e., 01.08.2025):

SNo	Dept.	USN	Name of the Student	Date of Admission Cancellation	Sem
1	MCA	1BM24MC095	Ms. Stuti Kabra	05-08-2025	I Sem
2	ME	IBM24ME006	Ms. Akshay Kaushik	11-08-2025	II Sem
3	CV	1BM20CV135	Rohith B.	18-08-2025	II Sem
4	EIE	1BM22EI015	Mr. Babideval Kumar	18-082025	II Sem
5	CV	1BM24CV126	Mr. Yashraj BaleKumadri	21-08-2025	II Sem
6	CSBS	1BM24CB009	Mr. Anshuman Salangi	22-08-2025	II Sem
7	EEE	1BM24EE005	Ms. Aishna Tiwari	22-08-2025	II Sem
8	ME	1BM23ME067	Ms. Monisha S.	26-08-2025	IV Sem

9	EEE	1BM24EE023	Ms. Kushi Rghavendra	03-09-2025	II Sem
10	CSE	1wn24cs255	Ms. Sehaj Kaur Sowpni	04-09-2025	II Sem
11	CSE	1BM22CS165	Mr. Muhammed Safee Ullah Khan	04-09-2025	II Sem
12	UG	1BM23EE061	Mr. Srujan R	10-09-2025	II Sem
13	CH	1BM24CH065	Mr. Yuvaraj	24-09-2025	II Sem
14	CV	1BM24CV018	Mr. Ayush A Anju	12-09-2025	II Sem
15	CSE	1WA24CS260	Mr. Sathvik Gowda	11-10-2025	II Sem
16	BT	1BM23BT011	Mr. Anirudh Praveen	13-10-2025	II Sem
17	CSE	1BM23CS199	Mr. Monish Yumnam	15-10-2025	II Sem
18	ISE	1BM23IS085	Ms. Divya Ravi Garani	17-10-2025	II Sem
19	ECE	1BM24EC020	Mr. Anirudh Sony	24-10-2025	II Sem
20	ECE	1BM24EC424	Ms. Shrusti M.	30-10-2025	IV Sem
21	CSE	1BM22CS137	Mr. M.P.Vilas Gowda	04-10-2025	II Sem
22	CH	1BM23CH038	Mr. Prajwal S	04-10-2025	II Sem
23	CH	1BM23CH028	Mr. Mahesh Chandra	12-11-2025	II Sem
24	CSE	1BM23CS105	Mr. Harsh Abhinav	24-11-2025	II Sem
25	CV	1BM24CV091	Mr.Sai Shashank	09-10-2025	II Sem
26	MCA	1BM24MCA071	Mr. Rahul M.	05-12-2025	III Sem
27	MCA	1BM24MCA032	Mr.Gurudarshan Yegappa Sakri	06-12-2025	I Sem
28	ME	1BM24ME043	Mr. Hruthek Gowda S.V.	06-12-2025	III Sem
29	CS	1WA24CS143	Ms. Khushi S Anand	17-01-2026	I Sem

3.2 REVISED ACADEMIC RULES AND REGULATIONS FROM AY 2024-25 ONWARDS

The Dean (Academic) brought to the notice of the Council that the Academic Rules and Regulations have been revised with effect from the academic year 2024-25 and onwards, in accordance with the VTU Notification dated 24.03.2025 ("Measurement for Maintenance of standards at Affiliated Autonomous Institutions Guidelines, 2024").

The Council ratified the revisions and further recommended to seek legal consultation or legal vetting to address issues related to ragging cases and other unethical behaviour of students on the campus.

The revised Academic Rules and Regulations is provided in **Annexure-III.**

3.3 FIRST YEAR SYLLABUS FOR THE STUDENTS ADMITTED DURING THE AY 2025-26

The Scheme and Syllabus book for first year students admitted during the academic year 2025-26 was circulated to the Council members. The Dean (FYB) briefed the content of the syllabus

The Council approved and ratified the First year Scheme and Syllabus. The approved Syllabus is provided in **Annexure-IV.**

SECTION 4: ITEMS FOR APPROVAL

4.1 POLICY FOR REGISTRATION AND CREDIT TRANSFER OF MOOC COURSES (UG & PG PROGRAMS)

The Dean (Academic) presented the Policy Document for Registration and Credit Transfer of MOOC Courses for UG and PG programs to the Council and explained the details of the policy.

After detailed deliberations, the Council made the following observations and recommendations:

1. The departments shall ensure the authenticity of MOOC certificates submitted by students upon completion of the respective courses.

2. The Council noted that IIT, Bombay, through its Spoken Tutorial Project funded by the Ministry of Education, India, offers free, self-paced, multilingual IT training and certification in Free and Open-Source Software (FOSS) to enhance employability.

   The project also offers laboratory courses in tools such as Linux, Scilab, Python, LaTeX, and Avogadro for engineering and science students. The Council advised exploring the possibility of offering these courses at the institution and examining the necessary modalities for implementation.

3. The Council appreciated the initiative of BMS College of Engineering in becoming an NPTEL Examination Centre. The Council also acknowledged the financial support provided by the Management to students registering for Open Elective MOOC courses.

4. The Council recommended organizing digital training programs for faculty members with the objective of enhancing their awareness, skills, and engagement with MOOC platforms. Such programs would help faculty understand the process of identifying relevant MOOC courses, guiding students in course selection, and effectively integrating MOOC learning with the existing curriculum.

   The training may also include orientation on major platforms such as NPTEL, SWAYAM, and other recognized online learning portals.

5. The proposal to develop in-house MOOC courses was well received by the Council. However, it was suggested that faculty involved in recording these courses ensure a more professional approach and quality in content delivery.

With the above suggestions and recommendations, the Council approved the Policy Document for Registration and Credit Transfer of MOOC Courses. The approved policy document is provided in **Annexure-V**.

4.2 MODALITIES FOR CONDUCTION OF ONE-YEAR INTERNSHIP FOR STUDENTS ADMITTED FROM AY 2022 ONWARDS

The Academic Council approved the proposal of allowing final-year undergraduate students to undertake a one-year industry/academic internship. The modalities for implementing this internship—including the mode of course delivery, integration of the internship with the Major Project, identification of equivalent MOOC courses, and fulfilment of other academic requirements during the internship period, were discussed in detail.

After thorough deliberation, the Council approved the proposed modalities for conducting the one-year internship for final-year students. This provision will be implemented for students admitted from the academic year 2022 onwards.

The approved document in this regard is provided in **Annexure-VI**.

4.3 LIST OF STUDENTS APPLIED FOR TEMPORARY WITHDRAWAL

The Council noted and approved the students who have requested for temporary withdrawal from the program during the academic year 2025-26 (since 25th AC Meeting i.e., 01.08.2025). The list is provided hereunder:

SNo	USN	Name of the Student	UG/PG	Duration
1	1BM24MC116	Zabi Ulla	PG	Multiple Semesters
2	1BM24BT057	G. Shubha	UG	
3	1BM22EC401	Aravinda C. R.	UG	
4	1WN24CS136	Keerthana K.	UG	

SECTION 5: ANY OTHER SUBJECT WITH PERMISSION OF THE CHAIR

1. Proposal for Change in the Process of First-Year Electives

The Dean (FYB) briefed the members on the existing process for offering first-year elective courses and sought the Council's approval for certain modifications to the current system. He outlined the delays, student-related concerns, and operational challenges encountered in offering, processing, and conducting the five elective courses for first-year engineering students.

In view of these challenges, the Dean proposed the introduction of **discipline-wise electives** for students starting from the **2026 batch onwards**. He also presented a tentative implementation plan for the Council's consideration.

After detailed deliberation, the Council noted the proposal and approved the suggested change in the process.

2. **a) Graduation Day Ceremony – Award of Degrees and Ranks (M.Tech – All Branches)**

The Controller of Examinations (CoE) informed the Council that the College conducts an annual Graduation Day Ceremony to confer Degrees upon students who have successfully completed the prescribed academic requirements. The Graduation Day is organized after the University Convocation.

During the ceremony, the College awards Ranks and Medals to meritorious students in recognition of their academic excellence and to encourage them to strive for higher achievements.

Policy for Awarding Ranks – M.Tech (All Branches)

The number of ranks to be awarded shall be determined based on the total number of students who have appeared for the examination in the respective department. In addition, the student must have completed and submitted the thesis on or before the prescribed date, as detailed below:

Admitted Strength	Number of Ranks
More than 1 and up to 10	1 Rank
More than 10 and up to 15	2 Ranks
More than 15	3 Ranks

b) The NCMC course with the code 23NCMC6PE4 and the course code 24NCMC6PE4, which was offered in the VI Semester in July 2025, is the same and both are equivalent.

The Council noted matter and approved.

3. **Permitting IEM student to appear for Semester End Examination after completion of course duration:**

As per the VTU Notification dated 30.10.2025 w.r.t. permitting students to appear for examination after completion of course duration, a student from department of Industrial Engineering and Management named Ananya D. Bhardwaj bearing USN:1BM17IM006 has submitted a request for permission to complete her Engineering degree by taking SEE conducted during June, 2026.

The Council approved the student request to write SEE during June 2026. Further, it was informed that, Hon'ble High Court of Karnataka has directed the University not to permit students who are unable to complete the B.E. course within the stipulated duration. Further, it has cleared that there shall be no extension / relaxation in maximum duration of the program (eight years).

4. Enhancement of weightage for Alternate Assessment Tool (AAT):

The Vice Principal (Aca) brought to the notice of the Council that it is proposed to enhance the weightage for AAT component from 20% to 40%.

The objective of enhancing the weightage is to;

- Provide greater emphasis on extended learning and self-learning of students.
- Facilitate effective mapping of courses to higher order Program Outcomes (POs) and knowledge profiles.
- Address Sustainable Development Goals (SDGs) in alignment with GAPC 4.0 guidelines of the National Board of Accreditation (NBA).

The enhancement is implemented only after ensuing proper planning, execution and use of appropriate evaluation rubrics. The HODs were instructed to have DAC meetings before finalization.

The revised AAT weightage structure is provided in the Table:

SNo	Course Type		Existing weightage of Marks	Proposed weightage of Marks
1	Non-integrated course	X*-0-0	10 Marks (20% weightage)	20 Marks (40% weightage)
2		X*-1-0	10 Marks (20% weightage)	20 Marks (40% weightage)
3	Integrated course	X*-0-1	5 Marks (20% weightage)	10 Marks (40% weightage)

X* = Credits for Lecture Hours

The meeting concluded with thanks to the chair.

DEAN (ACADEMICS)

PRINCIPAL

ANNEXURE –I

Approved Academic Calendar for Even Semester
UG and PG programs AY 2025-26

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

No.BMS/VP(Aca)/2025-26

Date : 16.12.2025

ACADEMIC CALENDAR FOR EVEN SEMESTER OF UG PROGRAMS FOR THE ACADEMIC YEAR 2025-26

EVENT	II & IV Semester	VI Semester	VIII Semester
Registration & Commencement of Induction Program	16.02.2026 to 21.02.2026 (II Semester only)	NA	NA
Course Registration & Commencement of Classes	23.02.2026	19.01.2026	19.01.2026
Dropping of courses	Within Two weeks from Commencement of semester (IV Semester only)	Within Two weeks from Commencement of semester	Within Two weeks from Commencement of semester
Quiz#1/AAT#1	Before Test I	Before Test I	Before Test I
CIE: Test I	06.04.2026 to 08.04.2026	19.02.2026 to 21.02.2026	19.02.2026 to 21.02.2026
Announcement of first CIE Marks	13.04.2026	25.02.2026	25.02.2026
First Student Feedback on T-L-P	13.04.2026 to 15.04.2026	25.02.2026 to 27.02.2026	25.02.2026 to 27.02.2026
First Proctor-Parent meeting	25.04.2026	28.02.2026	28.02.2026
Open House / Project Exhibition	NA	NA	28.02.2026 (Tentative)
UTSAV	17.04.2026 to 19.04.2026		
Quiz#2/AAT#2	Before Test II	Before Test II	Before Test II
CIE: Test II	18.05.2026 to 20.05.2026	06.04.2026 to 08.04.2026	06.04.2026 to 08.04.2026
Announcement of Second CIE Marks	23.05.2026	13.04.2026	13.04.2026
Second Student Feedback on T-L-P	25.05.2026 to 27.05.2026	13.04.2026 to 15.04.2026	13.04.2026 to 15.04.2026
Second Proctor-Parent meeting	30.05.2026	25.04.2026	25.04.2026
Course Withdrawal	11.06.2026 (IV Semester only)	04.05.2026	04.05.2026
CIE: Test III	18.06.2026 to 20.06.2026	07.05.2026 to 09.05.2026	07.05.2026 to 09.05.2026
Announcement of Third CIE Marks	23.06.2026	12.05.2026	12.05.2026
Third Student Feedback on T-L-P	21.06.2026 to 23.06.2026	10.05.2026 to 12.05.2026	10.05.2026 to 12.05.2026
Farewell to the final year students	NA	NA	11.05.2026
Last Working Day	23.06.2026	12.05.2026	12.05.2026
Submission of final CIE to the office of COE	23.06.2026	14.05.2026	12.05.2026
Issue of Hall Ticket for SEE	25.06.2026	18.05.2026	14.05.2026
SEE-Lab/Project/SMR /SEE-Theory	29.06.2026 to 13.07.2026	20.05.2026 to 03.06.2026	18.05.2026 to 25.05.2026
Announcement of VIII Sem SEE Results	NA	NA	29.05.2026
Announcement of VI Sem SEE Results	NA	08.06.2026	NA
Announcement of II & IV Sem SEE Results	17.07.2026	NA	NA
Vacation for students	TO BE ANNOUNCED LATER	TO BE ANNOUNCED LATER	NA
Commencement of Fast Track / Summer Semester	TO BE ANNOUNCED LATER	TO BE ANNOUNCED LATER	TO BE ANNOUNCED LATER
Commencement of ODD Semester	TO BE ANNOUNCED LATER	TO BE ANNOUNCED LATER	NA

Note: There may be small variation in dates for CIE/SEE/Commencement of ODD Semester based on university guidelines /other valid reasons.
If necessary, college may organize extra classes on the Sundays and holidays to complete academic activities within the stipulated time.

PRINCIPAL

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

No.BMS/VP(Aca)/2025-26

Date : 23.01.2026

ACADEMIC CALENDAR FOR EVEN SEMESTER OF PG PROGRAMS FOR THE ACADEMIC YEAR 2025-26

EVENT	IV SEMESTER MCA & M.TECH	IV SEMESTER MBA	II SEMESTER MBA, MCA & M.TECH
Course Registration & Commencement of Classes	12.02.2026	12.02.2026	25.03.2026
Internship/Project Professional Training	NA	12.02.2026 to 26.03.2026	NA
Commencement of Classes	12.02.2026	27.03.2026	25.03.2026
CIE: Test I / AAT#1	09.04.2026 to 11.04.2026	14.05.2026 to 16.05.2026	11.05.2026 to 13.05.2026
Announcement of first CIE Marks	17.04.2026	20.05.2026	18.05.2026
First Student Feedback on T-L-P	16.04.2026 to 18.04.2026	18.05.2026 to 20.05.2026	18.05.2025 to 20.05.2026
UTSAV	(*)	(*)	(*)
Proctor-Parent meeting (**)	25.04.2026	30.05.2026	13.06.2025
Photo Session to the final year students	(***)	(***)	NA
CIE: Test II /AAT#2	04.06.2026 to 06.06.2026	22.06.2026 to 24.06.2026	02.07.2026 to 04.07.2026
Announcement of Second CIE Marks	11.06.2026	27.06.2026	09.07.2026
Second Student Feedback on T-L-P	08.06.2026 to 10.06.2026	25.06.2026 to 27.06.2026	09.07.2026 to 11.07.2026
LAB CIE / Compensatory	NA	NA	06.07.2026 to 11.07.2026
Last Working Day	12.06.2026	30.06.2026	15.07.2026
Submission of final CIE to the office of COE	12.06.2026	30.06.2026	15.07.2026
Issue of Hall Ticket for SEE	16.06.2026	03.07.2026	18.07.2026
SEE-Lab/Project/SMR /SEE-Theory	17.06.2026 to 25.06.2026	06.07.2026 to 18.07.2026	20.07.2026 to 05.08.2026
Announcement of IV Sem SEE Results	03.07.2026	22.07.2026	NA
Announcement of II Sem SEE Results	NA	NA	10.08.2026
Vacation for students	NA	NA	TAL
Commencement of Fast Track / Summer Semester	TAL	TAL	TAL
Commencement of ODD Semester	NA	NA	TAL

Note: 1) There may be small variation in dates for CIE/SEE based on university guidelines /other valid reasons.
2) If necessary, college may organize extra classes on the Sundays and holidays to complete academic activities within the stipulated time.
3) (*) UTSAV Dates : 17.04.2026 to 19.04.2026 (As per B.E. Even Semester Academic Calendar).
4) (**) HODs may conduct a second Parent-Proctor Meeting, if required.
5) (***) Farewell / Photo Session to the final year students : 11.05.2026 (As per B.E. Even Semester Academic Calendar).

PRINCIPAL

12

ANNEXURE – II

Minutes of BOS Meetings of various Departments/Clusters held since August, 2025 till date

B.M.S. COLLEGE OF ENGINEERING, BENGALURU
Autonomous institute affiliated to VTU

MINUTES OF BOS MEETINGS

of various departments / clusters

held since August, 2025

B.M.S. COLLEGE OF ENGINEERING, BENGALURU
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SCHEDULE OF MEETINGS - BOARD OF STUDIES

for various departments / clusters held
from August, 2025 to till date

SNo	Name of the Department / Cluster	Date of conduction
1	Civil Engineering	24.02.2026
2	Electrical Science Custer (EE, EC, TE, IT & ML)	24.02.2026
3	Data Science cluster (ADS, CDS & CSI)	21.02.2026
4	Chemical Cluster (BT & CH)	24.02.2026
5	Industrial Engineering & Management	24.02.2026
6	Computer Science Engineering	03.02.2026
7	Aerospace Engineering	20.02.2026
8	Information Science Engineering	28.10.2025
9	Computer Science & Business Systems	18.10.2025 21.02.2026
10	Master of Business Administration	15.11.2025
11	Physics	21.08.2025
12	Chemistry	20.08.2025

B.M.S. COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

BOS Meeting: Hybrid Mode

MINUTES OF MEETING

Date: 24.02.2026 Time: 2:00 pm

Agenda:

1)) Ratification of the Department UG Vision, Mission Statement.
2) Ratification of the UG program PEO and PSO statements.
3) Approval of MOOC Courses for UG program.
4) Approval of Syllabus for I year BE Course-Engineering Mechanics & Building Sciences and Mechanics.
5) Approval of Vision, Mission PEO Statements for 3 PG programs.

Members:

Sl. NO	NAME	DESIGNATION	PRESENT/ LEAVE OF ABSENCE
1	Dr. Sureka Naagesh	Chairperson, BOS & HOD, Dept. of Civil Engg	Present
2	Dr. Ramachandra. V	Principal advisor (Tech), Ultra Tech Cements Ltd., Mumbai	Present
3	Dr. Radhakrishna	VTU Nominee, Professor & PG Dean, Dept of Civil Engineering, RVCE, Bangalore	Present
4	Dr. Ravi Kumar. A	Professor, Faculty of Civil Engineering,UVCE, Jnanabharathi, Bengaluru.	Present
5	Dr. S. K Prasad	Professor, HOD, Department of Civil Engg, VVCE, Mysore	Present
6	Sri N P Sharma	Chief Engineer, BMRCL	Leave of Absence
7	Dr. Ajith Sabnis	ICICON AG	Leave of Absence
8	Dr. K Ganesh	Professor	Present
9	Dr Ramakrishnaiah C R	Professor	Present
10	Prof. R Taranath	Associate Professor	Present
11	Dr. Reshmi Devi T V	Associate Professor	Present
12	Dr. T Rajanna	Associate Professor	Leave of Absence

Invitees:

1	Dr Parthan. K,	Asst. prof	Present
2	Dr Manjunath R	Asst. prof	Present
3	Dr Asha. K	Asst. prof	Present

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Sureka Naagesh

HOD, Dr Sureka Naagesh, welcomed all the BOS members and invitees to the meeting and presented the agenda. Meeting was conducted in hybrid mode.

1. HOD presented the revised Vision and Mission of the Department for ratification. The vision mission statements were approved by DAB. The BOS Members deliberated and Ratified the same.
2. HOD presented the revised PEOs and PSOs of the UG program and the same was ratified.
3. **Approval of MOOC courses for UG program** for AY 2025-26:
    - The list of identified MOOC courses for the IV & VI semester, for AY 2025-26 and onwards was presented and was approved. The list is enclosed herewith.
    - Members discussed the measures taken to monitor the progress of students and to ensure MOOC course completion. HOD explained that students are advised to register for courses offered by NTPEL or SWAYAM. Proctors and MOOC coordinators are assigned to monitor the students. Also, as per the VTU and college guidelines, the Department and the coordinators will ensure course completion by students and will guide them from time to time. Guidelines on CIE and SEE were also discussed.
    - The list of MOOC courses for open elective and for HSS courses that was identified for the upcoming Odd semester (III, V & VII semesters 2026-27) was presented by HOD and is approved by BOS.
    - Open elective MOOC courses for the Even Semester for AY 2026-27 during VIII semester were also discussed and approved.
4. **Approval of I year 2025-2026 Syllabus:**
    - Syllabus for the I year course "Engineering Mechanics" (25CV1PSENM) and "Building Sciences and Mechanics" (25CVIESBSM) was presented, discussed and approved. The list of Lab experiments in Engineering mechanics was also discussed. The same was approved.
5. **Approval of the revised PEO statement for the PG programmes:**
    - The revised PEOs for the PG course: Construction Technology, Environmental Engg and Transportation Engg and management was presented by respective PG coordinators. Minor modification such as to include the word sustainable development was suggested and the revised PEO statements were approved.

Sureka Naagesh

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- Further, the BOS members suggested to circulate the PG- PEO statements among all the stake holders and to collect the suggestions.

  HOD requested the BOS members to kindly approve the above agenda items.

The meeting concluded with thanks to all the members.

Dr Sureka Naagesh
25/2/26

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CV
BANGALORE
BOARD OF STUDIES

Department of Civil Engineering

BOS MEETING 24-2-26

1) Ratification of Vision, mission, PEO and PSO statements of UG program for 2025-26

Vision statement of dept	Vision statement of Dept. (Revised)
To be an excellent center for imparting quality higher education in Civil Engineering for a constantly changing societal needs with credibility, integrity and ethical standards	**To be a center of excellence for imparting quality education in Civil Engineering with integrity and ethical standards for societal needs.**

Mission statement of dept	Mission statement of Dept. **(Revised)**
Accomplish excellence in curricular, co-curricular activities with a committed faculty through teaching and research which creates technically competent and dedicated civil engineers to serve their surroundings with pride.	**Accomplish Excellence in Civil Engineering through dedicated teaching, learning and Research to produce technically competent civil engineers to serve the society with pride.**

	PEO	PEO **(REVISED)**
PEO1	*Practice Civil Engineering in construction Industry, public sector, undertaking and as an entrepreneur for successful professional career.*	Implement Civil Engineering practices in an industry or as an entrepreneur for a successful Professional career.
PEO2	*Pursue higher education for professional development.*	Pursue higher education for Professional development.
PEO3	*Exhibit leadership qualities with demonstrable attributes in lifelong learning to contribute to the societal needs with a focus on sustainability.*	Inculcate lifelong learning to cater to societal needs with a focus on sustainability.

	PSO	PSO **(REVISED)**
PSO1	*Analyze and design civil engineering systems.*	Analyse, design and build Civil Engineering systems.
PSO2	*Become environmentally and socially responsible citizens with awareness of the use of sustainable materials and technologies so as to provide alternate engineered solutions.*	Adopt durable, Sustainable materials and Technologies to provide Engineered solutions.

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Sunekaravaagesh

DEPARTMENT OF CIVIL ENGINEERING

BOS MEETING: 24-02-2026

List of MOOC courses Approved:

AY 2025-26 Even semester	Course details as per syllabus		MOOC course Equivalent	MOOC Course equivalent
IV semester	Universal human Values 23MA4HSUHV 1 credit		*Ethics in Engineering practice* NPTEL IIT Kharagpur 8 weeks	
VI sem	Research methodology 23CV6HSRMY 2 Credit		*Research Methodology* IIT Madras NPTEL 8 weeks	
VI sem Open elective	Climate change and carbon capture 23CV6OECCC 3 credits		*3C s – clean, capture and convert* Swayam course 12 weeks NITTTR Chennai	
	Disaster management & mitigation 23CV6OEDMM 3 Credits		*Disaster Management* Swayam course 12 weeks NITTTR Chennai	*Climate hazards and disaster mitigation* IIT Indore NPTEL 12 Weeks
Open elective	----		*Economic Analysis for management* *IIT Kanpur 12 weeks*	
VI sem HSS course	Project management and finance 23CV6HSPMF 2 Credits		*Construction management* IIT KANPUR 8 weeks NPTEL	

AY 2026-27	Course details as per syllabus		MOOC course Equivalent	MOOC Course equivalent
III semester	Biology for Engineers 23CV3BSBFE 1 credit		*Biology for engineers and other non-biologists* IIT Madras 4 weeks	
V sem	Environmental studies 23CV5HSEVS 1 credit		*Environmental studies* Swayam DA Vishwavidyalaya, Indore 12 weeks	
VII SEM	Indian knowledge system 25MA7HSIKL 1 credit		*Indian knowledge system: concepts and applications in Engineering* 12 weeks IIMB, Chanakya University, Bangalore	
OPEN ELECTIVE VII sem	RS & GIS 23CV7OERSG 3 credits		*Remote sensing and GIS for rural development* IIT Bombay 12 weeks Or *Remote sensing essentials* IIT Roorkee 12 weeks	Geographic information system IIT Roorkee 12 weeks

AY 2026-27	Course as per syllabus		MOOC course Equivalent	MOOC Course equivalent
VIII sem	OSHA 23CV8OEOSH 3 credits		*Environmental occupational hazard* SWAYAM, 12 weeks	Any other relevant course covering occupational hazards of 12 weeks
VIII sem	Sustainability and life cycle assessment 23CV8OESLA 3 credits		*Strategies for sustainable design* IIT Hyderabad 12 weeks	

Shrekaravaagesh

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PG: PROGRAMME EDUCATIONAL OBJECTIVES(PEOs) – CCT

	Current	Revised
PEO 1	Pursue a proficient career in the dynamic sectors of the construction industry	Apply knowledge and skills for an efficient professional career in the construction sector.
PEO 2	Contribute in developmental works related to construction development	Demonstrate specialized knowledge to pursue career in academia and research.
PEO 3	Practice and promote green construction initiatives for the benefit of the society	Practice and Promote smart and sustainable construction technologies for societal needs.

PG: PROGRAMME EDUCATIONAL OBJECTIVES(PEOs) – ENV. ENGG

	Current	Revised
PEO 1	Possess the knowledge, attitude and skills needed for a professional career in the field of Environmental engineering and Management.	Apply knowledge and skills to develop effective solutions for complex challenges in the field of Environmental Engineering and Management.
PEO 2	Continue to advance career through higher education and professional development.	Advance career growth through higher education and continuous professional development.
PEO 3	Advocate environmental engineering for societal issues and sustainable development of society.	Demonstrate leadership and ethical responsibility in addressing societal issues for sustainable development.

PG: PROGRAMME EDUCATIONAL OBJECTIVES(PEOs) – CTM

	Current	Revised
PEO 1	Reveal essential knowledge and skills necessary for a professional career in Transportation Engineering and management.	Apply knowledge and skills for an efficient professional career in the Transportation sector.
PEO 2	Demonstrate the analytical, qualitative and interpretative abilities required for the effective leadership in their field.	Demonstrate specialized knowledge to pursue career in academia and research.
PEO 3	Exhibit the responsibility in a professional and ethical manner in their domain and continue career through lifelong learning to contribute to the societal needs.	Practice and Promote smart and sustainable technologies for societal needs.

****

Shreekanth Nagesh
25/2/26

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B.M.S. COLLEGE OF ENGINEERING, Bengaluru-19
(Autonomous Institute, Affiliated to VTU)

Board of Studies (BoS), Electrical Cluster

Proceedings of BoS meeting dated 24th Feb 2026

The Board of Studies (BoS) members of the Electrical cluster were informed about the recent curriculum changes, including college policies on implementing open elective courses, one- and two-credit courses in online mode, and the VIII semester internship offered through the VTU portal. This was taken up in continuation of the discussions held in the previous BoS meeting and the details regarding the implementation of higher-semester courses as per college-level policies were communicated to the BoS members via email, and their approval was sought.

Accordingly, the BoS members have approved the following points:

1. The 1-credit course "Universal Human Values" (4th semester UG) and the 2-credit course "Research Methodology and IPR (RMI)" (6th semester UG) are offered in online mode through the NPTEL/VTU portal.

2. The 3-credit Open Elective courses of 6th semester UG are offered in online mode through the NPTEL/VTU portal. The list of DAC-approved courses is enclosed (as per college decision).

3. The 3-credit Professional Elective courses of PG programs (Electronics, Digital Communication Engineering, and VLSI & Embedded Systems) are offered in online mode as per VTU guidelines.

4. The Internship course, PG III Semester (MINT 384 – 11 credits) is evaluated using a structured rubric by both the internal and external guides. The DAC-approved evaluation rubric and process are adhered to, while evaluating the internship.

5. The Research Methodology and IPR, and Non-Credit Mandatory (NCMC) courses for PG students admitted in 2025 are offered through the online VTU portal, in accordance with VTU guidelines.

6. The funded laboratories in the department have been approved as Centres of Excellence (CoE) in Electronics and Communication Engineering by the college and through the VTU internship portal. Students of 8th semester (6 credits) are undertaking internships under this CoE, supervised by the respective Project Investigators (New initiative at Department of ECE).

Additionally:

- Year-back students of the 2021 admitted batch will complete their 6th and 8th semester courses through NPTEL, similar to the 2022 admitted batch.
- UG students entering 3rd or 7th semester after a gap year due to vertical progression ineligibility will follow the curriculum and regulations prevailing at the time of rejoining, applicable to regular students of that semester.
- The Electrical Engineering Department has revised up to 20% of a course content in consensus with the CSE Department. The revised syllabus is enclosed for ratification.

The matters for ratification and the processes arrived at departmental academic committees (DAC) from the individual departments of the cluster are enclosed. DAC approved course list is enclosed of all five departments.

Dr. Veena N. Hegde

B.M.S. COLLEGE OF ENGINEERING, BENGALURU 560 019

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

LIST OF OPEN ELECTIVE COURSES OPTED BY VI SEMESTER STUDENTS

Sl No.	Course code	Course Title
1		Algorithmic Graph Theory and Data Structures
2		Artificial Intelligence: Knowledge Representation and Reasoning
3		Blockchain And Its Applications
4		Cryptography and Network Security
5		Digital Design with Verilog
6		Disaster Management
7		Discrete Time Signal Processing
8		Embedded Sensing, Actuation and Interfacing Systems
9		Embedded system design
10		Embedded systems
11		Entrepreneurship Essentials
12		Fundamental of Carbon Capture, Utilization and Storage
13		Health Economics
14		Healthcare Quality Management- Infection Control and Patient Safety
15		Human Computer Interaction (in English)
16		Introduction to Database systems
17		Principles of Management
18		Smart Cities
19		Smart Grid: Basics to Advanced Technologies

course equivalent to RMI - VI SEMESTER STUDENTS

Sl No.	Course code	Course Title
1		Research Methodology

Course equivalent to UHV- IV SEMESTER

Sl No.	Course code	Course Title
1		Ethics in Engineering Practices

Department of Electronics and Communication Engg. A.MOOC Course UG: OE details from the AY-2025-26	
Students Final List	**Registered**
Advanced Robotics	2
AI in Human Resource Management	7
ALGORITHMIC GRAPH THEORY AND DATA STRUCTURES	12
ARTIFICIAL INTELLIGENCE : KNOWLEDGE REPRSENTATION AND REASONING	7
Basic Overview of Semiconductor Device Processing & IC Fabrication	16
Blockchain and its applications	2
Business Development: From Start to Scale	5
Business fundamentals for entrepreneurs	1
Climate Hazards and Disaster Mitigation	1
Climate Risk, Adaptation and Sustainable Development	1
Cloud Computing	6
Computer vision and image processing-fundamentals and applications	6
Cryptography and Network Security	1
Data Analytics with Python	4
Deep learning	3
Diaster managment	2
Digital VLSI testing	3
Disaster Management	8
Education for Sustainable Development	3
Embedded sensing, Actuation and Interfacing Systems	38
Embedded Systems Design	1
ENTREPRENEURSHIP ESSENTIALS	4
EV - Vehicle Dynamics and Electric Motor Drives	2
Forensic Linguistics	1
FOUNDATION OF DEEP LEARNING	2
Foundations of Cryptography	1
Foundations of Deep Learning: Concepts and Applications	1
Fundamental of Carbon Capture,Utilization and Storage	3
Fundamental of Power Electronics	1
Fundamentals of automotive systems	1
Fuzzy sets , Logic and systems & Application	2

GPU ARCHITECTURES AND PROGRAMMING	9
GPU DESIGN	2
Healthcare Quality Management-Infection Control and Patient Safety	14
Human Computer Interaction, Artificial Intelligence: Knowledge Representation and Reasoning	2
Human computer intraction	43
Industry 4.0 and Introduction to IOT	1
Innovavation in Marketing and Marketing of Innovation	1
Integrated Circuits, Mosfets, OP-Amps and their Applications	2
introduction to cybersecurity	2
introduction to databases System	33
introduction to DBMS	1
Introduction To Internet Of Things	19
Introduction to Large Language Models (LLMs)	5
Introduction to Machine Learning	6
Measurement and Instrumentation	2
Memory Device Technology for AI/ML Computing	1
Microprocessors and Microcontrollers	1
Network Security	2
Optical Wireless Communications for Beyond 5G Networks and IoT	1
Principles of management	2
Problem solving through programming in C	5
Programing in Java	1
Quantum Technology and Quantum Phenomena In Macroscopic Systems	1
Remote Sensing and GIS for Rural Development	4
Renewable Energy Engineering:Solar, Wind and Biomass Energy Systems	4
Robotics: basics and selected advanced concepts	7
Smart cities	1
Solar, Wind and Biomass Energy Systems	1
Strategies for Sustainable Design	1
Strategies of Sustainable Develoment	2

B.MOOC Courses PG(3rd Semester): Professional Electives:

Details from the AY-2025-26

Course Code	COURSE TITLE
MECE3ELA	VLSI design Flow : RTL to GDS
MECE3ELB	Fundamentals of Micro and Nano Fabrication
MECE3ELC	Cryogenic Electronics for Quantum Computing
MECE3ELD	C-Based VLSI Design
MECE3ELE	Microelectronics: Devices To Circuits
MECE3ELF	Multicore Computer Architecture
MECE3ELG	Physics Nanoscale Devices
MECE3ELH	Semiconductor device modelling and simulation
MECE3ELI	Digital Circuits
MECE3ELJ	Digital Image Processing
MECE3ELK	Introduction to wireless and cellular communication
MECE3ELL	power system protection

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SNo	Name of the MOOC Platform	Name of the Course	Course Instructor	Name of the University/College	Course Duration
6th Semester					
1	NPTEL	Healthcare Quality Management- Infection Control and Patient Safety	Prof. Dhananjay D Mankar	Tata Institute of Social Sciences, Mumbai	12 weeks
2	NPTEL	Safety and Risk Analytics	Prof. Jhareswar Maiti	IIT Kharagpur	12 weeks
7th Semester					
1	NPTEL	Health Economics	Prof. Pratap C. Mohanty	IIT Roorkee	12 weeks
2	NPTEL	Entrepreneurship Essentials	Prof. Manoj Kumar Mondal	IIT Kharagpur	12 weeks
8th Semester					
1	NPTEL	Innovation in Marketing and Marketing of Innovation	Prof. Vinay Sharma	IIT Roorkee	12 weeks
2	NPTEL	Financial Statement Analysis and Reporting	Prof. Anil K. Sharma	IIT Roorkee	12 weeks

		BMS COLLEGE OF ENGINEERING, BENGALURU-19	Open Electives	EIE department	BMSCE						
		Autonomous Institute, Affiliated to VTU									
	SL no	EIE course	semester	No of credits (EIE-Syllabus)	NPTEL/Swayam Course	course instructor	Institute	no of weeks (NPTEL /Swayam)	Links	Start Date	End Date
	1	Carbon Initiative for Climate, 23EI6OE1CI	VI	3	Fundamental of Carbon Capture, Utilization and Storage	Prof. Archana	IIT(ISM) Dhanbad	12	Fundamental of Carbon Capture, Utilization and Storage - Course (nptel.ac.in)	19 Jan 26	10 Apr 26
	2	Fundamentals of HDL, 23EI6OE1HD	VI	3	Digital Design with Verilog	By Prof. Chandan Karfa, Prof. Aryabartta Sahu	IIT Guwahati	12	Digital Design with Verilog - Course (nptel.ac.in)	19 Jan 26	10 Apr 26
	3	Food and Agriculture Instrumentation,23EI7OE2FA	VII	3	Novel Technologies For Food Processing And Shelf Life Extension	Prof. Hari Niwas Mishra	IIT Kharagpur	12	Novel Technologies For Food Processing And Shelf Life Extension - Course (nptel.ac.in)	19 Jan 26	10 Apr 26
	4	MEMS Technology, 23EI7OE2MT	VII	3	Sensors and Actuators	Prof. Hardik Jeetendra Pandya	IISc Bangalore	12	Sensors and Actuators - Course (nptel.ac.in)	19 Jan 26	10 Apr 26
	5	Automotive Electronics , 23EI8OE3AE	VIII	3	Fundamentals of Automotive Systems	Prof. C. S. Shankar Ram	IIT Madras	12	Fundamentals of Automotive Systems - Course (nptel.ac.in)	19 Jan 26	10 Apr 26
	6	Instrumentation for Connected Cities, 23EI8OE3IS	VIII	3	Smart Cities	Prof. Neelima Satyam, Prof. Priyansh Singh	IIT Indore	12	Smart Cities - Course (nptel.ac.in)	19 Jan 26	10 Apr 26
	7	Smart Sensors technologies for IoT, 23EI8OE3ST	VIII	3	Introduction To Internet Of Things	Prof. Sudip Misra	IIT Kharagpur	12	Introduction To Internet Of Things - Course (nptel.ac.in)	19 Jan 26	10 Apr 26

MEDICAL ELECTRONCIS ENGINEERING						
SNo	**Name of the MOOC Platform**	**Name of the Course**	**Course Instructor**	**Name of the University/College**	**Course Duration**	**Link**
6th Semester						
1	NPTEL	Biomechanics -6	Prof. Varadhan SKM	IIT Madras	12 weeks	https://onlinecourses.nptel.ac.in/noc26_bt35/preview https://onlinecourses.nptel.ac.in/noc25_bt08/preview https://nptel.ac.in/courses/102106098
2	NPTEL	Human Computer Interaction (in English) - 6	Prof. Rajiv Ratn Shah	IIIT Delhi	12 weeks	https://onlinecourses.nptel.ac.in/noc26_cs70/preview https://onlinecourses.nptel.ac.in/noc25_cs38/preview https://nptel.ac.in/courses/106106575
7th Semester						
1	NPTEL	Healthcare Entrepreneurship - 7	Prof. Arnab Chanda	IIT Delhi	12 weeks	https://onlinecourses.swayam2.ac.in/ntr26_ed68/preview https://nptel.ac.in/courses/102102817
2	NPTEL	Foundations of Deep Learning: Concepts and Applications -7	Prof. Sriram Ganapathy Prof. Ashwini Kodipalli Prof. Baishali Garai	IISc Bangalore RV University	12 weeks	https://onlinecourses.nptel.ac.in/noc26_cs01/preview https://nptel.ac.in/courses/106108840
8th Semester						
1	NPTEL	Introduction to Industry 4.0 and Industrial Internet of Things -8	Prof. Sudip Misra	IIT Kharagpur	12 weeks	https://onlinecourses.nptel.ac.in/noc26_cs38/preview https://onlinecourses.nptel.ac.in/noc25_cs146/preview https://nptel.ac.in/courses/106105195

BMS COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
Internship Evaluation Process

Meeting of the Department Academic Committee

As per the discussion in DAC meeting, it is decided that the Evaluation Procedure for 8th semester INTERSHIP is as follows:

Continuous Internal Evaluation:

- In a semester two reviews will be conducted for CIE and the sum of the two CIE assessment will be considered for total allotment of the internal marks
- The review assessment will be carried out as per rubrics formulated.
- Review-1 will be conducted for 20 marks and Review -2 will be conducted for 30 marks.

Semester End Examination:

- Semester end examination will be conducted with the help of an internal and External examiner.

  Both CIE and SEE will include the marks split-up as below:

  Criteria1- VTU internship diary entry -10 M
  Criteria 2 – Report submission about the internship carried out -10 M
  Criteria 3 – Presentation -20 M
  Criteria 4 – Question & Answer – 10M

DAC Committee Members

1. Dr. K Padmavathi
2. Dr. Venkatesh Boddapati
3. Dr. Prakash D B

BMS COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)
ELECTRONICS AND INSTRUMNTATION ENGINEERING
Internship Evaluation Process

Meeting of the Department Academic Committee

The DAC meeting of the Department of Electronics and Instrumentation Engineering conducted on 23/02/2026. As per the discussion in DAC meeting, it is decided that the Evaluation Procedure for 8th semester INTERSHIP is follows

Continuous Internal Evaluation:

- In a semester two reviews will be conducted for CIE and the sum of the two CIE assessment will be considered for total allotment of the internal marks
- The review assessment will be carried out as per rubrics formulated.
- Review-1 will be conducted for 20 marks and Review -2 will be conducted for 30 marks.

Semester End Examination:

- Semester end examination will be conducted with the help of an internal and External examiner.

Both CIE and SEE will include the marks split-up as below:

Criteria1- VTU internship diary entry -10 M
Criteria2 – Report submission about the internship carried out -10 M
Criteria3 – Presentation -20 M
Criteria 4 – Question & Answer – 10M

DAC Committee Member

1. Dr S Kumuda
2. Prof Kumar D

BMS COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU
DEPARTMENT OF MEDICAL ELECTRONICS ENGINEERING

Date: 23/02/2026

Meeting of the Department Academic Committee

The DAC meeting of the Department of Medical Electronics Engineering conducted on 23/02/2026. As per the discussion in DAC meeting, it is decided that the Evaluation Procedure for 6th semester INTERSHIP is follows

Continuous Internal Evaluation

2-CIE will be conducted and the CIE will be evaluated for 50 Marks which is the cumulative marks scored by the student in 2- CIES. CIE will be evaluated with internal committee

Semester End Examination:

and 1-SEE will be conducted and the CIE will be evaluated for 50 Marks. SEE will be conducted along with 1- Internal Examiner and 1- External examiner with the approval of Controller of Examination

Both CIE and SEE will include the marks split-up as below

Criteria1- VTU internship diary entry -10 M

Criteria2 – report submission about the internship carried out -10 M

Criteria3 – Presentation -20 M

Criteria 4 – Question & Answer – 10M

DAC Committee Member

1. Dr. K. Vijayalakshmi – Vijayalakshmi 23/2/26
2. Dr. Joshi Manisha S

23/2/26

Head of the Department
Dr. R. JAYAGUWRI
Professor & Head
Dept. of Medical Electronics Engineering
BMS COLLEGE OF ENGINEERING
Bengaluru-560019, Karnataka, India

BOARD OF STUDIES * CHAIR PERSON * B.M.S. COLLEGE OF ENGG. BENGALURU

Course Title: Data Base Management Systems **Course Code: 23EE6PE2DB**
Credits: 03

DBMS 23EE6PE2DB

Dear Members,

The original syllabus was quite extensive and includes topics that are more suitable for core Computer Science students. Since this course is being handled for Electrical Engineering students, I have made a few minor adjustments to improve the learning flow and ensure better understanding without changing the core intent of the subject.

The main changes are:

1. Reordered the modules so that students first learn database fundamentals and ER modeling (design concepts), and then move to SQL. This helps them understand how a database is designed before learning how to write queries.
2. RemovedRelational Algebra.
   While it is important in depth for CS students, it is less essential for Electrical students compared to practical database usage, schema design, and SQL.
3. Removed ARIES Recovery Algorithm.
   The existing syllabus is already dense, and ARIES is a detailed recovery topic that may add extra complexity for this audience. Core transaction processing and concurrency control concepts are still retained.

These modifications are only for better delivery and student understanding, and the overall change is within the permissible limit (less than 20%). The course still covers all important DBMS fundamentals, SQL, normalization, transaction concepts, and modern database topics like NoSQL and vector databases.

The subject expert Dr. Manjunath, Dept of CS and Cybersecurity and the course handling faculty Dr. S Pradeepa have made these changes to ensure the syllabus is more balanced, practical, and appropriate for Electrical students while maintaining academic rigor.

- **By R.S Geetha, HoD EEE**

PRE-REQUISITES: C Programming

Course Objectives: The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

MODULE – 1

Introduction to Databases: Introduction, An Example, Characteristics of Database approach, Advantages of using DBMS approach, When not to use a DBMS. Database System Concepts and Architecture: Data models, Schemas and instances, Three schema architecture.

Data Modelling using the Entity-Relationship(ER) model: Using High-Level conceptual Data Models for Database Design, A sample Database Application, Entity types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity types, Refining the ER Design, ER Diagrams, Relational Database Design using ER-to-Relational Mapping. **08 Hrs**

MODULE – 2

SQL: SQL Data Definition and Data Types specifying basic constraints in SQL, Schema Change Statement in SQL, Basic retrieval queries in SQL, Insert, Delete and Update statements in SQL, Additional features of SQL, More complex SQL Queries, Views (Virtual Tables) in SQL, Triggers and Stored Procedures. 8 hrs

MODULE – 3

Database Design Theory and Normalization: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multi-valued Dependencies and a Fourth Normal Form, Join Dependencies, Fifth Normal Form. **08 Hrs**

MODULE – 4

Transaction Processing, Concurrency Control: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Two Phase Locking Techniques for Concurrency Control. **08 Hrs**

MODULE – 5

NoSQL: An overview of NoSQL, Characteristics of NoSQL, NoSQL storage types, Advantages and Drawbacks of NoSQL, Case Study: Application definition, Requirement Analysis, Implementation using MongoDB, Database Queries, Writing Queries.

Vector database: Introduction, Vector Index, Working of Vector database. **08 Hrs**

TEXT BOOKS:

1. Fundamental of Database Systems, Ramez Elmasri and Shamkant B Navathe, 6 th Pearson, 2017

2. Getting Started with NoSQL Gaurav Vaish, PACKT, 2013

3. Vector Database, RoieSchwaber-Cohen, Pinecone, https://www.pi necone.io/learn

/vectordatabase/ 2023

Reference books:

1. Database Management Systems, Ramakrishnan and Gehrke, 3rd McGraw Hill, 2014.

2. Database Systems: The Complete Book Hector Garcia Molina,Jeffrey D. Ullman, Jennifer Widom,

2nd Pearson Education, 2001

3. Database System Concepts Abraham Silberschatz, Henry F. Korth, S. Sudarshan 6th Tata

McGrawHill, 2010

E-learning:

1. Data Base Management System NPTEL 2019 https://onlinecourses.nptel.ac.in/noc19_cs12/preview

2. Data Base Management System SWAYAM 2017 https://swayam.gov.in/course/220-database-management-system

3. SQL tutorial W3 schools -- www.w3schools.com/sql/

Course outcomes (Course Skill Set): At the end of the course the student will be able to

CO1 :Apply the concepts of database management system for various applications.

CO2 :Analyse database concepts for a given problem.

CO3 :Design SQL queries and conceptual data models for database applications.

CO4: Demonstrate SQL commands to create, manipulate and query data in a database.

B.M.S. College of Engineering, Bengaluru
(Autonomous Institute affiliated to VTU)
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Approval for Modified PEOs of MTech Power Electronics programme

The Program Educational Objectives (PEOs) of MTech Power Electronics programme are required to be modified as the present statements were formulated almost a decade ago. The statements were reframed after discussions held in the department meeting with the faculty members. It was approved by the internal BoS members and mailed to the external BoS, DAB members and stake holders for their review and suggestions. They have reviewed the modified PEOs and approved the same.

The approved statements are as follows:

1. Empower to excel professionally in Power Electronics and allied domains
2. Facilitate research & development and entrepreneurial skills that address technological requirements of industries and institutes of higher learning
3. Adapt to sustainable development goals for changing needs of industry/society through lifelong learning

HoD, EEE

BoS Chair

Dr. GEETHA
Professor & HOD
Dept. of Electrical Electronics Engg.
B.M.S. College of Engineering
Bengaluru - 560 019.

M. Tech : POWER - Electronics.

Program Educational Objectives Revised :

1. Empower to excel professionally in power Electronics and allied domains
2. Facilitate research & development and entrepreneurial skills that address technological requirements of industries and institutes of higher learning
3. Adopt to sustainable development goals for changing needs of industry/society through lifelong learning

Internal B.O.S :—

1) Dr. C. Lakminaya. 20/2

2) Dr. Usha. A → 25/02/26

To
The Dean (Academics)
BMS College of Engineering
Bengaluru

Subject: Conduct of Board of Studies (BOS) Cluster Meeting and Approval of Curriculum Changes

Respected Sir/Madam,

This is to submit that the **Board of Studies (BOS) – Cluster (Internal members) meeting** was conducted in **the Department** on 16/01/2026. Owing to the short notice, the external BOS members could not attend the meeting. Therefore, the minutes of the meeting were shared with them through email for their consideration and formal approval of the proposed curriculum revisions for the academic year 2025–26.

After the meeting, the **minutes of the meeting** along with the revised curriculum were circulated to all BOS members via email for confirmation. The **approval and acceptance of the proposed changes** were received from the members through **email notifications**, which may be treated as formal consent.

We hereby submit the **agenda, minutes of the meeting, list of NPTEL courses approved by BOS members and email approvals from BOS members** for your kind perusal and approval. We kindly request you to accord approval for implementing the revised curriculum from the forthcoming academic session.

Thanking you.

Yours sincerely,

21/02/26

Chairperson
Board of Studies (BOS) – Cluster
Department of AI & DS, CSE(DS), CSE(IoT)
BMS College of Engineering

Head of the Department
Dept. of Artificial Intelligence & Data Science
B.M.S.College of Engineering
BENGALURU - 560019

BMS COLLEGE OF ENGINEERING, BENGALURU-560 019

(Autonomous Institute under VTU, Belagavi)

Department of AI &DS, CSE (Data Science), CSE (IOT)

Date: 16/01/2026

Agenda

1. Introducing 6th semester Open Electives through NPTEL platform
2. Introducing 4th semester UHV course through NPTEL platform
3. Addition of Professional Electives for 7th semester - AI & DS department
4. Any other matter with the permission of the chair

Minutes of Meeting

1. The 6th semester open electives were decided to be offered through NPTEL platform as per mail from Dean Academics (dated: 09/01/2026). Students were allowed to choose a NPTEL course from the basket of electives that was offered by the Institution. The list is attached.
2. The 4th semester Universal Human Value (UHV) Course was also decided to be offered through NPTEL platform as per mail from Dean Academics (dated: 09/01/2026). Students were asked to register for the course Ethics in Engineering practice in NPTEL as a substitute to UHV course.
3. The DAC committee of the Department of AI & DS had proposed to add few more electives as professional electives through NPTEL platform. The same has been decided by BoS to offer the electives for 7th sem.
   The details are listed below.

   1. Human Computer Interaction - 23DC7PENP7
   2. Industry 4.0 - Managing the digital transformation - 23DC7PENP8

Members present

1. Dr. Indiramma M - BOS Chairperson, Prof & Head (AI&DS, BMSCE)

2. Dr. Prasad G R - Prof & Head (CSE-ICB, BMSCE)

3. Dr.Shambhavi B.R. - Prof & Head (CSE-DS, BMSCE)

4. Dr. Shruthi K.R. - Assistant Prof (AI&DS, BMSCE)

5. Mrs. Krupa K.S. - Assistant Prof (CSE-ICB, BMSCE)

6. Mr. Manoj Kumar S. - Assistant Prof (CSE-DS, BMSCE)

APPROVED LIST OF MOOC COURSES BY BOS MEMBERS						
SNo	**Name of the MOOC Platform**	**Name of the Course**	**Course Instructor**	**Name of the University/College**	**Course Duration**	**Link**
4th semester						
1	SWAYAM	Ethics In Engineering Practice	Prof. Susmita Mukhopadhyay	IIT Kharagpur	8 weeks	https://onlinecourses.nptel.ac.in/noc22_ma54/preview
6th semester						
COMPUTER SCIENCE DATA SCIENCE & ARTIFICIAL INTELLIGENCE DATA SCIENCE						
SNo	**Name of the MOOC Platform**	**Name of the Course**	**Course Instructor**	**Name of the University/College**	**Course Duration**	**Link**
6th Semester						
1	NPTEL	Introduction to Database Systems	Prof. Sreenivasa Kumar	IIT Madras	12 weeks	https://onlinecourses.nptel.ac.in/noc20_cs03/preview
7th Semester						
1	NPTEL	Data Analytics with Python	Prof. A Ramesh	IIT Roorkee	12 weeks	https://onlinecourses.nptel.ac.in/noc21_cs45/preview
8th Semester						
1	NPTEL	Software Testing	Prof. Meenakshi D'Souza	IIIT Bangalore	12 weeks	https://onlinecourses.nptel.ac.in/noc22_cs61/preview
COMPUTER SCIENCE AND IOT						
SNo	**Name of the MOOC Platform**	**Name of the Course**	**Course Instructor**	**Name of the University/College**	**Course Duration**	**Link**
6th Semester						
1	NPTEL	Foundations of Cryptography, IIIT Bangalore	Prof. Ashish Choudhury	IISc Bangalore	12 weeks	https://onlinecourses.nptel.ac.in/noc26_cs18/preview
2	NPTEL	Secure Computation: Part I	Prof. Ashish Choudhury	IISc Bangalore	12 weeks	https://onlinecourses.nptel.ac.in/noc26_cs17/preview
3	NPTEL	Embedded Systems Design	Prof. Anupam Basu	IIT Kharagpur	12 weeks	https://onlinecourses.nptel.ac.in/noc26_cs54/preview
7th Semester						
1	NPTEL	Cyber Security and Privacy	Prof. Saji K Mathew	IIT Madras	12 weeks	https://onlinecourses.nptel.ac.in/noc25_cs116/preview
2	NPTEL	Ethical Hacking	Prof. Indranil Sengupta	IIT Kharagpur	12 weeks	https://onlinecourses.nptel.ac.in/noc25_cs142/preview
8th Semester						
1	NPTEL	Network Security	Prof. Gaurav S. Kasbekar	IIT Bombay	12 weeks	https://onlinecourses.nptel.ac.in/noc26_ee20/preview
2	NPTEL	Blockchain and its Applications	Prof. Sandip Chakraborty Prof. Shamik Sural	IIT Kharagpur	12 weeks	https://onlinecourses.nptel.ac.in/noc26_cs34/preview

Head of the Department
Dept. of Artificial Intelligence & Data Science
B.M.S.College of Engineering
BENGALURU - 560019

BMSCE

HOD ADS <hod.ads@bmsce.ac.in>

Curriculum Revision – Introduction of NPTEL Open Electives and Additions to 7th Semester Courses

7 messages

HOD ADS <hod.ads@bmsce.ac.in> Sat, Feb 21, 2026 at 5:24 PM
To: Jaya Sreevalsan Nair <jnair@iiitb.ac.in>, "jayashree r. r" <jayashree@pes.edu>, ramakanthkp@rvce.edu.in, Vinay Prashanth <Vinayp0608@gmail.com>, aruna.a.r@sap.com, Preyaansh Patel <preyaansh.patel@gmail.com>, Ashwin Geet D'Sa <ashwindsa@tutanota.com>
Cc: HOD CDS <hod.cds@bmsce.ac.in>, HOD CSI <hod.csi@bmsce.ac.in>, Manoj Kumar <manojkumar.cds@bmsce.ac.in>, Shruthi K R <shruthikr.ads@bmsce.ac.in>, Krupa K S <krupaks.csi@bmsce.ac.in>

Dear Board of Studies members,

Greetings.

This is to formally inform you that the Data science cluster departments have discussed and approved certain revisions to the curriculum in alignment with academic flexibility, interdisciplinary learning, and value-based education objectives.

The following changes are being introduced:

1. **Introduction of Open Elective Courses through NPTEL**
   Open Elective courses will now be offered through the NPTEL platform. This initiative is intended to provide students with access to high-quality courses from premier institutions, promote interdisciplinary learning, and enhance academic flexibility.

2. **Introduction of HSS Course – Universal Human Values (NPTEL)**
   The HSS course titled *Universal Human Values* will be offered through NPTEL. The course aims to inculcate ethical values, social responsibility, and holistic thinking among students, thereby complementing their technical education.

3. **Additions to 7th Semester NPTEL Course Offerings only for AI & DS department**
   A few additional NPTEL courses have been included in the 7th semester basket to widen the academic choices available to students and align with emerging industry and research trends. List of courses are as follows:

   1. Human Computer Interaction - 23DC7PENP7

   2. Industry 4.0 - Managing the digital transformation - 23DC7PENP8

These revisions will be implemented from the upcoming academic session and will be reflected in the updated scheme and syllabus.

The esteemed members of the Board of Studies are kindly requested to take note of these changes. We welcome any suggestions or recommendations for further improvement.

The list of NPTEL courses is specified in the attached file.

Please reply as approved.

Thank you for your continued guidance and support.

List of MOOC Courses.xlsx
34K

Jaya Sreevalsan Nair <jnair@iiitb.ac.in>
Sat, Feb 21, 2026 at 11:18 PM
To: HOD ADS <hod.ads@bmsce.ac.in>, "jayashree r. r" <jayashree@pes.edu>, "ramakanthkp@rvce.edu.in" <ramakanthkp@rvce.edu.in>, Vinay Prashanth <Vinayp0608@gmail.com>, "aruna.a.r@sap.com" <aruna.a.r@sap.com>, Preyaansh Patel <preyaansh.patel@gmail.com>, Ashwin Geet D'Sa <ashwindsa@tutanota.com>
Cc: HOD CDS <hod.cds@bmsce.ac.in>, HOD CSI <hod.csi@bmsce.ac.in>, Manoj Kumar <manojkumar.cds@bmsce.ac.in>, Shruthi K R <shruthikr.ads@bmsce.ac.in>, Krupa K S <krupaks.csi@bmsce.ac.in>

Dear HOD-ADS Ma'am,

I approve of the changes.
Only a minor correction needed in the Excel Sheet (in both sheets) - Prof Ashish Choudhury is with IIIT Bangalore and not IISc Bangalore.
Thank you.

Regards,
Jaya

-

Jaya Sreevalsan Nair, Ph.D.
Research Affiliations: Graphics-Visualization-Computing Lab | E-Health Research Centre
Current: Professor, IIIT Bangalore (IIIT-B), India | Ph: +91-80-41407777
Public Profile: CV | LinkedIn | DBLP | Publication-List

From: HOD ADS <hod.ads@bmsce.ac.in>
Sent: Saturday, February 21, 2026 5:24 PM
To: Jaya Sreevalsan Nair <jnair@iiitb.ac.in>; jayashree r. r <jayashree@pes.edu>; ramakanthkp@rvce.edu.in <ramakanthkp@rvce.edu.in>; Vinay Prashanth <Vinayp0608@gmail.com>; aruna.a.r@sap.com <aruna.a.r@sap.com>; Preyaansh Patel <preyaansh.patel@gmail.com>; Ashwin Geet D'Sa <ashwindsa@tutanota.com>

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Cc: HOD CDS <hod.cds@bmsce.ac.in>; HOD CSI <hod.csi@bmsce.ac.in>; Manoj Kumar <manojkumar.cds@bmsce.ac.in>; Shruthi K R <shruthikr.ads@bmsce.ac.in>; Krupa K S <krupaks.csi@bmsce.ac.in>
Subject: Curriculum Revision – Introduction of NPTEL Open Electives and Additions to 7th Semester Courses

[Quoted text hidden]

---

jayashree r. r <jayashree@pes.edu>
To: HOD ADS <hod.ads@bmsce.ac.in>
Sun, Feb 22, 2026 at 1:15 PM
Cc: Jaya Sreevalsan Nair <jnair@iiitb.ac.in>, "Ramakanth Kumar P." <ramakanthkp@rvce.edu.in>, Vinay Prashanth <Vinayp0608@gmail.com>, aruna.a.r@sap.com, Preyaansh Patel <preyaansh.patel@gmail.com>, Ashwin Geet D'Sa <ashwindsa@tutanota.com>, HOD CDS <hod.cds@bmsce.ac.in>, HOD CSI <hod.csi@bmsce.ac.in>, Manoj Kumar <manojkumar.cds@bmsce.ac.in>, Shruthi K R <shruthikr.ads@bmsce.ac.in>, Krupa K S <krupaks.csi@bmsce.ac.in>

Dear HOD,

I approve the same,

Dr Jayashree R, B.E(CSE),M.Tech(CSE),Ph.D(CSE)
Professor and Chairperson,
Department of CSE(AI & ML),
PES University, Ring Road Campus
100 ft Ring Road, BSK III Stage,
Bangalore - 560 085, Karnataka, India
Phone: +91-80-2672 1983 / 2672 2108 Extn:579
Fax: +91-80-2672 0886
+91-9845897074
[Quoted text hidden]

Preyaansh Patel <preyaansh.patel@gmail.com>
To: HOD ADS <hod.ads@bmsce.ac.in>
Sun, Feb 22, 2026 at 1:33 PM

Hello HoD Ma'am,

Noted and approved.

Thanks,
Preyaansh
[Quoted text hidden]

A R, Aruna <aruna.a.r@sap.com>
To: HOD ADS <hod.ads@bmsce.ac.in>
Mon, Feb 23, 2026 at 10:13 AM

Dear sir / madam,

Approved

B.M.S. COLLEGE OF ENGINEERING, BENGALURU
Autonomous Institute, Affiliated to VTU
Department of Chemical Engineering & Biotechnology

Minutes of Meeting

Board of Studies – Chemical Cluster

Agenda: Approval of MOOC Course List for 2023-2024 and 2024-2025 Batch students.

The Board of Studies (BOS)- Chemical Cluster meeting on 24.02.2026. Due to shortage of time and the AC meeting scheduled on 28.02.2026 the approval for the MOOC course List were sent via email to all the members for approval.

BOS Members

Name	Designation	Description
Dr. Chetan A Nayak	Professor & Head of Department of Chemical Engineering, BMSCE, Bengaluru	Chairperson
Dr. Saisha Vinjamuri	Professor & Head of Department of Biotechnology, BMSCE, Bengaluru	Convener
Dr. Vidya Shetty K.	Professor (HAG), Department of Chemical Engineering, NITK Surathkal, Mangaluru.	Expert Member, VTU Nomination
Dr. Ranganath D.	Professor, Department of Chemical Engineering, RVCE.	Member
Dr. Nagendra H.G.	Retired Professor, Department of Biotechnology, Sir MVIT, Bengaluru	Member
Dr. Samita Maitra	Professor, Dept. of Chemical Engineering, BMSCE, Bengaluru	Member
Dr. Savithri Bhat	Professor, Department of Biotechnology, BMSCE, Bengaluru	Member
Dr. Mahesh Kumar	Lead Scientist, Syngene International Ltd., Bengaluru	Member
Mr. Hitesh G Chakrapani	Senior Research Executive, Hindustan Uniliver Limited, Bengaluru	Member
Mr. Sanjay Venugopal	Senior Technologist, Yokogowa India Ltd., Bengaluru	Member
Mr. Ashok Kumar S	Assistant Professor, Department of Biotechnology, BMSCE, Bengaluru	Member
Dr. Sainath K	Associate Professor, Dept. of Chemical Engineering, BMSCE, Bengaluru	Member
Dr. Shivakumar R.	Associate Professor, Dept. of Chemical Engineering, BMSCE, Bengaluru	Invitee
Mr. Pradeep S.	Assistant Professor, Department of Biotechnology, BMSCE, Bengaluru	Invitee

The BoS Chairperson & Convener conveyed to the BOS members for the approval of the following list of MOOC courses for 2023-2024 Batch and 2024-2025 Batch students. The list is as below.

B.M.S. COLLEGE OF ENGINEERING, BENGALURU
Autonomous Institute, Affiliated to VTU
Department of Chemical Engineering & Biotechnology

LIST OF MOOC COURSES (Common to all Branches)						
SNo	**Name of the MOOC Platform**	**Name of the Course**	**Course Instructor**	**Name of the University/College**	**Course Duration**	**Link**
AEC/HSS COMMON MOOC COURSES FOR ALL THE PROGRAMS						
1	SWAYAM	Indian Knowledge System: Concepts and Applications in Engineering	Prof. B. Mahadevan, Dr. Vinayak Rajat Bhat, Dr. R Venkata Raghavan	IIMB, Chanakya University, Bangalore	12 weeks	https://onlinecourses.swayam2.ac.in/imb26_mg12/preview
2	NPTEL	Research Methodology	Prof. Edamana Prasad & Prof. Prathap Haridoss	IIT Madras	8 weeks	https://onlinecourses.nptel.ac.in/noc26_ge43/preview
3	SWAYAM	Ethics In Engineering Practice	Prof. Susmita Mukhopadhyay	IIT Kharagpur	8 weeks	https://onlinecourses.nptel.ac.in/noc22_mg54/preview
4	SWAYAM	Environmental studies	Dr Monica Jain	Devi Ahilya viswavidyalaya , Indore	12 weeks	https://onlinecourses.swayam2.ac.in/cec26_es01/preview
5	SWAYAM	Biology for engineers and other non-biologists	Prof. G.K. Suraishkumar & Prof. Madhulika Dixit, IIT Madras	IIT Madras	04 Week	https://onlinecourses.nptel.ac.in/noc19_ge31/preview

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B.M.S. COLLEGE OF ENGINEERING, BENGALURU
Autonomous Institute, Affiliated to VTU
Department of Chemical Engineering & Biotechnology

BIOTECHNOLOGY						
SNo	**Name of the MOOC Platform**	**Name of the Course**	**Course Instructor**	**Name of the University/College**	**Course Duration**	**Link**
4th Semester (AEC/HSS)						
1	SWAYAM - NPTEL	Bioengineering: An Interface with Biology and Medicine	Prof. Sanjeeva Srivastava	IIT Bombay	8WEEKS	https://onlinecourses.nptel.ac.in/noc20_bt09/preview
6th Semester (AEC/HSS)						
1	SWAYAM - NPTEL	Project Management	Prof. Ramesh Anbanandam	IIT Roorkee	8WEEKS	https://onlinecourses.nptel.ac.in/noc24_mg01/preview
6th Semester						
1	SWAYAM - NPTEL	Introduction to complex biological systems	Prof. Soumya De, Prof. DIBYENDU SAMANTA	IIT Kharagpur,	12 weeks	https://onlinecourses.nptel.ac.in/noc25_bt25/preview
2	SWAYAM - NPTEL	Biomechanics	Prof. Vardhan	IIT Madras	12 weeks	https://onlinecourses.nptel.ac.in/noc26_bt35/preview
3	SWAYAM - NPTEL	Basics of Crop Breeding and Plant Biotechnology	Prof. Joydeep Banerjee	IIT Kharagpur,	12 weeks	https://onlinecourses.nptel.ac.in/noc26_ag07/preview
7th Semester						
1	SWAYAM - NPTEL	Computational Systems Biology	Prof. Karthik Raman	IIT Madras	12 weeks	https://onlinecourses.nptel.ac.in/noc22_bt03/preview
2	SWAYAM - NPTEL	Microsensors , Implantable devices and	Prof. Hardik Jeetendra Pandya, Prof. Shabari Girishan K V	IISc Bangalore, Ramaiah University of	12 weeks	https://onlinecourses.nptel.ac.in/noc24_bt37/preview

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		rodent surgeries for biomedical applications		Applied Sciences (RUAS)		
3	SWAYAM - NPTEL	Conservation Economics	Prof. Ankur Awadhiya	IIT Kanpur	12 weeks	https://onlinecourses.nptel.ac.in/noc21_bt21/preview
4	SWAYAM - NPTEL	Biointerface Engineering	Prof. Lalit M. Pandey	IIT Guwahati	8 WEEKS	https://onlinecourses.nptel.ac.in/noc21_bt12/preview
8th Semester						
1	SWAYAM - NPTEL	Interactomics : Basics & applications	Prof. Sanjeeva Srivastava	IIT Bombay	12 weeks	https://onlinecourses.nptel.ac.in/noc20_bt02/preview
2	SWAYAM - NPTEL	RNA Biology	Prof. Rajesh Ramachandran	IISER Mohali	12 weeks	https://onlinecourses.nptel.ac.in/noc23_bt03/preview
3	SWAYAM - NPTEL	Forests and their Management	Prof. Ankur Awadhiya	IIT Kanpur	12 weeks	https://onlinecourses.nptel.ac.in/noc24_bt23/preview

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B.M.S. COLLEGE OF ENGINEERING, BENGALURU
Autonomous Institute, Affiliated to VTU
Department of Chemical Engineering & Biotechnology

CHEMICAL ENGINEERING						
SNo	**Name of the MOOC Platform**	**Name of the Course**	**Course Instructor**	**Name of the University/ College**	**Course Duration**	**Link**
6th Semester						
1	SWAYAM	Characterization of Polymers, Elastomers and Composites	Prof. Santanu Chattopadhyay	IIT Kharagpur	12 weeks	https://onlinecourses.nptel.ac.in/noc26_ch29/preview
2	SWAYAM	Polymeric Biomaterials: Structure, Properties, Function and Performance	Prof. Satyavrata Samavedi	IIT Hyderabad	12 weeks	https://onlinecourses.nptel.ac.in/noc26_bt05/preview
3	SWAYAM	Introduction to Operations Research	Prof. G. Srinivasan	IIT Madras	8 Weeks	https://onlinecourses.nptel.ac.in/noc20_ma23/preview
7th Semester						
1	SWAYAM	Renewable Energy Engineering: Solar, Wind And Biomass Energy Systems	Prof. R. Anandalakshmi, Prof. Vaibhav Vasant Goud	IIT Guwahati	12 Weeks	https://onlinecourses.nptel.ac.in/noc26_ch26/preview
8th Semester						
1	SWAYAM	Industrial Safety Engineering	Prof. Jhareswar Maiti	IIT Kharagpur	12 weeks	https://onlinecourses.nptel.ac.in/noc20_mg43/preview
6th Semester (AEC/HSS)						
1	SWAYAM	Project Management	Prof. Ramesh Anbanandam | IIT Roorkee	IIT Roorkee	8 Weeks	https://onlinecourses.nptel.ac.in/noc24_mg01/preview

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The BoS Chairperson & Convener thanked all the internal and external experts for their approval.

Saisha 22/2/26

Dr. Saisha Vinjamuri

Convener

AIS
Dr. SAISHA VINJAMURI
Head of the Department
Department of Biotechnology
B.M.S College of Engineering
Bangalore - 560 019

chetanayak 22/2/2026

Dr. Chetan A. Nayak

Chairperson

CHAIRMAN B.M.S. COLLEGE OF ENGG. BANGALORE BOARD OF STUDIES CH

Dr. CHETAN A. NAYAK
Professor & Head of the Dept.
Department of Chemical Engineering
B.M.S. COLLEGE OF ENGINEERING
BENGALURU - 560 019

BMSCE

Hod Chemical <hod.chemical@bmsce.ac.in>

Request for approval of MOOC Course

Vidya Shetty K Faculty Chemical Dept <vidyaks95@nitk.edu.in> Wed, Feb 25, 2026 at 7:50 AM
To: Hod Chemical <hod.chemical@bmsce.ac.in>
Cc: "Dr .H.G Nagendra" <nagendra_biotech@sirmvit.edu>, "Ranganath D." <ranganathd@rvce.edu.in>, mahesh.kumar@syngeneintl.com, sanjay.venugopal@yokogawa.com, HITESH G CHAKRAPANI <hiteshgchitesh@gmail.com>, "cc: Savitri M Bhat" <savithri.bt@bmsce.ac.in>, Samita Maitra <smaitra.che@bmsce.ac.in>, Ashok Kumar S <ashok.bt@bmsce.ac.in>, Sainath K <sainath.che@bmsce.ac.in>, Hod BT <hod.bt@bmsce.ac.in>, Saisha Vinjamuri <saishav.bt@bmsce.ac.in>, Chetan A Nayak <canayak.che@bmsce.ac.in>, Pradeep S <pradeeps.bt@bmsce.ac.in>, Shivakumar R <shivakumarr.che@bmsce.ac.in>

Approved.

On Tue, 24 Feb 2026 at 5:36 PM, Hod Chemical <hod.chemical@bmsce.ac.in> wrote:

> Dear Sir/Madam
>
> Greetings from B.M.S. College of Engineering, Bengaluru
>
> We wish to inform you that as an institutional norm, all one credit, two credit courses as well as Open elective courses are being offered via MOOC's platform as listed in the attachment.
>
> The equivalent courses have been deliberated upon and finalized by the respective Department Academic Committees.
>
> We request your kind approval for the same at the earliest.
>
> Thanking you
> Regards
> Chetan & Saisha (HoD-BT)
>
> ---
>
> **Dr. Chetan A Nayak** **M.Tech, Ph.D,** MIE, LMIIChE, LMAFST
> Professor & Head,
> Department of Chemical Engineering
> Program Accredited by NBA in Tier-I of Washington Accord
> **B M S College of Engineering,**
> P B NO. 1908, Bull Temple Road,
> BENGALURU- 560019, Karnataka, INDIA
> Contact No: +91-80-26622130-135 Intercom: 128
> Mobile: +91 944 810 8572
> Website: www.bmsce.in
> Email: hod.chemical@bmsce.ac.in
> ---

BMSCE

Hod Chemical <hod.chemical@bmsce.ac.in>

Request for approval of MOOC Course

Nagendra GunduRao <nagshaila@gmail.com> Tue, Feb 24, 2026 at 10:09 PM
To: Hod Chemical <hod.chemical@bmsce.ac.in>

Dear Sir,

The list seems fine.

It may be considered as "Approved", from my end.

Best regards,
Nagendra

Dr H G Nagendra, Ph.D
Formerly Professor, SirMVIT
Ph: 7019670589, 99163 03565 (Cell)

On Tue, 24 Feb, 2026, 8:51 pm Hod Chemical, <hod.chemical@bmsce.ac.in> wrote:

> Dear Sir
>
> For you kind approval
>
> Regards
> Chetan
>
> ---
>
> **Dr. Chetan A Nayak** **M.Tech, Ph.D,** MIE, LMIIChE, LMAFST
> Professor & Head,
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> Mobile: +91 944 810 8572
> Website: www.bmsce.in
> Email: hod.chemical@bmsce.ac.in
> ---
>
> ---------- Forwarded message ---------
> From: **Hod Chemical** <hod.chemical@bmsce.ac.in>
> Date: Tue, Feb 24, 2026, 5:35 PM
> Subject: Request for approval of MOOC Course
> To: Dr .H.G Nagendra <nagendra_biotech@sirmvit.edu>, Ranganath D. <ranganathd@rvce.edu.in>, Vidya Shetty K Faculty Chemical Dept <vidyaks95@nitk.edu.in>, <mahesh.kumar@syngeneintl.com>, <sanjay.venugopal@yokogawa.com>, HITESH G CHAKRAPANI <hiteshgchitesh@gmail.com>, cc: Savitri M Bhat <savithri.bt@bmsce.ac.in>, Samita Maitra <smaitra.che@bmsce.ac.in>, Ashok Kumar S <ashok.bt@bmsce.ac.in>, Sainath K <sainath.che@bmsce.ac.in>, Hod BT <hod.bt@bmsce.ac.in>, Saisha Vinjamuri <saishav.bt@bmsce.ac.in>, Chetan A Nayak <canayak.che@bmsce.ac.in>, Pradeep S <pradeeps.bt@bmsce.ac.in>, Shivakumar R <shivakumarr.che@bmsce.ac.in>
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The equivalent courses have been deliberated upon and finalized by the respective Department Academic Committees.

We request your kind approval for the same at the earliest.

Thanking you
Regards
Chetan & Saisha (HoD-BT)

Dr. Chetan A Nayak **M.Tech, Ph.D,** MIE, LMIIChE, LMAFST
Professor & Head,
Department of Chemical Engineering
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Contact No: +91-80-26622130-135 Intercom: 128
Mobile: +91 944 810 8572
Website: www.bmsce.in
Email: hod.chemical@bmsce.ac.in

BMSCE

Hod Chemical <hod.chemical@bmsce.ac.in>

Request for approval of MOOC Course

Savitri M Bhat <savithri.bt@bmsce.ac.in> Wed, Feb 25, 2026 at 8:04 AM
To: Hod Chemical <hod.chemical@bmsce.ac.in>

Approved.

Best Regards
Prof. Savithri Bhat
Department of Biotechnology
B.M.S. College of Engineering
Bangalore-19
Phone:91-9535067633
Mail: savithri.bt@bmsce.ac.in

On Tue, 24 Feb, 2026, 17:36 Hod Chemical, <hod.chemical@bmsce.ac.in> wrote:

Dear Sir/Madam

Greetings from B.M.S. College of Engineering, Bengaluru

We wish to inform you that as an institutional norm, all one credit, two credit courses as well as Open elective courses are being offered via MOOC's platform as listed in the attachment.

The equivalent courses have been deliberated upon and finalized by the respective Department Academic Committees.

We request your kind approval for the same at the earliest.

Thanking you
Regards
Chetan & Saisha (HoD-BT)

Dr. Chetan A Nayak **M.Tech, Ph.D,** MIE, LMIIChE, LMAFST
Professor & Head,
Department of Chemical Engineering
Program Accredited by NBA in Tier-I of Washington Accord
B M S College of Engineering,
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Contact No: +91-80-26622130-135 Intercom: 128
Mobile: +91 944 810 8572
Website: www.bmsce.in
Email: hod.chemical@bmsce.ac.in

Department of Industrial Engineering & Management
B.M.S. College of Engineering, Bengaluru-19

Minutes of the Departmental BOS Meeting

24th February 2026

The departmental BOS meeting was held online on 24th February 2026 at Industrial Engineering & Management department, BMSCE.
The chairperson welcomed the members of the departmental BOS, IEM - BMSCE.

The chairperson briefed about the MOOCs courses proposed by the department for the 6th semester students as open elective in the current academic year 2026.

The Chairperson presented an overview of the NPTEL credit transfer policy framework and emphasized the option of enrolling in equivalent NPTEL courses as part of the open electives during the third and fourth years of study for the batch of 2023.

The Chairperson explained about the process of evaluation and certification NPTEL courses.

The Chairperson informed that the 1-credit course "Industry 5.0" in 6th semester is offered as a NPTEL course titled "Industry 4.0: Managing the Digital Transformation."

The Chairperson informed that the 1-credit course "Universal Human Values" in 4th semester is offered as a NPTEL course titled "Ethics in Engineering Practice:

The Chairperson informed about the equivalent NPTEL courses offered by the Department of Industrial Engineering and Management. The list of courses is provided below:

Courses	Name of the MOOC Platform	Name of the Course	Course Instructor	Name of the University/College	Course Duration	Link
Management and Entrepreneurship 23IM6OEMAE	NPTEL	Principles of Management	Prof. Usha Lenka	Department of Management studies, IIT Roorkee	12 weeks	https://onlinecourses.nptel.ac.in/noc22_mg42/preview
Human Recourse Management 23IM6OEHRM	NPTEL	AI in Human Resource Management	Prof. Abraham Cyril Issac	School of Business,IIT Guwahati	12 weeks	https://onlinecourses.nptel.ac.in/noc26_mg19/preview
Operations Research 23IM6OEOPR	NPTEL	Introduction to Operations Research	Prof. G. Srinivasan	Dept. of Management Studies, IIT, Madras	8 weeks	https://nptel.ac.in/courses/110106062
Industry 5.0 23IM6AEIND	NPTEL	Industry 4.0: Managing the Digital Transformation	Prof. Murli Dhar Agrawal	SJMSOM, IIT Bombay	8 weeks	https://onlinecourses.nptel.ac.in/noc26_ge04/preview

Universal Human Values 23MA4AEUHV	NPTEL	Ethics In Engineering Practice	Prof. Susmita Mukhopadhyay	IIT Kharagpur	8 weeks	https://onlinecourses.nptel.ac.in/noc22_mg54/preview

Dr. Shashi Jain, enquired about the evaluation pattern and credits of the courses and appreciated about the introducing the NPTEL course and also suggested conducting proctored examination for the said courses.

Dr. Savitha .M, asked for the clarification of the credits of the courses and the same was clarified by chairperson and Dr. B.R. Ramji (MOOCs Coordinator).

She also mentioned the requirement of the mentor for every elective course floated as a NPTEL course to facilitate the students in case of any difficulty faced during the course of study.

She enquired about the prerequisites of the said NPTEL courses.

Sri. R C Hari Rao, enquired about the reorientation of the staff to the courses.

External BOS members were satisfied with the syllabus contents and flow of the courses.

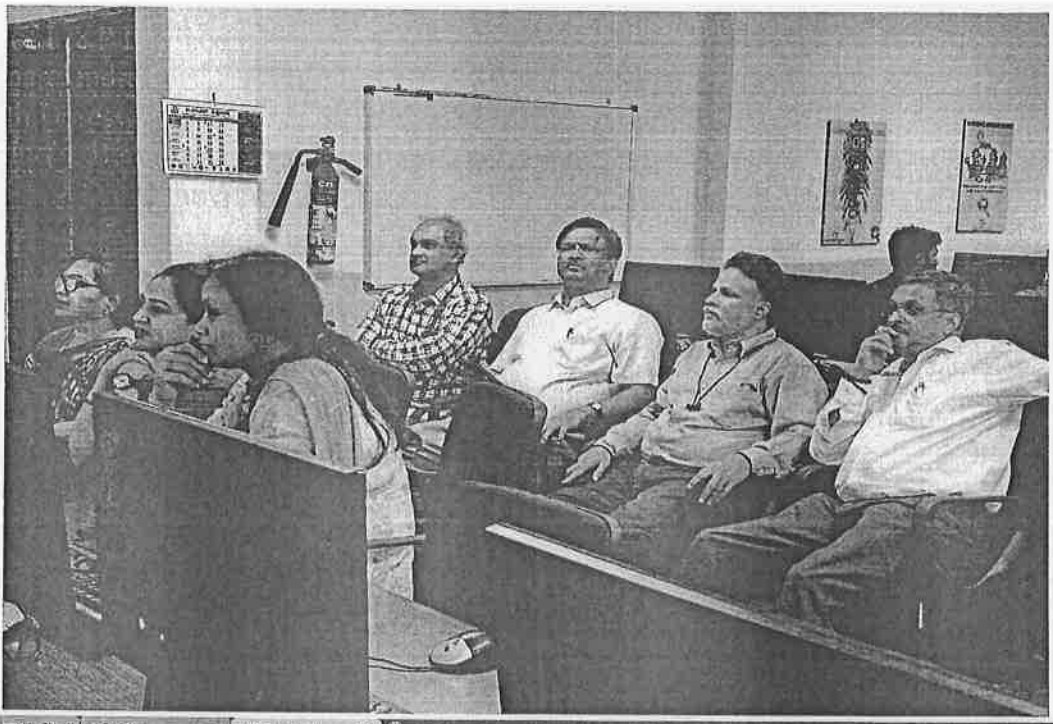
It has been ratified that the student named Ananya D Bharadwaj :1BM17IM006 has permitted to appear for examination after completion of course duration. With reference to the notification from VTU (Ref: VTU/BGM/Aca-SA/Max Dur/2025-26/3845, Dated 30th October 2025) student who have completed B.E. programme duration in full and failed in few courses have permitted two additional consecutive attempts to clear the courses with academic requirements within the permitted course/ programme duration.

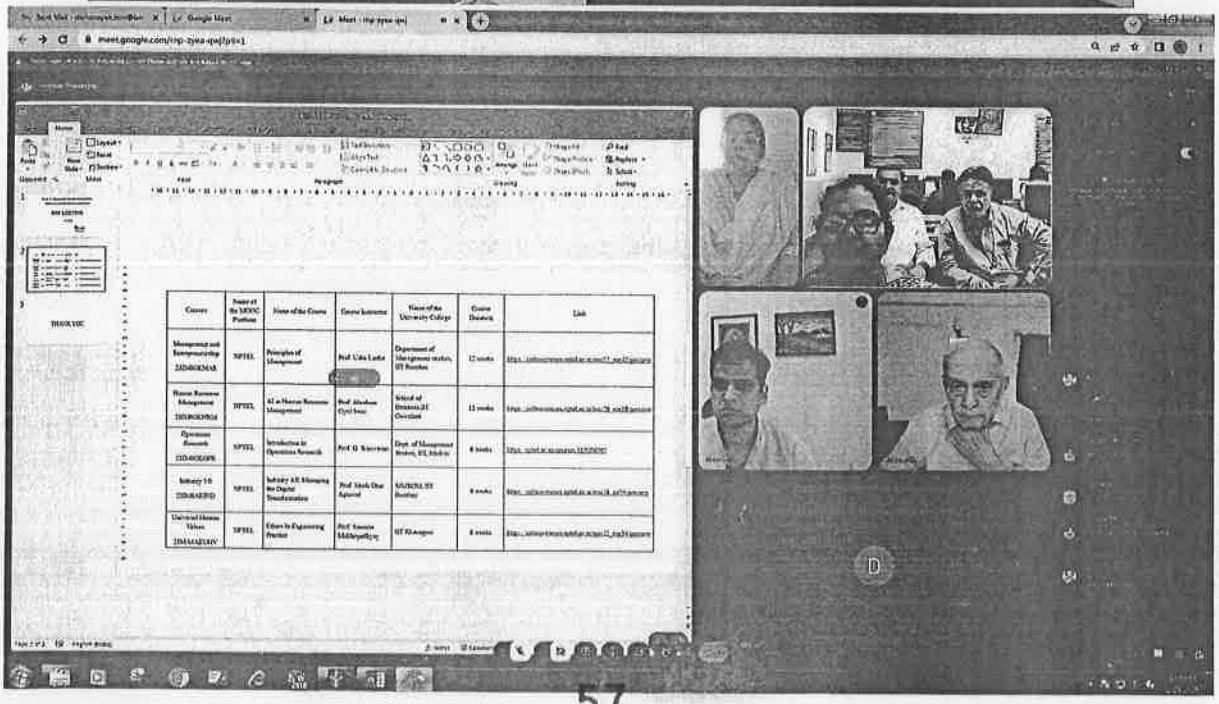
Meeting was concluded with vote of thanks and tea.

Members Present:

Name	Designation	Signature
Dr. Shailaja V. N., Professor, HOD, IEM	Chairman, BOS	24/2/2026
Dr. B. Ravishankar, Professor	Member	24.Feb.2026
Dr. K. J. Rathanraj, Professor	Member	24/2/26
Dr. G. Shashikumar, Professor	Member	24/2/26
Dr. B. Ramesh Nayak, Professor	Member	24/2/26
Dr. B. R. Ramji, Professor	Member	24/2/26
Sri. R C Hari Rao, Former Vice President, Titan Industries	External Member	

Dr. Shashi Jain, Associate Professor Department of Management Studies, IISc, Bengaluru	External Member	
Dr. Savitha.M., Professor & HoD Department of I & P Engineering Sri Jayachamarajendra College of Engineering, Mysuru	External Member, VTU Nominee	
Sri. Prashanth Doreswamy, President & CEO Continental India, Bengaluru	External Member	
Sri. Ramakrishna Dutt, Entrepreneur Quasar Telecom	External Member	
Dr. Kavitha Ran N, Assistant Professor	Invitee	24-02.26
Prof. Disha M Nayak, Assistant Professor	Invitee	24.2.26





B.M.S College of Engineering

Department of Computer Science and Engineering

BoS Internal Meeting -2025 Scheme

Date: 3-2-26

Agenda: Scheme for 2025 admitted students.

The Core subjects, Program electives and Ability enhancement courses are selected based on the template given by the college. Internal BoS members have prepared initial draft of the scheme. Associate head of the department presented to the faculty members. The department meeting happened online.

The following subjects have been combined because of credit restriction

i. Digital Logic and Computer Organization
ii. Software Engineering and Object-Oriented Modelling
iii. Machine learning and deep learning

The faculty members have accepted these modifications.

The followings are suggestions from the faculty members

- Required to introduce Operating System Lab than Software testing lab.
- The "Data Engineering and Pipeline" subject name to be only "Data Engineering"
- Data Engineering and Cryptography subjects have been moved to 4th and 6th semester as per faculty suggestion

Meeting Details

Department Meeting - 2025 Scheme

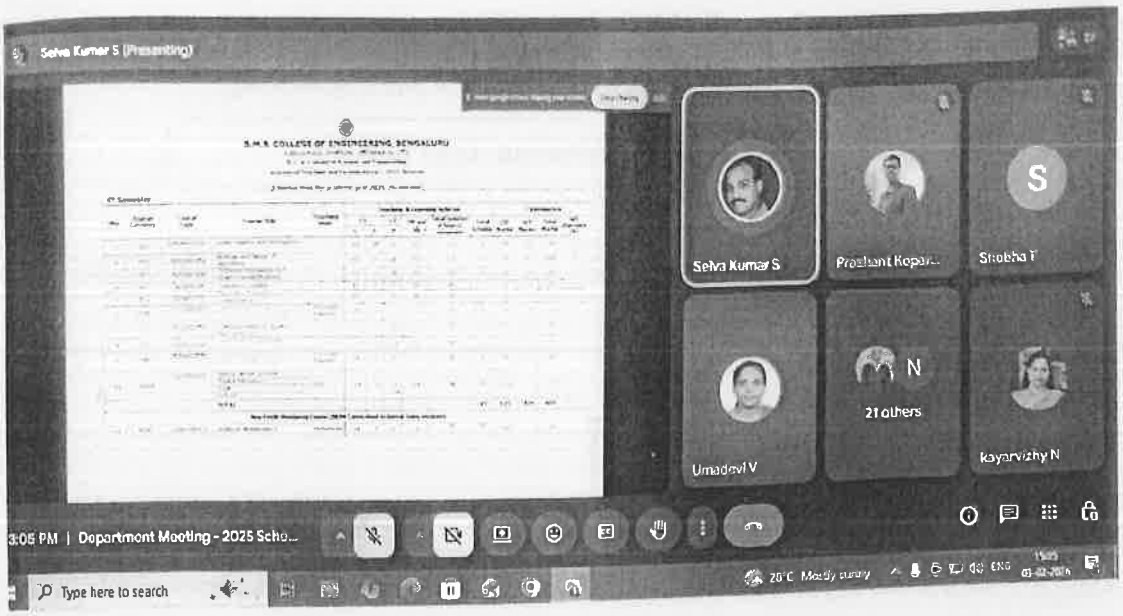
Tuesday, February 3 · 3:00 – 4:00pm

Time zone: Asia/Kolkata

Google Meet joining info

Video call link: https://meet.google.com/qcx-ardy-xgn

Or dial: (US) +1 510-945-0744 PIN: 487 025 537#



Members Present

- Associate head: Dr. Selva kumar S
- Associate head: Dr. Shubha Rao
- Bos Members: Dr.Jyothi S Nayak, Dr. Kayarvizhy N, Dr. Asha G R, Dr. Nandhini V
- 21 faculty members

AE

B.M.S. College of Engineering, Bengaluru – 560019

(Autonomous Institute, Affiliated to VTU)

Department of Aerospace Engineering

Proceedings of the Board of Studies Meeting

6th Board of Studies Meeting – Aerospace Engineering

A meeting of the Board of Studies (BoS), Department of Aerospace Engineering, is convened as per the details below:

Date: Friday, 20.02.2026
Time: 10:30AM
Venue: Aerospace CAD Lab

Agenda

1. Approval for offering MOOC courses as Open Elective courses for 6th, 7th, and 8th semester NEP-2 batch students.
2. Approval for offering 1 and 2 credit Ability Enhancement Courses on the MOOC platform.
3. Approval for allowing final-year students of the NEP-2 batch to carry out a one-year full-time industry internship.
4. Any other matter with the permission of the Chair.

Proceedings

The meeting commenced with the permission of the Chair. The Chairperson welcomed all members, VTU nominee, academic and industry experts, and alumni invitee.

The following agenda items were discussed:

Agenda Item 1: Offering MOOC Courses as Open Electives

The proposal to integrate AICTE/UGC-recognized MOOC courses as Open Electives for NEP-2 students of 6th, 7th, and 8th semesters was discussed.

Resolution1:
The Board approved offering selected MOOC courses as Open Electives subject to proper credit mapping and evaluation norms. The suggested courses to be offered as open elective for 6^{th}, 7^{th} and 8^{th} semester are given below,

Agenda Item 2: 1 & 2 Credit Ability Enhancement Courses (AEC)

The Board discussed introducing short-credit AEC courses via MOOC platforms to enhance students' professional and technical competencies.

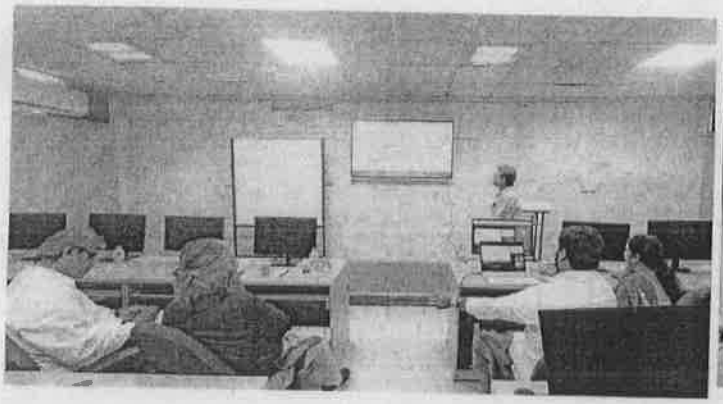
Resolution2:
The Board recommended to have an open option about offering of 1 and 2 credit Ability Enhancement Courses and suggested that either the courses should be offered with in the department or through recognized MOOC platforms.

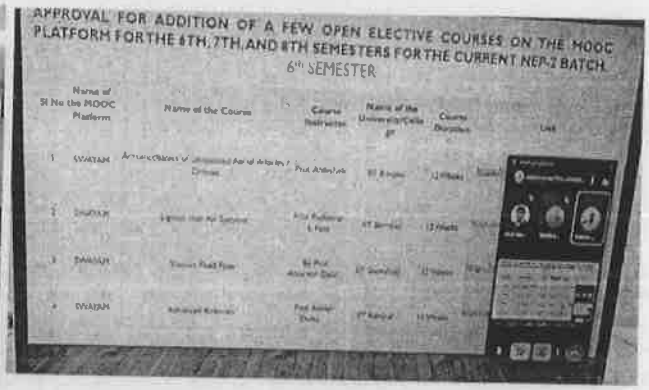
Agenda Item 3: One-Year Full-Time Industry Internship

The Board deliberated on permitting final-year NEP-2 students after thorough check of the offer to undertake a one-year full-time industry internship aligned with NEP experiential learning objectives.

Resolution3:
The Board approved the implementation of a one-year full-time industry internship for eligible final-year students, subject to monitoring and evaluation guidelines.

There being no further items for discussion, the meeting concluded with a vote of thanks to the Chair.





Chairperson, Board of Studies
Department of Aerospace Engineering
B.M.S. College of Engineering

Signature: _____
Date: 20.02.2026

PROFESSOR & HEAD
Department of Aerospace Engineering
B.M.S. College of Engineering
BANGALORE - 560 019

24.02.2026

Bangalore

From

The HOD,

Department of Information Science and Engineering,

BMSCE,

Bangalore - 19

To

The Dean Academics,

BMSCE,

Bangalore – 19

Respected Sir,

SUB: Online courses approval – reg.

As per the above subject, our department had BOS meeting on 07.07.2025 for UG and PG Syllabus review and approval in offline mode. The online MOOC courses were identified in specific for PG students of 2023 batch and taken approval online and the proof is attached herewith. I kindly request you to consider the same for AC meeting which is to be held on 28.02.2026.

Thanking you

Yours truly,

26/02/25

Head of the Department
Department of Information Science & Engineering
B.M.S. College of Engineering,
BANGALORE-560 019.

BMSCE

Hod Ise <hod.ise@bmsce.ac.in>

Fwd: Approval of online courses for III semester MTech

1 message

Hod Ise <hod.ise@bmsce.ac.in> Tue, Oct 28, 2025 at 3:56 PM
To: "Kumar, Arun Ramachandra (CTG Labs)" <arun.kumar2@hpe.com>, "Dr. Saritha Chakrasali" <sarithachakrasali@bnmit.in>, "Shylaja S. Sharath PESU CSE" <shylaja.sharath@pes.edu>, anirudh.bharadwaj2656@gmail.com

Dear Sir/Madam,
Good day!
Scheme for M.Tech [CNE] was discussed in the last BOS held on 07.07.2025. Following are the online courses identified. I request you to approve the same and do the needful.

1. Natural Language Processing
https://online.vtu.ac.in/course-details/Natural-Language-Processing

2. Social Network Analysis
https://online.vtu.ac.in/course-details/Social-Network-Analysis

3. Ethical Hacking
https://online.vtu.ac.in/course-details/Ethical-Hacking

Thanks & Regards
Dr. Nalini M K
Associate Professor and Head,
Department of ISE,
BMSCE, Bengaluru -19.
Mobile: 9945709435.
"Success is a journey, not a destination..."

MOOC courses for the UG-PG programme.

proceedings: The following courses has been approved by DAC members from the AY 2025-26.

→ For UG

4th semester: Universal Human Values

6th semester Open Electives: ① DCNS and
② Robotics - Basics & Selected Advanced Concepts
③ Algorithmic Graph Theory & Data Structures

For the upcoming

7th semester: Artificial Intelligence (Knowledge Representation & Reasoning)

8th semester: Data Analytics with Python

→ For PG courses, been approved by BOS

3rd semester: Natural Language Processing
Social Network Analysis
Ethical Hacking

DAC Members:

1) Dr. M. K. Nalini 10/2/2026

2) Dr. Roopa. R

3) Dr. Mahalakshmi B.S

4) Dr. Shobha. T

5) Prof. Rashmi. K.B

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous Institute, Affiliated to VTU)

DEPARTMENT OF COMPUTER SCIENCE AND BUSINESS SYSTEMS

Minutes of BOS Meeting

Date:21.02.2026 **Venue: Online Mode/CSBS HoD Chamber**

Time: 11.00 AM Onwards

Agenda:

1. **Approval of VII and VIII semester scheme and syllabus.**
2. **Approval of online Open Electives and MooC courses.**

BoS Members:

Internal Experts		
1.	Dr. R Ashok Kumar	Chairman-BoS, Professor & Head, Dept. of CSBS, BMSCE
2.	Dr. B N Shubha	Professor, Dept. of MBA, BMSCE
3.	Dr. Radhika K R	Professor, Dept. of ISE, BMSCE
4.	Dr. B R Shambhavi	Professor & Head, Dept. of CSE(DS), BMSCE
5.	Dr. Monika Puttaramaiah	Associate Professor, Dept. of AIML, BMSCE
6.	Dr. B S Mahalakshmi	Assistant Professor, Dept. of ISE, BMSCE
External Experts		
7.	Dr. Srinath M S	Professor & Head, Dept. of CSBS, MCE, Hasan (VTU Nominee)
8.	Mr. Ramesh Srinivasan	Head-Data Analytics- AWS BU, TCS, Bangalore (Industry Expert)
9.	Dr. R Mohan	Associate Professor, Dept. of CSE, NIT, Tiruchirappalli (Academic Expert)
10.	Dr. Dattatreya P Mankame	Professor & Head, Dept. of CSBS, DSCE (Academic Expert)
11.	Ms. Janami B	MTS QA Engineer, NetApp, Bangalore (Alumni)

At the outset, Dr. R Ashok Kumar, HOD, Dept. of CSBS extended a cordial welcome to all the BoS members followed Scheme & Syllabus presentation and Discussion.

The summary is as follows:

1. **The members deliberated and approved the scheme and syllabus of VII and VIII semester of 2023 Batch.**
2. **Approved all the Open Electives offered from CSBS department.**
3. **Approved the MooC courses on UHV, IKS, and Research Methodologies of CSBS department.**

The meeting concluded with Vote of Thanks by HoD, Dept. of CSBS, BMSCE.

Head of the Department
Department of Computer Science and Business Systems
B.M.S. College of Engineering
BANGALORE - 560 019

BoS Members		**Signature**
1.	Dr. R Ashok Kumar	
2.	Dr. B N Shubha	
3.	Dr. Radhika K R	
4.	Dr. B R Shambhavi	Shambhavi. B.R.
5.	Dr. Monika Puttaramaiah	
6.	Dr. B S Mahalakshmi	B.S
7.	Dr. Srinath M S	online
8.	Mr. Ramesh Srinivasan	online
9.	Dr. R Mohan	online
10.	Dr. Dattatreya P Mankame	online
11.	Ms. Janani B	online

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous Institute, Affiliated to VTU)

DEPARTMENT OF COMPUTER SCIENCE AND BUSINESS SYSTEMS

Minutes of BOS Meeting

Date:18.10.2025 **Venue: Online Mode/CSBS HoD Chamber**

Time: 10.30 AM Onwards

Agenda:

Approval of First Semester Scheme and Syllabus of "Essentials of Information Technology" course.

BOS Members:

Internal Experts		
1.	Dr. R Ashok Kumar	Chairman-BoS, Professor & Head, Dept. of CSBS, BMSCE
2.	Dr. B N Shubha	Professor, Dept. of MBA, BMSCE
3.	Dr. Radhika K R	Professor, Dept. of ISE, BMSCE
4.	Dr. B R Shambhavi	Professor & Head, Dept. of CSE(DS), BMSCE
5.	Dr. Monika Puttaramaiah	Associate Professor, Dept. of AIML, BMSCE
6.	Dr. B S Mahalakshmi	Assistant Professor, Dept. of ISE, BMSCE
External Experts		
7.	Dr. Srinath M S	Professor & Head, Dept. of CSBS, MCE, Hasan (VTU Nominee)
8.	Mr. Ramesh Srinivasan	Head-Data Analytics- AWS BU, TCS, Bangalore (Industry Expert)
9.	Dr. R Mohan	Associate Professor, Dept. of CSE, NIT, Tiruchirappalli (Academic Expert)
10.	Dr. Dattatreya P Mankame	Professor & Head, Dept. of CSBS, DSCE (Academic Expert)
11.	Ms. Janami B	MTS QA Engineer, NetApp, Bangalore (Alumni)

At the outset, Dr. R Ashok Kumar, HOD, Dept. of CSBS extended a cordial welcome to all the BoS members followed Scheme & Syllabus presentation and Discussion.**The summary is as follows:**

- **Experts suggested to remove advanced topics from Operating System Section, recommended to include introductory concepts of OS.**
- **Experts Advised to align the course syllabus with reference to prescribed textbook.**
- **Experts proposed to incorporate Practical or hands-on sessions for students as a part of AAT instead of Quiz.**
- **Experts Approved syllabus of Essentials of Information Technology course.**

The meeting concluded with Vote of Thanks by HoD, Dept. of CSBS, BMSCE.

BoS Members	Signature
1. Dr. R Ashok Kumar	
2. Dr. B N Shubha	Absent
3. Dr. Radhika K R	
4. Dr. B R Shambhavi	29/10/2025
5. Dr. Monika Puttaramaiah	27/10/2025
6. Dr. B S Mahalakshmi	online
7. Dr. Srinath M S	online
8. Mr. Ramesh Srinivasan	online
9. Dr. R Mohan	online
10. Dr. Dattatreya P Mankame	Absent
11. Ms. Janani B	online

Invitees:	Signature
1. Tejaswini K	
2. Amith Pradhaan	
3. Ananya S G	
4. Rezni S	
5. Birajdar Priyanka Ashok	
6. Venil Southiri	
7. Akshatha G	

BMS COLLEGE OF ENGINEERING

(Autonomous Institute under VTU)

Department of Management Studies & Research Centre

15th November 2025

Submitted: The Principal

Sub: Concurrence from BOS members

After the concurrence from the DAC and Internal BOS members, we had circulated and taken acceptance from all External BOS members on the following topics:

- To reduce the number of modules for each subject from 6 modules to 5 modules.
- To include more case studies, mini projects, self-learning components in the course curriculum.
- Credits for courses in 4th semester.
- Change in the Question paper pattern of SEE.

This is for your kind perusal.

Thanking You

Yours sincerely

HOD - MBA

Professor & HOD
Dept. of Management Studies
B.M.S. College of Engineering
Bull Temple Road, Bangalore - 19

BMS COLLEGE OF ENGINEERING

(Autonomous Institute under VTU)

Department of Management Studies & Research Centre

DAC- Minutes of the Meeting

Date: 10th September 2025
Time: 10.45 A.M.
Venue: HOD Room

Members Present:

Dr. Minu Zachariah	Chair Person & HOD-MBA	
Dr. A. Satyanandini	Member	
Dr. R. Sushma	Member	
Dr. Shubha Muralidhar	Member	

Agenda:

1. Credit Structure for 4 & 3 credits Structure as per NCrF

Proceedings:

1) For 4 credits with L-T-P-SL (4-0-0-57)
- 4 credits-120 hrs
- Lectures-4x14=56
- CIE Test (2) =03
- Quiz (2) =01
- SEE Exam =03
- Term work (SL)=57 (Seminar/Mini Project/Case Study/ Field Survey)

2) For 3 credits with L-T-P-SL (2-0-0-27)
- 3 credits-90 hrs
- Lectures-2x14=28
- Practicals-2x14=28
- CIE Test =03
- Quiz =01
- SEE Exam =03
- Term work (SL)=27

BMS COLLEGE OF ENGINEERING

(Autonomous Institute under VTU)

Department of Management Studies & Research Centre

DAC- Minutes of the Meeting

Date: 27th October 2025
Time: 10.45 A.M.
Venue: HOD Room

Members Present:

Dr. Minu Zachariah	Chair Person & HOD-MBA	
Dr. A. Satyanandini	Member	
Dr. R. Sushma	Member	
Dr. Shubha Muralidhar	Member	

Agenda:

1) Reduce the number of modules from 6 to 5 in all courses.
2) Question paper format to be(unit) module wise with 3,7,10 pattern.
3) To get the same vetted by BOS.

Proceedings:

1) To adhere to the requirements of the institution and ease administration it was decided to reduce the number of modules to 5 in every course.
2) As per NCrF it was decided to include more case studies, mini projects & self-learning concepts in respective courses.
3) Question paper format will be 3,7,10 & module wise.
4) It will be sent to BOS member (External) for approval.

BMSCE

Hod Mba <hod.mba@bmsce.ac.in>

Consent for change in syllabus

3 messages

Hod Mba <hod.mba@bmsce.ac.in> Mon, Nov 3, 2025 at 5:44 PM
To: "Dinesh Kumar, U" <dineshk@iimb.ac.in>

Dear Sir,

I would like to bring to your kind notice that we have been instructed to reduce the number of modules from 6 modules to 5 modules across all the departments to bring in uniformity and for easy administration. Thus, we have tried to fit in all the content in these five modules. As per NCrF, we will have to include more case studies, mini projects, self-learning components in addition to the concepts. We have thus increased the number of lecture hours to 56 hours (4 hours theory) for subjects with 4 credit courses and for 3 credit courses (2 hours of theory and 2 hours of practical) in the 4th semester MBA to facilitate placement.

The Question paper pattern has been changed to one question from each module with sub questions of 3, 7 & 10 marks and students can answer any four full questions out of five questions. 6th question will be case study/application-oriented problems which they have to compulsorily attempt that carries 20 marks.

PFA the revised syllabus for your kind perusal and consideration.

Looking forward to your consent to proceed with the same through return email.

Thanks & Regards,

Dr. Minu Zachariah
Professor and Head
Department of Management Studies and Research Centre
B.M.S. College of Engineering
Bangalore 560019

VISION:

- **DEVELOP LEADERS THROUGH QUALITY MANAGEMENT EDUCATION, RESEARCH AND ENTREPRENEURSHIP CONTRIBUTING TO THE SOCIETY**

MISSION:

- **TO ENHANCE THE KNOWLEDGE AND CAPABILITIES TO MEET THE GLOBAL CHALLENGES THROUGH SUITABLE CURRICULUM**
- **TO BE CONCERNED AND CONNECTED WITH THE SOCIETAL ISSUES.**
- **TO FOSTER COLLABORATIVE CONTRIBUTION THROUGH TRAINING.**
- **TO INCULCATE SENSE OF PROFESSIONAL ETHICS, COMMITMENT AND INTEGRITY**

Draft BMSCE MBA Curriculum 2024-26.pdf
2129K

Dinesh Kumar, U <dineshk@iimb.ac.in> Thu, Nov 6, 2025 at 2:18 PM
To: Hod Mba <hod.mba@bmsce.ac.in>

I am fine with the proposed change.

Dinesh

From: Hod Mba <hod.mba@bmsce.ac.in>
Sent: 03 November 2025 17:44

72

To: Dinesh Kumar, U <dineshk@iimb.ac.in>
Subject: Consent for change in syllabus

[Quoted text hidden]

Hod Mba <hod.mba@bmsce.ac.in> Thu, Nov 6, 2025 at 2:45 PM
To: "Dinesh Kumar, U" <dineshk@iimb.ac.in>

Thank you so much.

Regards,
Dr. Minu Zachariah
Professor and Head
Department of Management Studies and Research Centre
B.M.S. College of Engineering
Bangalore 560019

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[Quoted text hidden]

BMSCE

Hod Mba <hod.mba@bmsce.ac.in>

Consent for Change of Syllabus

Hod Mba <hod.mba@bmsce.ac.in>
To: "Dr. M. Mathirajan, FORSI" <iiscmathi@gmail.com>, msdmathi@iisc.ac.in

Mon, Nov 3, 2025 at 5:46 PM

Dear Sir,

I would like to bring to your kind notice that we have been instructed to reduce the number of modules from 6 modules to 5 modules across all the departments to bring in uniformity and for easy administration. Thus, we have tried to fit in all the content in these five modules. As per NCrF, we will have to include more case studies, mini projects, self-learning components in addition to the concepts. We have thus increased the number of lecture hours to 56 hours (4 hours theory) for subjects with 4 credit courses and for 3 credit courses (2 hours of theory and 2 hours of practical) in the 4th semester MBA to facilitate placement.

The Question paper pattern has been changed to one question from each module with sub questions of 3, 7 & 10 marks and students can answer any four full questions out of five questions. 6th question will be case study/application-oriented problems which they have to compulsorily attempt that carries 20 marks.

PFA the revised syllabus for your kind perusal and consideration.

Looking forward to your consent to proceed with the same through return email.

Thanks & Regards,

Dr. Minu Zachariah
Professor and Head
Department of Management Studies and Research Centre
B.M.S. College of Engineering
Bangalore 560019
Regards,

VISION:

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BMSCE

Hod Mba <hod.mba@bmsce.ac.in>

Consent for Change of Syllabus

Mathirajan Muthu <msdmathi@iisc.ac.in> Thu, Nov 13, 2025 at 4:41 PM
To: Hod Mba <hod.mba@bmsce.ac.in>, iiscmathi <iiscmathi@gmail.com>

Dear Professor

Kindly accept my consent to proceed with the revised syllabus.

Regards

Dr Mathirajan

From: Hod Mba <hod.mba@bmsce.ac.in>
Sent: Monday, November 3, 2025 5:46 PM
To: iiscmathi <iiscmathi@gmail.com>; Mathirajan Muthu <msdmathi@iisc.ac.in>
Subject: Consent for Change of Syllabus

External Email
[Quoted text hidden]

BMSCE

Hod Mba <hod.mba@bmsce.ac.in>

Consent for change of Syllabus

4 messages

Hod Mba <hod.mba@bmsce.ac.in> Mon, Nov 3, 2025 at 5:48 PM
To: Vinay S <vinays.83@gmail.com>

Dear Vinay,

I would like to bring to your kind notice that we have been instructed to reduce the number of modules from 6 modules to 5 modules across all the departments to bring in uniformity and for easy administration. Thus, we have tried to fit in all the content in these five modules. As per NCrF, we will have to include more case studies, mini projects, self-learning components in addition to the concepts. We have thus increased the number of lecture hours to 56 hours (4 hours theory) for subjects with 4 credit courses and for 3 credit courses (2 hours of theory and 2 hours of practical) in the 4th semester MBA to facilitate placement.

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PFA the revised syllabus for your kind perusal and consideration.

Looking forward to your consent to proceed with the same through return email.

Thanks & Regards,

Dr. Minu Zachariah
Professor and Head
Department of Management Studies and Research Centre
B.M.S. College of Engineering
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Vinay S <vinays.83@gmail.com> Sat, Nov 8, 2025 at 10:44 AM
To: Hod Mba <hod.mba@bmsce.ac.in>

Dear Madam,

I have reviewed the syllabus and give my consent to it.

Thanks and regards
Vinay
[Quoted text hidden]

Hod Mba <hod.mba@bmsce.ac.in> Sun, Nov 9, 2025 at 5:46 PM
To: Vinay S <vinays.83@gmail.com>

Dear Vinay,

Thank you so much for your consent to goahead with the syllabus.

Regards,
Dr. Minu Zachariah
Professor and Head
Department of Management Studies and Research Centre
B.M.S. College of Engineering
Bangalore 560019

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[Quoted text hidden]

Hod Mba <hod.mba@bmsce.ac.in> Wed, Nov 12, 2025 at 11:05 AM
To: MBA Office <mba_office@bmsce.ac.in>

Dear Rekha,

PFF the final Syllabus. Please send only the syllabus to the COE office.

Regards,
Dr. Minu Zacharlah
Professor and Head
Department of Management Studies and Research Centre
B.M.S. College of Engineering
Bangalore 560019

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BMSCE

Hod Mba <hod.mba@bmsce.ac.in>

Consent for Change in Syllabus

Hod Mba <hod.mba@bmsce.ac.in>
To: Dr anupama - <anupama.rvim@rvei.edu.in>

Mon, Nov 3, 2025 at 5:50 PM

Dear Madam,

I would like to bring to your kind notice that we have been instructed to reduce the number of modules from 6 modules to 5 modules across all the departments to bring in uniformity and for easy administration. Thus, we have tried to fit in all the content in these five modules. As per NCrF, we will have to include more case studies, mini projects, self-learning components in addition to the concepts. We have thus increased the number of lecture hours to 56 hours (4 hours theory) for subjects with 4 credit courses and for 3 credit courses (2 hours of theory and 2 hours of practical) in the 4th semester MBA to facilitate placement.

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PFA the revised syllabus for your kind perusal and consideration.

Looking forward to your consent to proceed with the same through return email.

Thanks & Regards,

Dr. Minu Zachariah
Professor and Head
Department of Management Studies and Research Centre
B.M.S. College of Engineering
Bangalore 560019

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2129K

BMSCE

Hod Mba <hod.mba@bmsce.ac.in>

Consent for Change in Syllabus

Dr anupama - <anupama.rvim@rvei.edu.in> Wed, Nov 12, 2025 at 12:02 PM
To: Hod Mba <hod.mba@bmsce.ac.in>

Dear Madam,

I approve the syllabus. It is quite well designed.
Apologies for the delay in responding.

Regards

Dr Anupama K Malagi
Professor and IQAC Convenor
RV Institute of Management
Bengaluru
[Quoted text hidden]

BMSCE

Hod Mba <hod.mba@bmsce.ac.in>

Consent for Change in Syllabus

3 messages

Hod Mba <hod.mba@bmsce.ac.in> Mon, Nov 3, 2025 at 5:52 PM
To: Lara Matthai <Lara.matthai@gmail.com>

Dear Lara,

I would like to bring to your kind notice that we have been instructed to reduce the number of modules from 6 modules to 5 modules across all the departments to bring in uniformity and for easy administration. Thus, we have tried to fit in all the content in these five modules. As per NCrF, we will have to include more case studies, mini projects, self-learning components in addition to the concepts. We have thus increased the number of lecture hours to 56 hours (4 hours theory) for subjects with 4 credit courses and for 3 credit courses (2 hours of theory and 2 hours of practical) in the 4th semester MBA to facilitate placement.

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PFA the revised syllabus for your kind perusal and consideration.

Looking forward to your consent to proceed with the same through return email.

Thanks & Regards,

Dr. Minu Zachariah
Professor and Head
Department of Management Studies and Research Centre
B.M.S. College of Engineering
Bangalore 560019

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Draft BMSCE MBA Curriculum 2024-26.pdf
2129K

Lara Matthai <lara.matthai@gmail.com> Mon, Nov 3, 2025 at 11:02 PM
To: Hod Mba <hod.mba@bmsce.ac.in>

Thank you for your email and update Ma'am

I agree with your approach below.

Regards
Lara

[Quoted text hidden]

Hod Mba <hod.mba@bmsce.ac.in> Tue, Nov 4, 2025 at 5:14 AM
To: Lara Matthai <lara.matthai@gmail.com>

Thank you so much Lara for your Immediate response.

Regards,
Dr. Minu Zachariah
Professor and Head
Department of Management Studies and Research Centre
B.M.S. College of Engineering
Bangalore 560019

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B.M.S. COLLEGE OF ENGINEERING, BENGALURU

(Autonomous Institute, Affiliated to VTU)

Department of Management Studies and Research Centre

SL. No.	Programme conducted (FDP/SDP)	Topic	Speaker	Participants	Date/ Duration
1	AICTE - Vibrant Advocacy for Advancement and Nurturing of Indian Languages programme. (VAANI)	AI and Data Science, titled "From Theory to Practice: Accessible AI and Data Science Applications", under the aegis of	Dr. S Nagendra, Mr.CNB Rajesh, Mr.Dhanush S Ms. Vindhyashree, Dr.Piyush Mr.Manamohana	60	13th -15th October 2025 9:00 AM – 5:00 PM
2	SDP	"Personal Finance"	Mr. Vinod Tantri from Knowledge Bell	62	27th -28th November 2025 9:00 AM – 5:00 PM
3	FDP	"Research Methodology and Data Analysis using JAMOVI"	Dr. A Satya Nandini Dr. B N Shubha Dr. Minu Zachariah Dr. Shubha Muralidhar Dr. Sushma R Dr. Tejaswi Patil Dr. V. Rajesh Kumar & Dr. K.R. Pundareeka Vitala	60	4th - 6th December 2025, 9:00 AM – 5:00 PM

Prathima 25/02/2026
for Professor & HOD
Dept. of Management Studies
B.M.S. College of Engineering
Bull Temple Road, Bangalore - 19

PHY

BMS COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU
Department of Physics

PROCEEDINGS OF BOS MEETING ON 21.08.205

The BoS- Physics meeting was conducted on 21.08.2025 at 11 AM.

The syllabi for the academic year 2025-2026 for five different clusters were discussed in detail by the BOS committee.

The following members were present:

Sl. No.	Name	Designation
1.	Dr. B.L Suresha	Chairperson
2.	Dr. Prasanna A A	VTU Nominee
3.	Dr. N. Dhananjaya	External Member
4.	Dr A Jaganatha Reddy	External Member
5.	Mr. Kalyan	External Member (Industry)
6.	Dr. Latha kumari	Internal Member
7.	Dr. K.E Ganesh	Internal Member
8.	Dr. Murugendrappa M V	Internal Member
9.	Dr. Kaliprasad C. S	Internal Member
10.	Dr. Karthik Kumara	Internal Member

The syllabi for the following courses were discussed at length

1. Quantum Physics and Sensors for Electronics Engineering Course code – 25PH1BSPEC/25PH2BSPEC
2. Physics of Materials for Electrical Engineering Course code 25PH1BSPEE/25PH2BSPEE
3. Quantum Physics and Computation for Computer Science Engineering Stream Course code – 25PH1BSPCS/25PH2BSPCS
4. Physics of Structural systems for Civil Engineering Course code – 25PH1BSPCV / 25PH2BSPCV

5. Physics of Materials for Mechanical Engineering Stream Course code – 25PH1BSPME / 25PH2BSPME

The above syllabi were framed in line with the VTU Syllabus framework suggested by VTU from the Academic Year 2025-26. The Following changes were made in syllabi after detailed deliberations and suggestions by the internal members, external members, industry experts and from invited member of the premier Institute.

1. No substantial changes were suggested in the syllabi proposed
2. Small changes in the topics, content length as suggested by BOS members is incorporated
3. Course titles and course codes were approved by the BOS members

Dr. B.L Suresha
Chairperson-BoS Physics

CHAIRMAN B.M.S. COLLEGE OF ENGG PHY BANGALORE BOARD OF STUDIES

BMS COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

DEPARTMENT OF CHEMISTRY
Board of Studies members 2025-26 August month
BOS meeting held on 20/8/25 at 10:30 AM

Sl. No	Category	Status	Name	Signature
1.	Head of the Department	Chairman	Dr. K L Nagashree	20/8/25
2.	Faculty Members at different levels covering different specializations	Member	Dr.Kalyan Raj	20/8/2025
3.			Dr. G S Ananthnag	
4.			Dr. Srinidhi R	
5.			Dr. Malini S.	20/8/25
6.			Dr. Manjunatha S	20/8/25
7.			Dr. Harish KN	20/8/25
8.			Dr. Mohan Reddy R	20/08/25
9.			Dr. Supriya	20/08/25
10.			Dr. Madhuri P Rao	20/08/2025
11.	Subject Experts from outside the College nominated by Academic Council	Member	Dr. Lalithamba, Associate Professor and Head Department of Chemistry SIT, Tumkur Contact No: 9008305654	Lalithamba
12.			Dr. Chethana P R Professor. Department of Chemistry UVCE, Bengaluru Contact No.: Ph-8277003566	20/08/25
13.	Expert from outside College, nominated by Vice Chancellor – Visvesvaraya Technological University (VTU)	Member	Dr. Jahagirdar A.A Prof. & Head, Department of Chemistry Dr. Ambedkar Institute of Technology, Bengaluru Contact: 9972630398	
14.	Representative from industry / corporate sector / allied area relating to placement nominated by Academic Council	Member	Dr. Aruna S. T. Senior Scientist, NAL, Bengaluru – 562125 Email: alexander.s@sabic.com Ph-9481054732	
15.	Postgraduate Meritorious Alumni	Member	Not Applicable	

Nagashree K.L.
Head of the Department
Chairperson, BOS in Chemistry
B.M.S. College of Engineering
Bengaluru - 560 019.

DEPARTMENT OF CHEMISTRY, B.M.S. COLLEGE OF ENGINEERING

Minutes of meeting: BOS meeting for syllabus revision 2025-2026

A BOS meeting was conducted on 20-Aug-2025 in the Department of Chemistry from 10:00 am. The agenda of the meeting was to discuss the proposed revised syllabus of Applied Chemistry for various streams of engineering (I/II Sem) as per VTU guidelines. The meeting was chaired by Dr. K.L. Nagashree, HOD Chemistry, and was conducted in the presence of internal and external (online) BOS members, Dr. Lalithamba H.S., Dr. Aruna S.T., Dr. P.R. Chetana and Dr. Jahagirdar A. A.

The suggestions from BOS members are as follows:

Computer Science stream:

i) The title of module 1 could be 'Electrochemistry of corrosion and sensors'
ii) Start the first module with an introduction to 'smart systems', their importance and types; and electrochemistry could be linked to smart systems.
iii) No other changes, in the framed syllabus, were suggested.

According to the inputs of BOS members, these changes are made in the syllabus copy.

Electrical stream:

The proposed syllabus was accepted without any modifications.

Mechanical stream:

i) The title of Module 1 was suggested to be kept as 'Electrochemistry of corrosion and Coating technologies'
ii) In Module 4, types of fuel cells could be added
iii) In Module 4, the term 'auxiliary power unit' could be removed and mention construction and working of SOFC
iv) In Module 5, it was suggested to add 'Phase rule' concept if possible.
But because of contact hour limitation, it could not be added. Further, the concept was not included in the current VTU syllabus.

The changes are accordingly incorporated.

Civil stream:

i) The title of module 1 could be 'Electrochemistry of corrosion and sensors". The change was made accordingly.

The **assessment pattern and CO-PO mapping** was found good. No changes were recommended here.

The syllabi for open elective courses (VII and VIII semester- New courses-Energy and environmental sustainability, Nano and smart materials for engineering applications, revision in the course-Corrosion science and engineering) were discussed in the BOS meeting. The content was accepted as such without any modifications.

Head of the Department
of Chemistry
B.M.S. College of Engineering
Bengaluru - 560 019.

ANNEXURE – III

Revised Academic Rules and Regulations
from AY 2024-25 onwards

B.M.S. COLLEGE OF ENGINEERING, BENGALURU
Autonomous institute affiliated to VTU

ACADEMIC RULES AND REGULATIONS

for the AY 2024-25 onwards

CONTENTS

1. Preamble:

B.M.S. College of Engineering (BMSCE) Bengaluru has the unique distinction of being the first private engineering college established in the country. Started in the year 1946, The College became autonomous, UGC approved, in 2008 and has been effectively practicing Outcomes-based Education.

To fully leverage the academic autonomy granted to the college, it is essential to address key 21st-century challenges in technical education, such as rapid technological change, IT integration, service sector growth, and the rise of knowledge economies.

Academic Autonomy enables the institute to design globally relevant curricula, adopt innovative teaching-learning methods, and nurture student creativity, positioning itself as a leading technological institution in the country. Autonomy allows the institution to innovate, stay relevant, and prepare engineers with strong fundamentals, technical expertise, problem-solving ability, self-learning skills, and leadership qualities.

The college should exercise academic autonomy, foster academic excellence, and cultivate trust among all stakeholders to enhance its reputation and visibility within the higher education sector.

2. Definitions:

- **"University"** means Visvesvaraya Technological University (VTU)
- **"College"** means B.M.S. College of Engineering (BMSCE)
- **"Affiliation"** means association of the College and its admission to the privileges of the University.
- **"Commission"** means University Grants Commission (UGC)
- **"Council"** means All India Council for Technical Education (AICTE)
- **"Statute"** means VTU Autonomous College Statute, 2018
- **"Academic Autonomy"** means freedom granted by the University to the College in all aspects of conducting its academic programmes for promoting academic excellence
- **"Autonomous College"** means a college notified as an autonomous college as per the VTU Autonomous College Statute, 2006
- **"Regular Students"** means students who are admitted to the first year of the respective
- **"Lateral Entry"** means students who are admitted to the third semester of the respective programme (Undergraduate Engineering Programme or the Post Graduate MCA programme, based on the qualification at the time of entry)
- **"Branch"** means specialization in a programme like B.E. degree programme in Civil Engineering or B.E. degree programme in Computer Science and Engineering etc. (k) "Course" means a subject either theory or practical identified by its title and code number.
- **"Degree"** means a degree awarded by the Higher Education Institution in accordance with the provisions of section 22(3) of the UGC Act.
- **"Grade Card"** means a consolidated statement issued every semester, reflecting their performance, to all the students registered for the semester End Examination after evaluating their performance. The grade card will display the details of Course code, title, number of credits earned, grade secured SGPA of that semester and CGPA earned till that semester.

- **"Course"** means one of the specified units which goes to comprise a program of study. Courses are assigned a unit value (credit points) and a specific course code which indicates the subject area/teaching department and year-level of each course.
- **"CGPA"** Cumulative Grade Point Average means it is a measure of overall cumulative performance of a student, overall semesters.
- **"SGPA"** Semester Grade Point Average means it is a measure of academic performance of a student in a semester.
- **"Program"** means an academic program framework that defines the structure of an educational curriculum. It includes the goals, outcomes of all courses and vision of a course of study and establishes the milestones and boundaries of learning. Academic Programs can include instructional, research and public service activities such as teaching and research assistantships, internships and cooperative education.
- **"Regulations"** means the prevailing applicable regulations notified by a statutory body.
- **"Semester"** means a duration meant for teaching, learning and final examinations. Typically, a regular semester (odd and even) shall have 16 weeks for Teaching -Learning-Process followed by 4 weeks for preparation, examinations and declaration of results of SEE. An academic year shall consist of two regular semesters of 20 weeks each and a special summer semester of 8 weeks for Teaching-Learning-Process followed by 2 weeks for SEE followed by 2 weeks of vacation. Generally, the Odd semester starts in the month of August, Even semester in the month of January and summer semester in the month of May in an academic year.
- **"Summer semester/Term"** means a short semester held after the even semester. During the summer semester, internship/apprenticeship/work-based vocational education and training can be carried out, especially by students who wish to exit after two semesters or four semesters of study. Regular courses may also be offered during the summer semester in a fast-track mode to enable students to do additional courses or complete backlog courses. The colleges can decide on the courses to be offered in the summer semester depending on the availability of resources.
- **"Statutes"** means the prevailing applicable statutes notified by a statutory body.

3. Academic Programs:

Academic autonomy applies to all programs offered by the college, including B.E. degree programs at the undergraduate (UG) level, M.Tech, M.B.A, and M.C.A programs at the postgraduate (PG) level, as well as M.Sc. (Engineering by research) and Ph.D. programs. These programs adhere to the minimum academic quality and standards required for the award of degrees, as prescribed by the University, the Council, and the Commission.

4. Programs Offered:

The College offers the following Undergraduate (UG), Postgraduate (PG) and Research Programs:

Undergraduate Programs

SNo	Programmes	Estd.
1	Civil Engineering	1946
2	Mechanical Engineering	1946
3	Electrical & Electronics Engineering	1946
4	Computer Science & Engineering	1983
5	Electronics & Communication Engineering	1971
6	Industrial Engineering & Management	1979
7	Electronics & Telecommunication Engineering	1986

8	Information Science & Engineering	1987
9	Electronics & Instrumentation Engineering	1991
10	Medical Electronics	1992
11	Chemical Engineering	1995
12	Bio-Technology	2002
13	Aerospace Engineering	2018
14	Artificial Intelligence and Machine Learning	2020
15	Artificial Intelligence & Data Science	2022
16	Computer Science & Engineering (Data Science)	2022
17	Computer Science & Engineering (IOT & Cyber Security including Blockchain Technology)	2022
18	Computer Science & Business Systems	2023

Postgraduate Programs

SNo	Programmes	Estd.
1	Construction Technology	1983
2	Machine Design	1985
3	Electronics	1986
4	Power Electronics	1991
5	Computer Science & Engineering	1993
6	Digital Communications	1996
7	Environmental Engineering	1997
8	Transportation Engineering & Mgmt.	2006
9	Computer Network Engineering	2011
10	VLSI & Embedded Systems	2014
11	Master of Computer Applications	1984
12	Master of Business Administration	1992

Research Programs

(Research Centres recognized by the University)

SNo	Programmes	Estd.
1	Civil Engineering	2002
2	Mechanical Engineering	2002
3	Electrical and Electronics Engineering	2002
4	Electrical and Communication Engg	2002
5	Industrial Engineering & Management	2002
6	Chemical Engineering	2004
7	Mathematics	2004
8	Management Studies (MBA)	2004
9	Biotechnology	2009
10	Computer Science and Engineering	2010
11	Information Science and Engineering	2011
12	Physics	2011
13	Chemistry	2011
14	Electronics & Telecommunication Engg.	2013
15	Computer Applications (MCA)	2023

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4.1. Program Duration and Total Credits:

SNo	Programs	Total Credits	Duration for obtaining Degree	
			Normal Duration	Maximum Duration
1	B.E.	160	4 years (Eight semesters)	8 years
2	B.E. (Lateral Entry)	120	3 years (Six semesters)	6 years
3	M.Tech.	80	2 years (Six semesters)	4 years
4	M.C.A.	100	2 years (Six semesters)	4 years
5	M.B.A.	100	2 years (Six semesters)	4 years

The students admitted to first semester B.E. program shall complete the program within eight academic years from the year of the first admission, failing which they will not be eligible for award of degree.

4.2. Admission:

a) Admissions to UG & PG Programs:

The admission of students to various UG & PG programs offered at BMS College of Engineering listed under section 4 shall be made by following the orders issued from government of Karnataka and/or University Notifications issued from time to time.

Eligibility Criteria for UG/PG Programs: The eligibility criteria for admission of students to UG, PG and Research degree programs at the Autonomous colleges shall be the same as those prescribed by the University.

- PG Diploma and Certificate Programmes: Admissions are managed directly by the College, in accordance with the Regulations approved by its Academic Council.
- Reservation Policy: All admissions must comply with the statutory reservation norms for different categories.

b) Lateral Entry admission to UG Programmes: Candidates with a polytechnic diploma or other equivalent qualifications (as approved by the University/Council) may be admitted directly to the second year of 4-year UG programmes, as per University norms.

c) Migration Between Branches/Colleges:

Students can **migrate** between;

- one branch to another in the same college or to another college within the University, shall be governed by the prevailing Regulations of the University.
- Within the same college or to another Autonomous, Affiliated, or Constituent College under VTU, shall comply with University Rules and Regulations.

d) Transfer of Students (Autonomous & Non-Autonomous):

Transfer of Students from non-Autonomous to Autonomous colleges, between Autonomous Colleges or from University scheme to Autonomous scheme within a college is subjected to the Transfer rules prevailing at the University.

e) Admission from Other Universities to an autonomous college:

Students seeking admission from other Universities to an Autonomous College, shall be the same as that prevailing for the other affiliated colleges of the University.

However, such admissions shall be subject to the following procedures:

- The Equivalence Committee of the Autonomous College shall assess and declare the equivalence of the syllabus/coursework completed by the student.
- If required, the College shall conduct bridge courses to address any academic gaps identified during the equivalence evaluation.
- Based on the recommendations of the Equivalence Committee, the proposal shall be placed before the Academic Council for approval.
- Upon approval from the Academic Council, the student's admission shall be processed with the final approval of the University.

4.3. Re-admission:

- Students who temporarily discontinue and are subsequently re-admitted or re-join the program shall complete their degree within a maximum duration of:
  - *Eight (8) years* for regular entry students, and
  - *Six (6) years* for lateral entry students, as applicable, from the date of initial admission.
- Re-admission is permitted *only on request* through the Principal and shall *not be considered as a matter of right*.
  - Re-admitted students shall not claim any special benefits or exemptions arising from the re-admission.
- Students re-admitted to any semester under a different scheme (as a repeater or fresher) must comply with the academic regulations of the prevailing scheme.
  - Such students are required to complete all the semester(s) of the program and undertake additional course(s), if mandated by the Equivalence Committee in concurrence with the concerned Board of Studies.
  - These students shall *not be eligible for the award of rank.*
- Re-admission to an odd/even semester shall not be treated as fresh admission. The student shall retain the *original University Seat Number* (USN) allotted at the time of initial admission.
  - The maximum duration of the program is counted from the academic year associated with the original USN.
- A student who fails to secure eligibility for the 3rd semester within *three academic years* from the date of admission to the 1st semester must *discontinue the program* or seek re-admission to the *1st semester afresh* with a new USN, while the *original year of admission* is retained.
- Students who temporarily discontinue, change schemes, or transfer credits from an autonomous college or another university to a non-autonomous constituent/affiliated college shall be eligible for the award of degree only if the *total earned credits* meet or exceed the *minimum credit requirement* prescribed by the University.
- In cases where the estimated earned credits upon completion of the program are *less than* those prescribed by the University, the student must *register for and complete additional course(s)* to fulfil the credit requirement.

5. Student Induction Program (As per AICTE guidelines):

The Induction Program is conducted to help new students adjust to and feel comfortable in their new environment. It is aimed at familiarizing newcomers with the institution and connecting them with its community.

The college conducts a **3-week induction program** for UG students before the semester begins. The program aims to help students adjust to the new environment, understand the institution's ethos and culture, build relationships with peers and faculty, and foster self-exploration. During the induction, students are introduced to institutional policies, practices, and values, and are assigned to mentor groups. The program focuses on helping students feel comfortable, establish a healthy routine, encourage bonding within their batch, and develop awareness and sensitivity towards themselves, their peers, and society.

6. AICTE Activity Points:

The regular UG students shall earn **100 activity points** throughout the duration of the program, while lateral entry students must earn **75 Activity Points** and it is a mandatory requirement for award of degree. These points will be reflected in your **Grade Card** at the end of the **VIII semester**. The students shall plan ahead and earn the necessary AICTE Activity Points consistently with proper guidance from the **Proctor**, throughout the program. The activity heads listed by AICTE is provided hereunder:

SNo	AICTE Activity Head
1	Support to School
2	Business Proposal for village
3	Sustainable water
4	Tourism promotion
5	Promotion of technologies
6	Reduction in Energy consumption
7	Skill rural population
8	Digitized money transaction
9	Women – Social /Economic
10	Efficient garbage disposal
11	Marketing of rural produce
12	Food Preservation/Packaging
13	Automation of local activities
14	Rural outreach programs
15	Contribution to National initiatives - Digital India/ Skill India/ swachh Bharat Internship etc
16	Contribution to activities in the college (department/Institution Level)
17	Any other with approval from the competent authority

Guidelines:

- Earning activity points shall not be considered for computation of SGPA/CGPA and for vertical progression.
- The total duration of the activities for the entire program is 400 hours for regular students and 300 hours for lateral entry students.
- Proctors shall monitor the progress of students work.
- For every Four hours of work, students will get One activity point.

- The student shall submit a Report and photographs related to activities carried out to the proctor.
- No Semester End Examination is conducted for Activity points.
- Students will be awarded either NP or PP grade based on their performance.
- Students will be awarded Degree only on earning 100 activity points and P grade in each activity.

7. Student's Feedback:

- The college obtains feedback from students on their course work and various academic activities conducted under the credit system. For this purpose, suitable Feedback form shall be prepared and the feedback is obtained on-line from the students at regular intervals maintaining confidentiality.
- The feedback received from the students is reviewed/discussed by a committee constituted for the purpose and necessary corrective measures are taken.

8. B.E. Honors Degree Program:

The objective of offering an Honors Degree program is to encourage students to engage in advanced levels of study and multidisciplinary learning. It aims to provide an opportunity for students to specialize in a focused area of their interest, acquire new skills and methodologies relevant to their field, and cultivate a sustained interest in advanced education and research. Additionally, the Honors Degree offers students the chance to gain recognition upon graduation for their advanced and distinguished work as undergraduates.

8.1. Eligibility Criteria for Registration:

- Registration to B.E. Honours qualification shall start from 5th semester onwards.
- Registrants shall have obtained a CGPA $\geq$7.50 at the end of 4th semester.
- Registrants shall have obtained a grade $\geq$ B in all the courses in the first attempt only, in the semesters until this stage.
- The lateral entry Diploma students shall have completed additional Mathematics I and II during 3rd and 4th semesters on the first attempt only.

8.2. Registration Procedure:

(a) Any student meeting the eligibility criteria specified above and intending to register for the Honours qualification shall apply to the University through the Principal of his/her College in the prescribed form along with the prescribed application fees within 15 working days after notification by the University.
(b) There shall be no limit on the intake of students for registration for the Honours qualification. All the applicants fulfilling the eligibility shall be free to register for the Honours qualification.
(c) The Registrar shall notify the registration, or otherwise, of the student/s within the next 15 working days on the University Notice Boards with copies to the Colleges concerned.
(d) If registered, the students shall pay a one-time non-refundable registration fee as prescribed by the University to confirm the registration.

8.3. Additional Coursework:

(a) In addition to the courses prescribed by the University to be completed successfully in the remaining semesters, that is, fifth to eight for the relevant Degree award, each

student registered for the Honours qualification shall have to take up the coursework as notified by the university from NPTEL and other platforms and complete each coursework successfully irrespective of the number of attempts, with a final score (Online assignments: 25% + Proctored exam: 75%) leading to NPTEL Elite (60 to 75 %) / Elite + Silver (76 to 89 %) / Elite-Gold (≥ 90 %)certificate, within the minimum prescribed duration for the award of degree.[To be read with 18UG HONRS 6.0 (c)]

(b) Students shall be permitted to drop the registered coursework/s and select alternative coursework/s in case they cannot appear for proctored examination/s or complete the examination as per 18UG HONRS 6 (a).

(c) The University shall announce the BOS-approved list of MOOCs (chosen from NPTEL/SWAYAM/other platforms) corresponding to each engineering programme. The University shall have the freedom to review and approve additional online platforms from time to time.

(d) (i) Students shall choose, online courses totaling to 18 or more credits from the bouquet of approved online courses as defined in 6(a). (ii) Students shall select, in consultation with the concerned Faculty Advisor, the MOOCs such that the content/syllabus of them are not similar to that of the programmes first to eighth semesters core courses, professional electives or open electives that the student chooses at later semesters of the programme. In case of violations, the credits earned by the students in such course/s shall not be considered for the summation of prescribed 18 or more credits and hence for the award of Honours degree.

(e) The students shall earn the credits by only appearing in person to the proctored examination conducted by NPTEL/SWAYAM/other platform. No autonomous or non-autonomous colleges under the University can conduct examination and award credits in lieu of NPTEL/SWAYAM/other platform to accrue 18 or more credits for the award of Honours degree.

(f) The method of assessment shall be as per the NPTEL online platform.

(g) The credit equivalence for online NPTEL courses shall be determined based on the following table. Table: Assigned

(h) The credit equivalence for online NPTEL courses shall be as per the following table.

Assigned credits for online courses:

Online course duration	Assigned credits
04 Weeks	01
08 Weeks	02
12 Weeks	03

8.4. Award of Honors Degree Qualification:

- Honors Degree will be awarded to the students only if their CGPA at the end of B.E. Program is ≥ 8.5.
- Students who cannot submit the certificates before the last date prescribed by the University shall not be considered for the award of "Honors Degree" irrespective of number of credits earned by them.

9. Minor Degree Program:

Minor Degree Program enhances employability skills and impart deep knowledge in emerging areas that are usually not covered in the Undergraduate Degree credit framework. A Minor program focuses on the fundamental principles of multiple Engineering disciplines, critical and analytical thinking, and the ability to develop a distinctive approach to interdisciplinary problems.

The objectives of Minor Degree Program are:

- To enable students to pursue allied academic interests in contemporary and emerging areas.
- To expand the domain knowledge of the students beyond their core branch of Engineering.
- To provide an academic mechanism for fulfilling the multi-disciplinary demands of industries.
- To enhance the employability of undergraduate students by equipping them for better opportunities in inter-disciplinary areas of Engineering and Technology.
- To offer knowledge in emerging technologies and thrust areas in Engineering.
- To provide students with opportunities to pursue higher studies in inter-disciplinary fields.

9.1. Guidelines:

- For B.E. with Minor degree, a student needs to earn 18 credits over and above the required 160 credits during 4th to 8th semesters of their B.E. program.
- A student can choose only one Minor program along with his/her basic Engineering Degree.
- There is no transfer of credits from Minor Program to regular degree program vice-versa.
- The maximum number of courses per semester for Minor degree is limited to two courses including Laboratory course.

9.2. Eligibility criteria:

- Student can opt for Minor Degree Program if he/she has CGPA $\geq$ 5.00 and no active backlog till the 3rd semester.
- The students will be awarded Minor Degree if they maintain CGPA $\geq$ 5.00 in the subsequent semesters without any backlog in order to keep the Minors registration active.

9.3. Registration Procedure:

- The students meeting the eligibility criteria shall apply to the University through the Principal of his/her college in the prescribed form along with application fee within 15 working days after notification by the University.
- If registration is approved, student shall pay one-time non-refundable registration fee prescribed by the University to confirm the registration.
- The students may contact the Institute level MOOC coordinator for further details.

9.4. Award of Minor Degree Qualification:

- All the students who complete the course(s) as prescribed in the above section and submit their certificates in-time before the completion of B.E. Program (8th semester), shall be eligible for the Minor Degree qualification.

- The Minor degree qualification shall be suffixed to the respective degree and shown in the degree certificate as a recognition of higher achievement.
- The CGPA and / or class awarded / award of rank / medal to the students shall only be based on the student's performance in various Semester End Examinations conducted by the college in the regular degree program and will not include the performance in Minor Degree qualification.

10. Guidelines pertaining to academic matters:

10.1. Academic Calendar: The Academic Calendar consists of three semesters in an academic year:

1. **Odd Semester** (Main Semester)
2. **Even Semester** (Main Semester)
3. **Summer Semester** (Supplementary/ Fast Track Semester)

The breakdown of academic year for regular semesters is given hereunder:

SNo	Academic Activities	Odd Semester	Even Semester
1	Online Course Registration	On the first day of Commencement of Semester	On the first day of Commencement of Semester
2	Course Work	15 weeks	15 weeks
3	Study holiday for Examination preparation	1 week	1 week
4	Semester End Examination	2.5 weeks	2.5 weeks
5	Evaluation and Declaration of Results	1.5 weeks	1.5 weeks
Total		**20 weeks**	**20 weeks**

Typical events included in the Academic Calendar of Events is as follows:

▪ Registration & Commencement of Induction Program and Commencement of Classes
▪ Course Registration and Commencement of Classes
▪ Dropping of Courses
▪ Quiz#1/AAT#1
▪ CIE: Test 1
▪ First Student Feedback on T-L-P
▪ First Proctor-Parent Meeting
▪ Quiz#2/AAT#2
▪ CIE: Test 2
▪ Second Student Feedback on T-L-P
▪ UTSAV – Annual Cultural Fest
▪ Second Proctor-Parent Meeting
▪ CIE: Test 3
▪ Third Student Feedback on T-L-P
▪ Announcement of Final CIE and Attendance
▪ Farewell to the Final year students
▪ Open House / Project Exhibition

▪ Course Withdrawal
▪ Last date for payment of reappearing examination fees
▪ Last working day
▪ Submission of Final CIE to the office of COE
▪ Issue of Hall Ticket for SEE
▪ SEE- Lab/Project/SMR/SEE-Theory
▪ Announcement of SEE results
▪ Vacation for students
▪ Commencement of Fast Track / Summer Semester
▪ Commencement of Odd Semester

10.2. Credit Definition: One unit of course work is assigned **one credit** in the regular semester (Odd/Even semester) for:

a) Theory Course conducted for one hour/week/semester
b) Tutorials conducted for Two hours/ Week/ Semester
c) Practical classes (Laboratory Courses) conducted for Two hours/ Week/ Semester
d) Four-credit theory courses shall be designed for 50 hours of Teaching –Learning-Process

e) Three credit theory courses shall be designed for 40 hours of Teaching –Learning-Process
f) Two credit theory courses shall be designed for 25 hours of Teaching –Learning-Process
g) One credit theory course shall be designed for 15 hours of Teaching –Learning-Process

The course content is framed with equal teaching hours for every module / Unit.

10.3. Credit Allocation:

10.3.1. Typical credit structure for a course:

Lecture (L) (Hours/week)	Tutorial (T) Hours/week)	Practical (P) Hours/week)	Credits (L:T:P)	Total Credits
4	0	0	4:0:0	4
3	0	2	3:0:1	4
2	2	2	2:1:1	4
3	0	0	3:0:0	3
2	2	0	2:1:0	3
2	0	2	2:0:1	3
0	0	6	0:0:3	3
2	0	0	2:0:0	2
1	0	0	1:0:0	1
0	2	1	0:1:0	1
0	1	1	0: 0.5: 0.5	1
0	0	2	0:0:1	1
Note: Activities like practical training, study tour, and participation in Guest Lectures do not carry credits.				

10.3.2. Typical credit distribution among various curricular components:

SNo	Category	Credits	Percentage of total Credits
1	Humanities and Social Sciences including Management courses and ability Enhancement courses	16	10%
2	Basic Science Courses	20	12.5%
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer/PL/ET etc.	22	13.7%
4	Professional Core courses relevant to chosen specialization/branch	59	36.8%
5	Professional Elective courses relevant to chosen specialization/branch	12	7.5%
6	Open subjects -Electives from other technical and /or emerging subjects	12	7.5%
7	Project work and internship in industry or elsewhere	19	12%
8	Mandatory Courses (Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition)	(Non-Credit)	00%
Total		**160**	**100%**

Semester-wise distribution of Credits among curricular components

Curricular Component ↓ Sem →	I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course (BS)	9	9	2						20
Engineering Science Course (ES)	8	8	3	3					22
Professional Core Course (PC)			15	16	16	12			59
Professional Elective Course (PE)					3	3	6		12
Open Elective Course (OE)						4	4	4	12
Project / Mini-Project (PW)					2		4	7	13
Internship (INT)							6		06
Humanities and Social Sciences, Management Course (HS)	1	1	1	1	1				05
Ability Enhancement Course	2	2	1	1		3			09
UHV Course				1					01
Indian Knowledge System								1	01
Non-Credit Mandatory Course	–	–	NC	NC	NC	NC	–	–	
Total Credits	**20**	**20**	**22**	**22**	**22**	**22**	**20**	**12**	**160**

10.4. Course Registration in Regular Semester:

A student shall register for courses core or elective, in order to earn credits required for the completion of a Degree, Diploma, or Certificate programme. The details of these courses, along with the grades obtained and credits earned, shall be reflected in the Grade Card issued by the College at the end of each semester (i.e., Odd, Even, or Supplementary).

1. Course registration is conducted in **online mode**.

2. A student has to register for all the courses offered in the semester. Partial course registration is not permitted.
3. The students are eligible to move from odd semester to even semester during the same academic year.
4. A student can register for a **maximum of 28 credits** including re-registered courses, if any. However, a student has to maintain a minimum of 16 credits in a semester.

10.5. Course re-registration in Regular Semester:

- Course Re-registration is offered for the students who have dropped, withdrawn, secured **'NE' grade** in a Professional Elective / Open Elective course, then student can re-register for the same or different course in the same category.
- Students needs to re-register those courses and shall secure **'E'** or higher grade.
- A student can re-register for a **maximum of 28 credits** including regular registered courses in a semester.
- The re-registration is done **Manually** at the respective department.
- The students shall submit a hard copy of the letter mentioning course code and course title for the courses to be re-registered with the recommendations of the concerned Proctor and HoD to the E-governance office to facilitate the online payment process. The students shall also submit a copy of the same to the department office.

10.6. Dropping of Courses:

- A student, who wants to drop a course, has to apply through concerned Proctor and HoD to the Dean (Academic) for permission.
- The dropping of the course is allowed within two weeks from commencement of the semester.
- If a student drops the course, the fee for the course registration has to be paid in the subsequent semesters.
- The course dropped will not be indicated in the grade card.
- A student can drop course(s) in a regular semester, however after dropping he/she has to maintain a minimum of 16 credits.
- The students are not permitted to drop the **Project work / Internship** in a regular semester.

10.7. Attendance Requirement: A student has to obtain a **minimum attendance of 85%** in each course to appear for the Semester End Examination.

10.7.1. Condonation of Attendance:

- In case of shortfall, the concerned Head of the Department shall consider and condone deficiency up to a **limit of 10%** (i.e., if student have attendance between 75% and less than 85%) in special cases and shall submit a list of such candidates to the office of COE within the date specified in the Academic Calendar. However, all the relevant documents pertaining to condonation of attendance shall be maintained by the respective department and produced as and when required by the Institutional authorities.
- However, such students who have attendance between 75% and less than 85% may get condonation of attendance by the concerned HOD, only on valid grounds such as

hospitalization, participation in University and inter-collegiate sports, cultural activities and participation in seminar, workshop and paper presentation with prior permission.

- Student must submit the request for condonation of attendance with supporting documents duly recommended by the Proctor and HoD before announcement of final CIE and Attendance as specified in the Calendar of Events failing which condonation of attendance will not be considered.
- Students having less than 75% attendance are not eligible for condonation of attendance shortage on any of the grounds.
- If a student fails to satisfy the minimum attendance requirements in any course, **'NE/DX'** grade is awarded in that course.
- For first semester B.E. and lateral entry students, the attendance reckoned from their date of admission. For all other semester students, attendance will be counted from the date of commencement of class as announced in the college academic calendar.

Any student failing to meet the above standard of attendance in any course(s) registered, shall not be allowed to appear for SEE of such course(s).

10.8. Withdrawal of Course:

A specific time period shall be identified by the College towards the end of each semester to facilitate a review of students' performance in the CIE by their respective proctors. Students who have poor performance in one or more courses may be permitted to withdraw subject(s) based on the following conditions:

- A student is permitted to withdraw a course one week before the last working day as mentioned in the Calendar of Events.
- A student must have a minimum of 85% attendance in the course(s) and minimum of 16 credits in the semester.
- The withdrawn course(s) will be indicated with the **Grade 'W'** on the Grade Card. Such course(s) must be re-registered and completed in a subsequent semester as per the academic regulations of the programme.
- Re-registered courses and Mandatory courses cannot be withdrawn.

10.9. Non-Credit Mandatory Course (NCMC)

The UG Degree programs also require the inclusion of certain courses necessary for familiarity of subjects, like Communication Skills, Chosen Language Knowledge/Proficiency, NSS, NCC, Physical Education, Yoga, Music, Indian Knowledge System, Theatre Arts, Photography, Fine Arts etc. as Mandatory Non-Credit Courses. Such courses shall not carry any credits. These courses shall have only CIE and shall not be considered for CGPA calculation and vertical progression, but completion of the courses shall be mandatory for the award of degree.

Formal registration for these courses shall also be done along with other courses, at the beginning of the semesters.

Non-Credit Mandatory Courses requirements are assessed as **Pass (PP) / Not Pass (NP)**, subject to the fulfilment of the minimum requirements of the specified activities and a **minimum of 85% attendance**. The award of degree is subject to successful completion of these requirements.

A student will be awarded **'PP' grade** for the course registered for, in that semester, provided the minimum requirement is met together with attendance criteria.

Not satisfying these requirements will result in a failure grade 'NP' (Not Pass), and the student has to **re-register for the course when offered next in summer semester only**.

10.10. Projects:

Students undertake two types of projects: Single Discipline Projects and Inter-disciplinary Projects.

For **Single Discipline Projects**, the Continuous Internal Evaluation (CIE) marks shall be awarded by the Department Project Evaluation Committee. The evaluation shall be based on the Project Report, Presentation Skills, and the Viva-Voce (question and answer session). The marks awarded for the Project Report shall be the same for all members of the group, whereas the marks for the other parameters shall be based on the individual performance of the students.

For **Inter-disciplinary Projects**, the CIE shall be conducted group-wise at the college level with the participation of all project guides. The evaluation shall similarly be based on the Project Report, Presentation Skills, and the Viva-Voce. The marks awarded for the Project Report shall be the same for all members of the group, whereas the marks for the other parameters shall be based on the individual performance of the students.

10.11. Mini-Project: The Mini-Project is offered in the 5th semester as a laboratory-oriented course designed to enhance students' practical knowledge and technical skills through the development of small-scale applications.

Based on the student's ability and the recommendation of the Proctor, the mini-project may be assigned either as a single-disciplinary or a multidisciplinary task. Projects may be undertaken individually or in teams comprising 3 to 4 students.

A student has to get a minimum of 40% marks in CIE to get eligibility to take up SEE. Failure to meet this requirement will necessitate a complete repetition of the mini-project.

10.12. Major-Project: The Major Project could be single-discipline and inter-disciplinary in nature.

- The Project could be part of the Research activity carried-out in the department.
- A comprehensive literature survey shall be a mandatory component of the project.
- Students are permitted to carry out their projects outside the institute in a recognized industry or research laboratory.
- Project guides shall be assigned by the Departmental Academic Committee (DAC) / Department Advisory Board (DAB).
- Projects may be undertaken individually or in teams comprising 3 to 4 students.
- In the case of interdisciplinary projects, there must be a guide from each participating department.
- The final project report, duly approved by the project guide and the Head of the Department (HOD), shall be submitted as per the timeline specified in the department-level academic calendar.
- A plagiarism check is mandatory for the dissertation report before submission.

- A student has to get a minimum of 40% marks for a pass. If a student fails, then training has to be repeated entirety.

11. Internship (Industry/Research):

Students have to undergo the internship for a period of **16 weeks** during VII/VIII semesters. Those students who are unable to complete during these periods will have to undergo the internship after the VIII semester and the VIII semester Grade Card will be issued only after the successful completion of internship by that student.

A student has to get a minimum of 40% of marks for a pass. If a student fails, then the training has to be repeated in its entirety.

12. Summer/Supplementary Semester:

The Summer semester is provided for helping students who have failed in their examinations. The Summer semester is provided to help the student to avoid losing an academic year. It enables students who wish to undertake a one-year research / Industry internship (leading to a project / start-up) / placement training (leading to job assurance) at the final year level, to complete higher semester courses by registering in summer semester. It also helps the students who are readmitted / opting change of branch / change in scheme / change of college to progress to higher semesters by offering backlog / equivalent courses during summer semester.

- The summer semester held annually after the EVEN semester shall have duration of **8 weeks** of classes followed by **2 weeks** of examinations.
- The department may offer selected regular courses, including mandatory courses depending on the availability of resources.
- **Maximum of 14 credits** is permitted in summer semester for course work, excluding audit / mandatory non-credit courses.
- Dropping and Withdrawal of courses are not allowed in summer semester.
- The students are not permitted to register **Project work** and **Internship** in summer semester.
- In addition, students have supplementary examination for all **'F' / 'AB' grade** courses of that academic year after the announcement of even semester results.
- The transitional grades i.e., **'X'** and **'I'** grades are not awarded in Summer Semester. However, students awarded with 'W' grade in regular semester may register in Summer semester, in case they wish to improve the score in CIE.
- Students with **'NE' grade** is eligible to register whenever offered during the odd or even semesters.
- Compensatory test will not be conducted in summer semester.
- The students completing four years of study and still have courses with **'DX' / 'NP'** grades, summer semester shall be conducted along with the regular odd/even semesters to complete the degree without much delay. However, such students can also re-register to **'DX' / 'NP'** grade courses, if they are offered in the regular odd/even semesters of the ongoing batch of students.

12.1. Eligibility to register for a course in Summer Semester:

Students who have received a 'DX' or 'NP' grade due to shortage of attendance and/or failure to secure the minimum required CIE marks in a course *must* register for the summer semester. These students are required to fulfill the minimum attendance and CIE criteria during the summer semester in order to become eligible to appear for the Summer Semester End Examination (SEE).

Students who have been awarded an 'F' (Fail) or 'AB' (Absent) grade but have the requisite attendance and CIE marks for a course may:

- Register for the summer semester SEE by carrying forward the previously earned CIE marks.
- Reregister for the course during the summer semester for better learning by forfeiting earlier CIE marks and satisfying the attendance and CIE requirements afresh.

Academically outstanding students with **CGPA ≥ 9.0**, who aspire to complete the programme in **3.5 years**, may register for additional subjects from higher semesters during the summer semester, subject to the availability of such courses offered by the higher education institutions.

Slow learners may opt to drop or not register for certain courses during the regular Odd/Even semesters and take those courses during the summer semester. This shall be done strictly under the guidance of the Faculty Mentors, ensuring that the academic load in each semester does not fall below the minimum prescribed limit.

13. EXAMINATION AND EVALUATION

13.1. Semester End Examination (SEE): Semester End Examination (SEE) will be conducted at the Institution level as per the calendar of events released by the College.

13.2. Conduct of Semester End Examinations:

Eligibility Criteria: Only students who fulfil the attendance requirement as specified in Regulation and the Continuous Internal Evaluation (CIE) requirement as per regulations shall be deemed eligible to appear for the SEE in that course.

The examination under SEE shall be conducted for a **maximum of 100 marks**. The marks secured by students in the SEE shall be proportionately **scaled down to a maximum of 50 marks**, which will then be added to the CIE marks to determine the final marks for awarding the letter grade in the course.

The Semester End Examination (SEE) for all courses offered during a semester shall be conducted at the end of the respective semester, in accordance with the Scheme of Teaching and Evaluation. However, if no students are enrolled or registered for a particular course, the examination for that course shall not be conducted.

13.3. Schedule of Examinations:

The examinations for all programmes shall be conducted at the end of each semester as per the academic calendar.

13.4. Guidelines for Scheduling Examination:

Students with no backlog courses shall not be scheduled for more than one examination on the same day, as far as possible.

Students with backlog courses may, however, encounter the following scenarios:

a) Two examinations scheduled at the same time on a single day.
b) Two examinations scheduled on the same day, one in the morning session and the other in the afternoon session.
c) Examinations scheduled on consecutive days.

Students must be prepared to appear for the examinations in **scenarios (b) and (c)** as described above. While the University shall make every effort to avoid scheduling conflicts as described in **scenario (a),** due to time constraints and the need to announce results on time, such conflicts may be unavoidable. In such cases, students are advised to consult their proctor and choose which examination to attend.

Please note that changing the date of examination is not an option, and the examination timetable shall not be modified, altered, or adjusted under any of the three scenarios mentioned.

Table:

Semester End Examination (SEE) for UG (2024 Batch)			
Type of Examination	**Odd Semester**	**Even Semester**	**Supplementary Examination**
Regular SEE	**I, III, V, VII** Semesters for all **regular & Re-registered (DX)** students completing the semester with Required Eligibility **Minimum 16 Credits and Maximum 28 Credits** & Students who have received an 'F' or 'AB' grade in a course are allowed to reappear for the SEE by carrying forward their CIE marks (only Odd Semester Courses)	**II, IV, VI, VIII** For all regular Re-registered students completing the semester with Required Eligibility **Minimum 16 Credits and Maximum 28 Credits** & Students who have received an 'F' or 'AB' grade in a course are allowed to reappear for the SEE by carrying forward their CIE marks (only Even Semester Courses)	Students who have received an **'F' or 'AB' grade** in a course are allowed to reappear for the Supplementary Examination by carrying forward their CIE marks whereas students with **'DX' or 'NP'** grades must re-register for the course and obtain fresh CIE marks to regain eligibility to attend the SEE **(Maximum of 14 Credits)**
Makeup Examination	Will be conducted immediate after announcement of Odd SEE results only for the students **who obtained 'X' and 'I' Grade.**	Will be conducted immediate after announcement of Even SEE results only for the students **who obtained 'X' and 'I' Grade.**	There is no Makeup Examination after Summer Semester results **(No 'X' and 'I' Grade will be awarded in the Summer Semester)**
CIE Only (Non-credit)	"Continuous Internal Evaluation (CIE) through assignments, quizzes, or seminars will be conducted to assess the performance, and Semester End Examination (SEE) is not required for non-credit courses."	"Continuous Internal Evaluation (CIE) through assignments, quizzes, or seminars will be conducted to assess the performance, and Semester End Examination (SEE) is not required for non-credit courses."	Students with NP Grade can register for the course and can earn PP Grade

13.5. Conduction of SEE in Odd and Even semester:

Odd Semester: SEE is conducted only for odd semester courses (I, III, V, VII) and students can also appear for backlog courses (F/AB grades) from previous odd semesters.

Even Semester: SEE is conducted only for even semester courses (II, IV, VI, VIII), and students may also appear for backlog courses (F/AB grades) from previous even semesters; in the first year, backlog courses from the 1st semester that are offered in the 2nd semester can also be attempted.

As a special case, only in the first year, if the students have **Backlog courses** ('F' grade/'AB' grade courses) **of first semester** and if those courses are offered in second

semester, then SEE shall be conducted for such courses in second semester. For the courses of first semester **that are not offered in second semester** (ex: Maths course of first semester), students can appear for examinations of such courses **in subsequent summer semester/odd SEE.**

13.6. Conduction of SEE in Summer /Supplementary semester: SEE is held for courses offered during the summer semester and students can also appear directly for backlog courses ('F'/ 'AB') from any previous semester. Students with DX Grade Can Re-Register and Earn the Eligibility (Max 14 Credits only).

13.7. Eligibility for Makeup Examination:

The Makeup Examination facility is available to students who have missed the Semester End Examination (SEE) for one or more courses in a semester due to valid reasons, resulting in the award of **an 'I' grade**. Students who have been assigned **an 'X' grade** are also eligible to avail of this facility. The Makeup Examination facility is available to students for both UG and PG programmes.

The Makeup Examination will be held immediately following the announcement of the SEE results, as per the dates specified in the Academic Calendar. In exceptional circumstances, and with the permission of the Academic Council of the Institute, the Makeup Examination may be scheduled at any other time during the semester. In all cases, the standard of the Makeup Examination shall be the same as that of the regular SEE.

"The award of grades will be reduced by one letter grade for 'X' grade candidates."

It is important to note that appearing in a Makeup Examination for a course shall be considered a second attempt, except in cases where the student has participated in national or international level events, such as Sports, NCC, NSS, RD Parade, etc., with prior approval from the University.

No Makeup Examination after Summer Semester: It is to be noted that, no Makeup Examinations shall be conducted after the Summer Semester End Examination.

13.8. Application Process for 'I' Grade:

Students seeking to appear for the Makeup Examination due to the reasons mentioned above are required to apply to the Controller of Examinations /Dean through the respective Department. The application should be accompanied by the relevant medical or other supporting documents issued by a competent authority. In cases of the death, serious illness, or accident of a parent or guardian, the application must be supported by appropriate documentary evidence. The decision regarding the approval of the Makeup Examination application shall rest with the committee headed by the principal of the institute, and the decision of this committee shall be final.

13.9. Question Paper Pattern: (Only for UG)

Table:

SNo.	Total Questions	Question Structure	Choice/ Options	Details
1.	10	5 Units, 2 questions in each unit	2 options per unit	**Each unit will have 2 questions** to choose from. Students must attempt 1 question from each of the 5 units.

- Total of 10 questions (2 questions from each of the 5 units).
- Students must answer 1 question from each of the 5 units (total of 5 questions).
- Each unit gives 2 options, so the student has a choice for each unit.

This structure ensures that students are evaluated on all key topics, while still giving them some flexibility in their choice of questions.

13.10. Evaluation of SEE Answer Scripts: The answer scripts of the Semester End Examination (SEE) shall normally be evaluated by the respective course instructor. However, as a quality assurance measure, a Department BOE has to oversee the evaluation process, ensuring consistency, fairness, and the maintenance of academic standards.

Scrutiny of Answer Scripts by External Reviewers: As part of the external review process, 30% of the evaluated answer scripts are randomly selected and scrutinized by external experts appointed by the institution. This scrutiny is aimed at verifying the fairness, consistency, and accuracy of the evaluation carried out by internal examiners.

13.11. Results and Revaluation: The results of the Semester End Examinations will be declared as per the schedule mentioned in the Examination Calendar of the institution.

Students who have appeared for the Semester End Examinations are eligible to apply for revaluation of the answer scripts of the current session, as per the circulars released by the institution from time to time.

13.12. Marks and Passing Standards

- **CIE (Continuous Internal Evaluation):**

  Both CIE and SEE carry equal weightage (50:50) in the overall evaluation. A student must score at least 40% of the maximum prescribed marks in CIE to be eligible to pass the course.

- **SEE (Semester End Examination):**

  i. The SEE also carries 50% (for 100 marks) weightage in the total marks for the course. Students need to secure a minimum of 35% in the SEE to pass.
  ii. Total Marks (CIE + SEE):
  iii. To pass the course, the sum of both CIE and SEE marks must be at least 40% of the total maximum prescribed marks for the course.

Absolute grading with equal weightage for Continuous Internal Evaluation (CIE) and Semester End Examination (SEE): (50:50).

Evaluation Method	Passing Standard
Continuous Internal Evaluation (CIE)	Minimum score: **40%** of the maximum marks prescribed for the course.
Semester End Examination (SEE)	Minimum score: **35%** of the maximum marks prescribed for the SEE.
Total Marks (CIE + SEE)	Combined CIE and SEE marks must be at least **40%** of the maximum prescribed for the course.

Examination Standards for SEE (Semester End Examination)

- The examination for all courses under the Semester End Examination (SEE) will be conducted for a maximum of 100 marks.
- The marks secured by students for these 100 marks will be proportionally scaled down to a maximum of 50 marks. This scaled value will then be added to the Continuous Internal Evaluation (CIE) marks for the final grading.

SEE Passing Criteria for Different type of Courses:

a) Theory Courses:

- The maximum marks for SEE in all theory courses will be 50.
- The minimum marks required to pass in SEE will be 35% of the total marks for SEE (i.e., 18 marks).

b) Practical/Fieldwork/Internship/Innovation/TechnicalSeminar/Societal/ Entrepreneurship - based Internship and Mini-Project:

- The maximum marks for SEE in practical's, fieldwork, internships, mini projects, and other similar activities will also be 50.
- The minimum marks required to pass in SEE will be 35% of the total marks for SEE (i.e., 18 marks).

14. Grading System:

With the introduction of the Choice Based Credit System (CBCS) in Higher Education Institutions (HEIs), the **institution has adopted an absolute grading system**, wherein marks are converted into letter grades, and the results for each semester are declared with the Semester Grade Point Average (SGPA) upon completion of the respective courses.

The Course Letter Grade (or simply letter grade or grade) is an index of a student's performance in a particular course and serves as a qualitative measure of their achievement, based on the percentage range of marks secured in the Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE) combined, or CIE alone in cases where SEE is not applicable. The total marks obtained by the student in CIE and SEE are expressed as a percentage to determine the corresponding grade points and the letter grade.

For each course, the combined marks obtained in the Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) are expressed as a percentage, based on which a letter grade is awarded as per the following scale:

UG Programmes (B.E./B.Tech.) - Letter Grade and Grade Points

Letter Grade	Grade Point	Percentage Range	Performance Level
O	10	≥90%	Outstanding
A+	9	80%–89%	Excellent
A	8	70%–79%	Very Good
B+	7	60%–69%	Good
B	6	50%–59%	Above Average
C	5	45%–49%	Average
P	4	40%–44%	Pass
F	0	<40%	Fail

14.1. Additional Letter Grades:

Grade	Description
DX	Detained due to non-compliance with attendance or CIE requirements. Not eligible for SEE.
NP	Not Passed in a Non-Credit course.
AB	Absent for the course in the Semester End Examination (SEE).
PP	Passed in a Non-Credit course.

a) DX Grade:

A student satisfies the attendance requirement but fails to meet the passing standard (minimum 20 out of 50) in Continuous Internal Evaluation (CIE) for any registered credit course, they shall not be permitted to appear for the Semester End Examination (SEE) in that course, and the course will be marked as 'DX' in the grade card."

A student satisfies the passing standard in CIE but fails to meet the Minimum attendance requirement (less than 85%) for any registered credit course, they shall not be permitted to appear for the Semester End Examination (SEE) in that course, and the course will be marked as 'DX' in the grade card."

b) NP Grade:

"A student who satisfies the attendance requirement but fails to meet the passing standard in Continuous Internal Evaluation (CIE), as specified for any registered Mandatory Non-Credit Course shall be awarded an 'NP' (Not Passed) grade in the grade card."

However, in the cases of 'DX' and 'NP' grades, students are allowed to appear for examinations of other eligible courses of the same semester, including backlog courses, provided they meet the eligibility conditions for the SEE. Students from UG Programmes who have been awarded a 'DX' or 'NP' grade in a course may re-register for the same course in the summer semester and will be permitted to appear for the SEE only after fulfilling the minimum CIE and attendance requirements."

14.2. Transitional Grades:

Grade	Condition	Description
I	Satisfactory attendance and CIE passed, but **absent from SEE** for **valid and documented reasons**	Awarded when a student is absent from SEE due to reasons like **illness, accident, family emergency**, or **other certified emergencies**. Required: prompt intimation and submission of supporting documents (medical certificates, authority letters, etc.).
X	Satisfied **attendance and CIE** (CIE marks ≥ 90), but **failed in SEE** (F grade)	Temporary grade given when a student performs well in CIE but fails the SEE. Student is expected to reappear for SEE to convert this to a passing grade.
W	Has **satisfactory attendance**, but **withdraws from the course** before deadline	Awarded when a student drops the course as per **faculty/mentor advice** before the university's withdrawal deadline. No grade points are assigned for this course.

All 'W' grades awarded to students shall be eligible for conversion to appropriate letter grades only after the student's re-register for the respective courses in a main (Odd/Even) or supplementary semester and fulfil the prescribed requirements for attendance,

Continuous Internal Evaluation (CIE), and Semester End Examination (SEE) as per college norms.

Grade Card: At the end of each semester, every student shall be issued a Grade Card listing all registered courses along with their credits, letter grades, and grade points; however, only credit courses with grade points will be considered for SGPA and CGPA calculations, while audit and non-credit mandatory courses will not be included in the computation—mandatory courses will be marked as 'PP' (Passed) or 'NP' (Not Passed), and students must secure a 'PP' in all such courses to be eligible for the degree award."

14.3. Grade Point Averages (SGPA & CGPA)

SGPA and CGPA:
The credit index is used to calculate two important academic performance indicators: Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA). These two indices reflect a student's performance in individual semesters and across all semesters respectively.

a) Semester Grade Point Average (SGPA):

The SGPA for a semester is calculated by dividing the credit index for the semester by the total number of credits registered by the student during that semester. It is calculated as:

$$SGPA = \sum \frac{[(Course\ Credits) \times (Grade\ points\ for\ all\ registered\ Courses\ with\ letter\ grades\ from\ S\ to\ F)]}{\sum (Course\ credits\ for\ all\ registered\ Courses\ with\ letter\ grades\ from\ S\ to\ F)}$$

(Includes all Grades)

b) Cumulative Grade Point Average (CGPA): CGPA gives the sum total of credit indices of all the previous semesters divided by the total number of credits registered in all these semesters.

$$CGPA = \frac{\left[\sum \text{(Course Credits)x(Grade Point/s) for all the courses registered by the students excluding F grades until that semester.}\right]}{\left[\sum \text{(Course Credits) for all the courses registered by the student excluding F grades, in that semester.}\right]}$$

* For the purpose of CGPA computation, grades such as F, AB, W, and DX are excluded, while all passing grades all Semesters, including 'O', 'A+', 'A', 'B+', 'B', 'C', and 'P', are included."

The SGPA AND CGPA shall be rounded off to 2 decimal points and reported in grade cards.

15. Vertical Progression:

The criteria for Vertical Progression are established in accordance with university guidelines to ensure uniform minimum standards for CGPA and the required number of credits to be earned within an academic year, thereby facilitating student mobility across institutions. These criteria are subject to a maximum program duration of eight years for regular students and six years for lateral entry students.

VTU Vertical Progression Criteria – UG Programmes (2024-25)

Progression Level	Criteria	Remarks
Progression to 2nd Year (3rd Semester)	Students with 'F', 'DX', or 'AB' grades totalling more than 16 credits in 1st and 2nd semesters are **not permitted to move to 3rd semester.**	Must clear these backlogs before progressing to 3rd semester.
Progression to 3rd Year (5th Semester)	**Students shall not be restricted** even if the student has any number of backlogs ('F', 'DX', 'AB' grades).	Allowed progression to 5th semester regardless of arrears
Progression to 4th Year (7th Semester)	Students with any pending 'F', 'DX', or 'AB' grades from 1st and 2nd semesters of the first year of program **are not allowed to move to the 7th semester**.	Must clear all first-year credit course backlogs before progressing to 7th semester
Audit/Mandatory Non-Credit Courses	May be carried forward to 7th semester. However, they must be completed before the award of the degree.	These do not affect vertical progression but are mandatory for award of degree
Odd to Even Semester	No restriction on promotion from odd semester to the following even semester (e.g., 1st to 2nd, 3rd to 4th etc.).	Applies to both UG and PG programmes regardless of backlogs.

Note: Vertical progression shall strictly adhere to the VTU Regulations and official notifications issued for the respective programmes from time to time. Autonomous colleges are not permitted to deviate from these prescribed guidelines.

16. Award of Class & CGPA to Percentage Conversion

a) **Award of Class:** Autonomous colleges under VTU may determine class equivalence based on CGPA thresholds only at the time of awarding the degree. This must follow guidelines set forth in the AICTE Approval Process Handbook. These equivalences help interpret SGPA/CGPA in terms familiar to conventional result systems.

b) **Conversion of CGPA into Percentage of Marks**

Percentage (M)=CGPA×10

Example:
If a student has a CGPA of **8.20**, then:

c) **Class Equivalence Based on Percentage and CGPA**

Percentage Range (M)	CGPA Range	Awarded Class
$M \geq 70$	CGPA ≥ 7.00	First Class with Distinction (FCD)
$60 \leq M < 70$	$6.00 \leq$ CGPA < 7.00	First Class (FC)
$50 \leq M < 60$	$5.00 \leq$ CGPA < 6.00	Second Class (SC)
$40 \leq M < 50$	$4.00 \leq$ CGPA < 5.00	Pass Class (P)

17. Successive Failures and alternate course selection:

- If a student fails in a course other than the professional core course even after four attempts, he may drop that course but shall choose an alternate course of his/her choice with the same number of credits from the pool of courses suggested by the department (approved by BoS).
- The course selected should not have been studied by the student or to be studied in future at higher semesters. The proctor shall guide/advise the student in this regard.

- This provision is given only for two courses (one at a time) during the entire maximum duration of the program.
- This provision is optional; the student/s can continue registering for the same course without opting for a change of course.
- The college must facilitate Registration for the newly chosen course and Conduct of Continuous Internal Evaluation (CIE) for the selected course. This provision can be used only for two courses during the entire duration of the program (one course at a time). It is an optional provision. The student may also choose to continue appearing for the original course in subsequent attempts instead of opting for a substitution.

18. **Rejection of Results:**

a) **Option to Reject Academic Performance:** A student may choose to reject the entire academic performance of one academic year, including CIE (Continuous Internal Evaluation) marks. This option can be exercised only once during the entire duration of the programme.

b) **Conditions for Rejection:**
- If the student opts to reject, it must be for all courses in that academic year, regardless of whether they are passed or failed.
- Rejection of the 8th semester project performance is not permitted under any circumstances.

c) **Readmission & Continuity:**
- Readmission after rejection will not be treated as a fresh admission.
- The student shall retain the original University Seat Number (USN).
- The overall programme duration will continue to be calculated from the initial admission (based on the old USN)

d) **Eligibility Implications** - Students who choose to reject the results:
- Will remain eligible for the award of the Degree and Minor Degree (if applicable)
- But will not be eligible for University Ranks or Honors Degree

19. **Malpractice Policy:** Academic malpractices shall be treated with utmost seriousness, and appropriate disciplinary action shall be taken as per institutional and university regulations.

19.1. **Malpractice in Quizzes / Tests:** In cases where malpractice is detected during any internal examination (CIE) such as assignments, quizzes, or tests, the Course Teacher or Invigilator shall report the incident to the **Principal or CoE / Dean**. Upon review, if the Principal / CoE / Dean deems the offence serious, the matter shall be referred to the Malpractice Consideration Committee (MCC) of the Institute for further investigation and appropriate penal and action. **'NE' grade** will be awarded for that course in that semester. He/she will not be permitted neither to Drop/Withdraw nor appear for SEE in that course.

19.2. **Malpractice in SEE:** Any instance of malpractice during the Semester End Examination (SEE), regardless of its severity, shall be mandatorily reported to the Principal and COE for necessary action in accordance with the Institution's disciplinary procedures.

20. Multiple-Entry-Multiple-Exit Options (MEME)

Stage	Entry/Exit Point	Description	Eligibility Criteria	Requirements & Conditions	Exit After Completion	Duration
Entry 1	1st Semester	Admission to the 1st Year of Bachelor's Degree Program	- Meet entrance requirements (academic qualifications, entrance exam)	- Entry based on specified levels of attainment at the secondary level.	-	1 Year (2 Semesters)
Exit 1	End of 2nd Semester	Exit after completion of 1st Year	- Completion of 1st and 2nd Semester requirements	- Must complete all academic requirements of 1st and 2nd semesters.- Must earn requisite credits. Recommendation from Counselling Team	Eligible for Exit	2 Years (After 4th Semester)
Entry 2	3rd Semester	Admission to the 2nd Year of Bachelor's Degree Program	- Must have completed 1st year and exited after the 2nd semester.- Subject to maximum 8 years duration from the date of 1st admission.	- Mandatory Summer Internship-I– 3 weeks between 3rd & 4th semester.- CIE conducted in 3rd Semester.- Internship credits entered into 4th Semester grade card.	-	1 Year (2 Semesters)
Exit 2	End of 4th Semester	Exit after completion of 2nd Year	- Completion of 1st to 4th semester requirements.- Must earn requisite credits. Recommendation from Counselling Team	Eligible for Exit	3 Years (After 6th Semester)	
Entry 3	5th Semester	Admission to the 3rd Year of Bachelor's Degree Program	- Must have completed 2nd year and exited after the 4th semester.- Subject to maximum 8 years (regular) / 6 years (lateral entry) from the date of 1st admission.	- Mandatory Summer Internship-II– 4 weeks between 5th & 6th semester.- CIE conducted in 5th semester.- Internship credits entered into 6th Semester grade card.	-	1 Year (2 Semesters)
Exit 3	End of 6th Semester	Exit after completion of 3rd Year (Eligible for relevant Bachelor's Degree)	- Completion of 1st to 6th semester requirements.- Must earn requisite credits.- Recommendation from Counselling Team	Eligible for Bachelor's Degree	4 Years (After 8th Semester)	

21. Recommendations for Award of Degree:

Degree is awarded to students satisfying the following requirements:

- Students should earn prescribed number of credits.
- Should not have 'F' grade or any transitional grades (I, X, W) in any of the courses.
- Should have passed all the prescribed mandatory courses.
- Should have obtained AICTE Activity points as per table:

SNo	Student Category	Activity Points Prescribed by AICTE
1	Regular students admitted to the 4 years Degree Program	100
2	Students entering 4 years Degree Program through lateral entry	75
3	Students transferred from other Universities to the 5th semester	50

22. Anti-Ragging Rules:

Ragging is considered a criminal offence under the law, and any student found involved in such obnoxious activities will be liable for rustication from the college. Severe disciplinary action will be initiated against students indulging in ragging, in line with institutional rules and national regulations. Ragging in any form is strictly prohibited on the campus. "Prevention and Prohibition of Ragging in Technical Institutions, Universities including Deemed to be Universities, and Other Institutions – 2009" (AICTE Notification dated 01.07.2009)

To prevent ragging, the institution has established Anti-Ragging Committee and Anti-Ragging Squads. These bodies actively monitor and ensure a ragging-free environment. Additionally, every student seeking admission to the college and hostel must submit:

- An anti-ragging affidavit duly signed by the student
- An anti-ragging affidavit duly signed by the parent/guardian
- These must be submitted in the prescribed format as per the regulations at the time of admission.

AICTE defines ragging as: "Any conduct by a student or group of students that causes or is likely to cause physical, psychological, or emotional harm, embarrassment, or harassment to another student, especially a fresher." This includes:

- Verbal abuse, bullying, or teasing
- Forcing to perform embarrassing acts
- Physical or sexual abuse
- Financial extortion
- Isolation or exclusion from activities
- Cyberbullying or online harassment

Punishments for Ragging: If any student found guilty, he/she may face:

- Suspension from classes/hostel
- Cancellation of admission
- Withholding of scholarships/results
- Debarring from exams or placement
- Rustication for 1–4 semesters
- Expulsion from the institution
- FIR filed with local police under Indian Penal Code (IPC)

Collective punishment is also allowed if the perpetrators are not specifically identified.

23. Termination from the Program: A student is required to withdraw from the program and leave the College on the following grounds:

- Failure to complete degree within the prescribed time period as indicated in Table-4.
- Failure to comply with the disciplinary rules as prescribed by the autonomous College from time to time.

24. Temporary Withdrawal from the Program:

A student may withdraw temporarily from the programme on grounds like, prolonged illness, grave calamity in the family or any other genuine reason. The withdrawal shall be for periods which are integral multiples of a semester, provided that:

- The student applies to the college within 6 weeks of the commencement of the semester or from the date he/she last attended the classes, whichever is later, stating fully the reasons for such a withdrawal, together with supporting documents and endorsement of his/her parent/guardian.
- The college is satisfied of the genuineness of the case and that, even by taking into account the expected period of withdrawal, the student has the possibility to complete the programme requirements within the time limits specified by the university.
- The student does not have any dues or demands at the college/university including tuition and other fees as well as library material.
- A student availing of temporary withdrawal from the college under the above provision shall be required to pay such fees and/or charges as fixed by the College until such time as his/her name appears on the students' roll list. **However, the fees/charges once paid shall not be refunded**.
- Normally, a student is entitled to avail **the temporary withdrawal facility only once during his/her studentship of the programme**. However, any other concession for the concerned student shall have to be approved by the Academic Council of the college. Hence, the students shall be advised by the Principal to use this provision only in exceptional cases.

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Important Academic Rules and Regulations guiding the batch of students admitted during 2021-22, 2022-23 and 2023-24.

Categories of courses under 160 credits scheme:

(Applicable for students admitted during the academic year 2021-22)

SNo	Category	Credits	Percentage of total Credits
1	Basic Science Courses	22	13.8%
2	Engineering Science Courses	20	12.5%
3	Integrated Professional Core Courses	24	15 %
4	Professional Core Courses	23	14.4%
5	Universal Human Values	1	0.6%
6	Humanity & Social Sciences and Management Courses	11	6.9%
7	Ability Enhancement Courses	11	6.9%
8	Professional Elective courses	09	5.6%
9	Open Electives	06	3.8%
10	Internship	20	12.5%
11	Mini and Major Project	12	7.5%
12	Technical Seminar	1	0.6%
Total		**160**	**100%**

Categories of courses under 160 credits scheme:

(Applicable for students admitted during the academic year 2022-23 and 2023-24)

SNo	Category	Credits	Percentage of total Credits
1	Humanities and Social Sciences including Management courses and ability Enhancement courses	16	10%
2	Basic Science Courses	22	13.75%
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer/PL/ET etc.	24	15 %
4	Professional Core courses relevant to chosen specialization/branch	59	36.8%
5	Professional Elective courses relevant to chosen specialization/branch	12	7.5%
6	Open subjects-Electives from other technical and /or emerging subjects	12	7.5%
7	Project work and internship in industry or elsewhere	15	9.37%
8	Mandatory Courses (Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition)	(Non-Credit)	00%
Total		**160**	**100%**

Supplementary Semester *(Applicable for students admitted **2021-22 onwards**)*

- The supplementary/Fast-Track semester has been permitted after every even semester for 2021-22, 2022-23 and 2023-24 admitted batches. Students who have obtained **'NE' grade** due to either not having the required CIE or attendance or both shall take the Supplementary semester to earn the required CIE marks and attendance for writing the SEE.
- Students who have satisfied CIE and Attendance requirements for the Course(s) and obtained **'F' Grade** in SEE are permitted to appear directly in the ensuing examination(s) as backlog paper(s). The student need not repeat the course for attendance and CIE. Students may also register for supplementary semester for courses having an **'F' grade**, but they are required to earn the CIE marks and attendance afresh during the supplementary semester.
    - A student is permitted to register for a **maximum of 16 credits** in supplementary semester.
    - Courses with **'W'** grade is eligible to register in supplementary semester.
    - All the courses may not be offered in the supplementary semester. It is the discretion of the college to offer the courses based on the availability of resources.
    - Supplementary semester is a special semester and the student cannot demand it as a matter of right.

Vertical Progression – Eligible Criteria for students admitted during 2021-22

Progression Level	Criteria	Remarks
To 2nd Year (3rd Semester)	No restriction, even if the student has any number of backlogs ('F' and 'NE' grades).	Allowed progression regardless of arrears (VTU circular ref.no.)
To 3rd Year (5th Semester)	No restriction, even if the student has any number of backlogs ('F' and 'NE' grades).	Allowed progression regardless of arrears.
To 4th Year (7th Semester)	No restriction, even if the student has any number of backlogs ('F' and 'NE' grades).	Allowed progression regardless of arrears (VTU circular ref.no.)
Audit/Mandatory Non-Credit Courses	May be carried forward to 7th semester. However, they must be completed before the award of the degree.	These do not affect vertical progression, but are mandatory for graduation.
Odd to Even Semester	No restriction on promotion from odd semester to the following even semester (e.g., 1st to 2nd, 3rd to 4th, etc.).	Applies to both UG and PG programmes regardless of backlogs.

25. Semester End Examination (SEE) for PG (2024-25)

25.1. Odd semester: only the Semester End Examinations (SEE) for odd semester courses (I, III,) are conducted, and students can also appear for backlog courses ('F'/ 'AB' grades) from previous semesters, and also for 'DX' and 'NP' grade courses, provided they have fulfilled the minimum attendance and CIE requirements (If offered).

25.2. Even semester: SEE is conducted only for even semester courses (II, IV), and appear for backlog courses ('F'/ 'AB' grades) from previous semesters, and also for 'DX' and 'NP' grade courses, provided they have fulfilled the minimum attendance and CIE requirements (If offered).

(DX: Students needs to re-register and obtain eligibility by earning minimum attendance and CIE requirements to regain eligibility to attend SEE).

25.3. Summer /Supplementary semester: There will be no Summer/Supplementary semester for PG programs.

25.4. Makeup Examination: The Makeup Examination facility is available to students in both UG and PG programmes.

Table:

Semester End Examination (SEE) for PG (2024-25)			
Type of Examination	**Odd Semester**	**Even Semester**	**Supplementary Examination**
Regular SEE	For I, III Semesters For all regular & Re-registered (DX Grade) students completing the semester with Required Eligibility & Students who have received an 'F' or 'AB' grade in a course are allowed to reappear for the SEE by carrying forward their CIE marks (only Odd Semester Courses)	For II, IV, VI, VIII For all regular Re-registered (DX Grade) students completing the semester with Required Eligibility & Students who have received an 'F' or 'AB' grade in a course are allowed to reappear for the SEE by carrying forward their CIE marks (only Even Semester Courses)	There is no Supplementary Examination for the PG
Makeup Examination	Will be conducted immediate after announcement of Odd SEE results only for the students **who obtained X and I Grade.**	Will be conducted immediate after announcement of Even SEE results only for the students **who obtained X and I Grade.**	There is no Supplementary Examination for the PG
CIE Only (Non-credit / Audit Course)	"Continuous Internal Evaluation (CIE) through assignments, quizzes, or seminars will be conducted to assess the performance, and Semester End Examination (SEE) is not required for non-credit courses."	"Continuous Internal Evaluation (CIE) through assignments, quizzes, or seminars will be conducted to assess the performance, and Semester End Examination (SEE) is not required for non-credit courses."	There is no Supplementary Examination for the PG

VTU Vertical Progression Criteria – PG Programmes (2024-25)

Progression Level	Criteria	Remarks
To 2nd Year (3rd Semester)	Students with **'F', 'DX', or 'AB' grades totalling more than 16 credits** in **1st and 2nd semesters** are **not permitted** to move to the 3rd semester.	Must clear these backlogs before progressing.
Odd to Even Semester	**No restriction** on promotion from **odd semester to the following even semester** (e.g., 1st to 2nd, 3rd to 4th, etc.).	Applies to **both UG and PG** programmes regardless of backlogs.

Eligibility to write SEE for UG students: "Students from PG Programmes who have been awarded a 'DX' or 'NP' grade in a course may be permitted to register afresh for the same course in the subsequent Odd or Even semester, as there is no summer semester for PG programmes. They will be allowed to appear for the SEE only after satisfying the minimum CIE and attendance requirements.

Note: Classes for re-registered courses with 'DX'/'NP' grades in PG programmes shall be scheduled at times that do not overlap with the regular Odd/Even semester timetable. Students are required to attend these classes as per the designated timetable for the re-registered courses."

ANNEXURE – IV

Approved First year Scheme and Syllabus for the students admitted during the AY 2025-26

BACHELOR OF ENGINEERING

SCHEME & SYLLABUS

I & II SEMESTERS

2025-26

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

VISION

PROMOTING PROSPERITY OF MANKIND BY AUGMENTINGHUMAN RESOURCE CAPITAL THROUGH QUALITY TECHNICAL EDUCATION &TRAINING

MISSION

ACCOMPLISH EXCELLENCE IN THE FIELD OF TECHNICAL EDUCATION THROUGH EDUCATION, RESEARCH AND SERVICE NEEDS OF SOCIETY

Scheme & Syllabus for UG Program – I & II Semesters
ABBREVIATIONS

AY	Academic Year
AAT	Alternative Assessment Tools
BOE	Board of Examiners
BOS	Board of Studies
CBCS	Choice Based Credit System
CGPA	Cumulative Grade Point Averages
CIE	Continuous Internal Evaluation
HS	Humanity and Social Science Courses
L-T-P-SL	Lecture-Tutorial- Practical-Self Learning
NFTE	Not Fit for Technical Education
SEE	Semester End Examination
SGPA	Semester Grade Point Average
BS	Basic Science
NC	No Credit
PP	Pass in Non-Credit Course
ASC	Applied Science Course
ESC	Engineering Science Course
PSC	Programme Specific Courses with Lab
AEC	Ability Enhancement
SDC	Skill Development Course
PLC	Programming Language Course
ETC	Emerging Technology Course
NCMC	Non-Credit Mandatory Course
HSMC	Humanities Course

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Content

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Scheme of Instruction for First Semester B.E. 2025 – 26 (PHYSICS CYCLE)

Sl. No.		Course Type	Course Code	Course Title	Credits (L:T:P)	L Hrs.	T Hrs.	P Hrs.	SL Hrs.	Total Hrs.
1.	1	ASC1	25MA1BSMCS	Mathematical foundation for Computer Science Stream– 1	4 (3:1:0)	42	28	0	50	120
2.			25MA1BSCEM	Mathematical Foundation for Civil, Electrical and Mechanical Streams– 1						
3.	2	ASC2	25PH1BSPCS	Quantum Physics and Computation for Computer Science Engineering Stream	4 (3:0:1)	42	0	28	50	120
4.			25PH1BSPEC	Quantum Physics and Sensors for Electronics Engineering						
5.			25PH1BSPEE	Physics of Materials for Electrical Engineering						
6.			25PH1BSPCV	Physics of Structural Systems for Civil Engineering						
7.	3	ESC	25ME1ESCED	Computer-Aided Engineering Drawing	3 (1:0:2)	14	0	56	20	90
8.	4	ESC-I	25CV1ESBSM	Building Science and Mechanics	3 (3:0:0)	42	0	0	48	90
9.			25EE1ESIEE	Introduction to Electrical Engineering						
10.			25EC1ESIEL	Introduction to Electronics & Communication Engineering						
11.			25ME1ESIME	Introduction to Mechanical Engineering						
12.			25CS1ESEIT	Essentials of Information Technology						
13.	5	PSC	25CV1PSENM	Engineering Mechanics	4 (3:0:1)	42	0	28	50	120
14.			25EE1PSBEE	Basics of Electrical Engineering						
15.			25EC1PSECE	Fundamentals of Electronics & Communication Engineering						
16.			25CS1PSSPC	Structured Programming in C						
17.			25BT1PSEBB	Elements of Biotechnology and Biomimetics						
18.	6	NCMC	25MA1HSSSK	Soft Skills	PP	14	0	0	16	30
19.	7	SDC	25ME1AEIDT	Innovation and Design Thinking	1 (1:0:0)	14	0	0	16	30
20.	8	HSMC	25MA1HSBAK	Balake Kannada	1 (1:0:0)	14	0	0	16	30
21.			25MA1HSSAK	Samskrutika Kannada						
Total Credit					**20**					

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Scheme of Instruction for First Semester B.E. 2025-26 (CHEMISTRY CYCLE)

Sl. No.		Course Type	Course Code	Course Title	Credits (L:T:P)	L Hrs.	T Hrs.	P Hrs.	SL Hrs.	Total Hrs.
1.	1	ASC1	25MA1BSMCS	Mathematical foundation for Computer Science Stream– 1	4 (3:1:0)	42	28	0	50	120
2.			25MA1BSCEM	Mathematical Foundation for Civil, Electrical and Mechanical Streams - 1						
3.	2	ASC2	25CY1BSCCS	Applied Chemistry for Smart Systems (CS Stream)	4 (3:0:1)	42	0	28	50	120
4.			25CY1BSCEE	Applied Chemistry for Emerging Electronics and Futuristic Devices (EEE & EC Stream)						
5.			25CY1BSCME	Applied Chemistry for Advanced Metal Protection and Sustainable Energy Systems (ME Stream)						
6.	3	ETC	25CS1ETIAA	Introduction to Al and Applications	3 (3:0:0)	42	0	0	48	90
7.	4	ESC1	25CV1ESBSM	Building Science and Mechanics	3 (3:0:0)	42	0	0	48	90
8.			25EE1ESIEE	Introduction to Electrical Engineering						
9.			25EC1ESIEL	Introduction to Electronics & Communication Engineering						
10.			25ME1ESIME	Introduction to Mechanical Engineering						
11.			25CS1ESEIT	Essentials of Information Technology						
12.	5	PLC[IC]	25CS1ESICP	Introduction to C Program	4 (3:0:1)	42	0	28	50	120
13.			25CS1ESIPP	Introduction to PYTHON Programming						
14.	6	AEC	25MA1AECEN	Communication Skills	1 (1:0:0)	14	0	0	16	30
15.	7	NCMC	25MA1HSICE	Indian Constitution & Engineering Ethics	PP	14	0	0	16	30
16.	8	SDC	25ME1AEIDL	IDEA Lab (Multidisciplinary)	1 (1:0:0)	14	0	0	16	30
Total Credit					**20**					

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Scheme of Instruction for Second Semester B.E. 2025-26 (PHYSICS CYCLE)

Sl. No.		Course Type	Course Code	Course Title	Credits (L:T:P)	L Hrs.	T Hrs.	P Hrs.	SL Hrs.	Total Hrs.
1.	1	ASC1	25MA2BSMCS	Mathematical foundation for Computer Science Stream– 2	4 (3:1:0)	42	28	0	50	120
2.			25MA2BSCEM	Mathematical Foundation for Civil, Electrical and Mechanical Streams - 2						
3.	2	ASC2	25PH2BSPCS	Quantum Physics and Computation for Computer Science Engineering Stream	4 (3:0:1)	42	0	28	50	120
4.			25PH2BSPEC	Quantum Physics and Sensors for Electronics Engineering						
5.			25PH2BSPME	Physics of Materials for Mechanical Engineering Stream						
6.	3	ESC-2	25ME2ESCED	Computer-Aided Engineering Drawing	3 (1:0:2)	14	0	56	20	90
7.	4	ESC2-II	25CV2ESBSM	Building Science and Mechanics	3 (3:0:0)	42	0	0	48	90
8.			25EE2ESIEE	Introduction to Electrical Engineering						
9.			25EC2ESIEL	Introduction to Electronics & Communication Engineering						
10.			25ME2ESIME	Introduction to Mechanical Engineering						
11.			25CS2ESEIT	Essentials of Information Technology						
12.	5	PSC2	25ME2PSEME	Elements of Mechanical Engineering	4 (3:0:1)	42	0	28	50	120
13.			25EC2PSECE	Fundamentals of Electronics & Communication Engineering						
14.			25CS2PSSPC	Structured Programming in C						
15.			25CH2PSCHE	Elements of Chemical Engineering						
16.	6	NCMC2	25MA2HSSSK	Soft Skills	PP	14	0	0	16	30
17.	7	SDC2	25ME2AEIDT	Innovation and Design Thinking	1 (1:0:0)	14	0	0	16	30
18.	8	HSMC	25MA2HSBAK	Balake Kannada	1 (1:0:0)	14	0	0	16	30
19.			25MA2HSSAK	Samskrutika Kannada						
Total Credit					**20**					

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Scheme of Instruction for Second Semester B.E. 2024-25 (CHEMISTRY CYCLE)

Sl. No.		Course Type	Course Code	Course Title	Credits (L:T:P)	L Hrs.	T Hrs.	P Hrs.	SL Hrs.	Total Hrs.
1.	1	ASC1	25MA2BSMCS	Mathematical foundation for Computer Science Stream– 2	4 (3:1:0)	42	28	0	50	120
2.			25MA2BSCEM	Mathematical Foundation for Civil, Electrical and Mechanical Streams - 2						
3.	2	ASC2	25CY2BSCCS	Applied Chemistry for Smart Systems (CS Stream)	4 (3:0:1)	42	0	28	50	120
4.			25CY2BSCEE	Applied Chemistry for Emerging Electronics and Futuristic Devices (EEE & EC Stream)						
5.			25CY2BSCCV	Applied Chemistry for Sustainable Structures & Material Design (CV Stream)						
6.	3	ETC2	25CS2ETIAA	Introduction to Al and Applications	3 (3:0:0)	42	0	0	48	90
7.	4	ESC2-II	25CV2ESBSM	Building Science and Mechanics	3 (3:0:0)	42	0	0	48	90
8.			25EE2ESIEE	Introduction to Electrical Engineering						
9.			25EC2ESIEL	Introduction to Electronics & Communication Engineering						
10.			25ME2ESIME	Introduction to Mechanical Engineering						
11.			25CS2ESEIT	Essentials of Information Technology						
12.	5	PLC[IC]2	25CS2ESICP	Introduction to C Program	4 (3:0:1)	42	0	28	50	120
13.			25CS2ESIPP	Introduction to PYTHON Programming						
14.	6	AEC2	25MA2AECEN	Communication Skills	1 (1:0:0)	14	0	0	16	30
15.	7	NCMC2	25MA2HSICE	Indian Constitution & Engineering Ethics	PP	14	0	0	16	30
16.	8	SDC2	25ME2AEIDL	IDEA Lab (Multidisciplinary)	1 (1:0:0)	14	0	0	16	30
Total Credit					**20**					

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Course Title: Mathematical Foundation for Computer Science Stream -1		Semester	I
Course Code	25MA1BSMCS	CIE Marks	50
Credits Distribution (L-T-P)	3-1-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:28:0:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course successfully, students will be able to:

CO 1: Apply the concepts of Calculus and Matrix theory in solving problems.

CO 2: Relate the importance of Calculus and Matrix theory in computer science stream

CO 3: Demonstrate the understanding of Calculus and Matrix theory through programming skills using engineering tools.

Module-1: Matrices and System of Linear Equations **10 Hours**

Prerequisites: Operations on matrices and determinants. Elementary row transformation of a matrix

Echelon form, rank of a matrix, consistency and solution of system of linear equations - Gauss-elimination method, approximate solution by Gauss-Seidel method. Eigenvalues and eigenvectors, Rayleigh's power method to find the dominant eigenvalue and eigenvector.
Applications: Balancing chemical equations, Traffic flow.
Self-Study: Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem

Module-2: Multivariable Calculus **10 Hours**

Prerequisites: Calculus of one variable

Partial differentiation, total derivatives - differentiation of composite functions, Jacobian, Taylor's and Maclaurin's series expansion for two variables (statement only) – problems.
Applications: Maxima and minima for a function of two variables.
Self-study: Indeterminate forms-L'Hospital's rule, Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

Module-3: Vector Calculus **10 Hours**

Prerequisites: Scalars, vectors and its operations, multivariable calculus, basic integration.

Scalar and vector fields. Gradient, divergence and curl – physical interpretation, solenoidal vector fields, irrotational vector fields.
Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality. **Applications:** Directional derivatives and scalar potential.
Self – study: Expression for gradient, divergence and curl in curvilinear systems.

Module-4 : Ordinary Differential Equations (ODEs) of First Order	**09 Hours**
Prerequisites: Basic integration, linear ODE, solution by separation of variables	
Bernoulli's differential equations. Exact and reducible to exact differential equations- Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$. **Applications**: Orthogonal trajectories, Newton's law of cooling. **Self-Study:** Nonlinear differential equations - Introduction to general and singular solutions, solvable for p, for x and y. Clairaut's equations.	
Module-5: Ordinary Differential Equations of Higher Order	**09 Hours**
Prerequisites: Roots of a polynomial	
Higher-order linear ordinary differential equations with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's differential equations. **Applications:** Solution of differential equation in fundamental forms (homogeneous equations). **Self-Study:** Method of undetermined coefficients	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna publishers, 45th Ed., 2024.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.
3. **D. C. Lay:** "Linear Algebra and its Applications", Pearson Publishers, 5th Ed., 2024.

II. Reference books:

1. **B. V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **S. Pal and S. C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **N. P. Bali and M. Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
4. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
5. **J. Stewart: "**Calculus" Cengage Publications, 7th Ed., 2019.
6. **G. Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.
7. **D.G. Zill and W.S.Wright:** "Advanced Engineering Mathematics", Jones Bartlett Publishers Inc.,7th Ed., 2020

III. Web links and Video Lectures (e-Resources):

1. http://academicearth.org/
2. VTU e-Shikshana Program

3. VTU EDUSAT Program
4. https://nptel.ac.in/courses/111106135
5. https://nptel.ac.in/courses/111105160
6. https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/
7. https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/
8. Vector Calculus: https://www.classcentral.com/course/mit-opencourseware-multivariable-calculus-fall-2007-40962/classroomand https://www.classcentral.com/course/vector-calculus-engineers-17387

Teaching-Learning Process (Innovative Delivery Methods):

1. Chalk and talk method / Power Point Presentation

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Theory	Quiz	10	100	5	50
	AAT	10		5	
	Test 1	40		20	
	Test 2	40		20	
	Test 3	40		20	
SEE	End Exam	100		50	

1. CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.
2. The best two scores out of three tests will be considered for CIE

Semester End Examination:

1. Two complete questions will be given from each unit.
2. One complete question from each unit to be answered.

Course outcomes (Course Skills Set)

After completing the course successfully, students will be able to:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3										
CO2	3										
CO3	3				3						

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Course Title: Mathematical Foundation for Civil, Electrical and Mechanical Streams- 1		**Semester**	I
Course Code	25MA1BSCEM	**CIE Marks**	50
Credits Distribution (L-T-P)	3-1-0	**SEE Marks**	50
Pedagogical Hours (L:T:P:SL)	(42:28:0:50)	**Total Marks**	100
Total Credits	**04**	**Exam Hours**	3
Examination type (SEE)	**Theory**		

Course Outcomes (Course Skill Set)

After completing the course successfully, students will be able to:

CO 1: Apply the concepts of Calculus and Matrix theory in solving problems

CO 2: Relate the importance of Calculus and Matrix theory concepts to Civil, Electrical & Mechanical Streams

CO 3: Demonstrate the understanding of Calculus and Matrix theory concepts through programming skills using engineering tools.

Module-1: Matrices and System of equations	**10 Hours**
Pre-requisites: Operations on matrices and determinants, elementary row transformations of a matrix	
Echelon form, rank, consistency and solution of system of linear equations - Gauss-elimination method, approximate solution by Gauss-Seidel method. Eigenvalues and eigenvectors, Rayleigh's power method to find the dominant eigenvalue and eigenvector. **Applications:** Balancing chemical equations, Traffic flow. **Self-Study:** Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem	
Module-2: Calculus of One Variable	**10 Hours**
Pre-requisites: Trigonometric functions and identities, differentiation and its rules.	
Introduction to polar coordinates, polar curves, angle between radius vector and tangent, angle between two curves. Length of perpendicular from pole to the tangent, pedal equations. **Applications**: Curvature and Radius of curvature – cartesian and polar forms. **Self-study:** Taylor's and Maclaurin's series expansion for one variable, radius of curvature in parametric form.	
Module-3: Multivariable Calculus	**10 Hours**
Pre-requisites: Higher-order derivatives, chain rule and determinants	
Partial differentiation, total derivatives - differentiation of composite functions, Jacobian, Taylor's and Maclaurin's series expansion for two variables (statement only) – problems. **Applications:** Maxima and minima for a function of two variables. **Self-study:** Indeterminate forms-L'Hospital's rule, Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint. Errors and approximations	

Module-4 : Ordinary Differential Equations (ODEs) of First Order	**09 Hours**
Pre-requisites: Basic integration, linear ODE, solution by separation of variables.	
Bernoulli's differential equations. Exact and reducible to exact differential equations- Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$. **Applications**: Orthogonal trajectories, Newton's law of cooling. **Self-Study:** Nonlinear differential equations - Introduction to general and singular solutions, solvable for p, for x and y. Clairaut's equations	
Module-5: Ordinary Differential Equations of Higher Order	**09 Hours**
Pre-requisites: Roots of a polynomial	
Higher-order linear ordinary differential equations with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's differential equations. **Applications:** Spring-Mass system and L-R-C series circuits **Self-Study:** Method of undetermined coefficients	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna publishers, 45th Ed., 2024.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.
3. **D. C. Lay:** "Linear Algebra and its Applications", Pearson Publishers, 5th Ed., 2024

II. Reference books:

1. **B.V. Ramana:** "Higher Engineering Mathematics", McGraw-Hill Education, 11th Ed., 2017
2. **S. Pal and S. C. Bhunia**: "Engineering Mathematics", Oxford University Press, 3rd Ed., 2016.
3. **N. P. Bali and M. Goyal**: "A textbook of Engineering Mathematics", Laxmi Publications, 10th Ed., 2022.
4. **H. K. Dass and Er. R. Verma:** "Higher Engineering Mathematics", S. Chand Publication, 3rd Ed., 2014
5. **J. Stewart:** "Calculus", Cengage Publications, 7th Ed., 2019.
6. **G. Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.
7. **D.G. Zill and W.S.Wright:** "Advanced Engineering Mathematics", Jones Bartlett Publishers Inc., 7th Ed., 2020

III. Web links and Video Lectures (e-Resources):

1. http://academicearth.org/
2. VTU e-Shikshana Program
3. VTU EDUSAT Program

4. https://nptel.ac.in/courses/111106135
5. https://nptel.ac.in/courses/111105160
6. https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/
7. https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/

Teaching-Learning Process (Innovative Delivery Methods):

1. Chalk and talk method / Power Point Presentation

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Theory	Quiz	10	100	5	50
	AAT	10		5	
	Test 1	40		20	
	Test 2	40		20	
	Test 3	40		20	
SEE	End Exam	100		50	

1. CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.
2. The best two scores out of three tests will be considered for CIE

Semester End Examination:

1. Two complete questions will be given from each unit.
2. One complete question from each unit to be answered.

Course outcomes (Course Skills Set)

After completing the course successfully, students will be able to:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3										
CO2	3										
CO3	3				3						

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Quantum Physics and Computation for Computer Science Engineering Stream		Semester	I/II
Course Code	25PH1BSPCS / 25PH2BSPCS	CIE Marks	50
Credit Distribution (L-T-P)	3-0-1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	03
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

CO1: Understand and Apply the principles of quantum mechanics, quantum computing, transport phenomena in metals, semiconducting and superconducting materials, construction and working principle of LASERs and optical fibers.

CO2: Use appropriate Tools to develop the concept of physics, perform as a member of team to design a model and make an oral presentation.

CO3: Conduct, Analyze and Interpret the data and results from Physics experiments.

Module-1: QUANTUM MECHANICS **8 Hours**

de-Broglie hypothesis – derivation by analogy. Definition of phase velocity and group velocity. Relation between group velocity and phase velocity, relation between group velocity and particle velocity, relation between group velocity, phase velocity and velocity of light (qualitative). Heisenberg's uncertainty principle - statement and physical significance. Application of uncertainty principle – non-existence of electron in the nucleus.

Wave function-properties, physical significance. Born Interpretation, expectation value, and its physical significance. Probability density and normalization of wave function. Setting up of one-dimensional time independent Schrödinger's wave equation. Particle in a one-dimensional potential well of infinite height and finite width (particle in a box) - Eigen functions, probability density and Eigen values for the first two states. Problems.

Self-study: Ehrenfest theorem, Quantum dots

Module-2: Electrical Properties Of Metals And Semiconductors **8 Hours**

Introduction to classical free electron theory and its failures. Mechanisms of electron scattering in solids, Matheissen's rule. Assumptions of Quantum Free Electron Theory, density of states (qualitative), Fermi energy, expression for Fermi energy (qualitative), Fermi velocity, Fermi temperature. Fermi factor, variation of Fermi factor with temperature and energy. Merits of quantum free electron theory.

Introduction to Semiconductors, expression for concentration of electrons in conduction band, expression for hole-concentration in valance band (qualitative). Expression for intrinsic carrier concentration. Fermi level for intrinsic (derivation) and extrinsic semiconductor (qualitative), expression for electrical conductivity of semiconductors and energy band gap. Hall effect, expressions for Hall voltage, Hall coefficient, and its applications. Problems.

Self-study: Semiconductors in electronics applications

Module-3: Superconductivity **8 Hours**

Introduction to superconductors – Zero resistance state, temperature dependence of resistivity, persistent current, three critical parameters - critical temperature, critical magnetic field and critical current: Silsbee effect. Derivation of critical current for a cylindrical wire using ampere's law. Meissner effect. Type-I and Type-II superconductors. Formation of vortices.

BCS Theory - two-fluid model, formation of Cooper pairs, phase coherent state. Limitations of BCS theory, examples of systems with low and high electron-phonon coupling. Cooper pair tunneling (Andreev reflection). Josephson junction, flux quantization, DC and AC SQUIDs (qualitative), MAGLEV vehicle. Problems.

Self-study: Principle and working of MRI

Module-4: Photonics **8 Hours**

LASERs: Introduction, characteristics of LASERs. Interaction of radiation with matter – Einstein's A and B coefficients. Expression for energy density of a system under thermal equilibrium in terms of Einstein's A and B coefficients. Conditions for Laser action. Requisites of a LASER system. Construction and working of He-Ne LASER. Applications of LASERs: Mach-Zehnder interferometer.

Optical Fiber: Introduction, principle of propagation, angle of acceptance, and numerical aperture. Expression for numerical aperture and condition for propagation. Number of modes: V-number. Classification of optical fibers. Attenuation- attenuation coefficient (qualitative), causes of attenuation. Applications of optical fibers: fiber optic displacement sensor and fiber optic temperature sensor. Problems.

Self-study: Various applications of LASERs

Module-5: QUANTUM COMPUTATION **8 Hours**

Introduction, Moore's law - limitation of VLSI. Difference between classical and quantum computation. Bit, Qubit and its properties. Bloch sphere (qualitative).

Dirac Notation: Matrix form of wave function, identity operator (I), determination of $I|0\rangle$ and $I|1\rangle$, Pauli matrices and its operations on $|0\rangle$ and $|1\rangle$ states. Mention of conjugate, transpose and unitary matrix. Inner product of 2x2 matrices. Probability and orthogonality.

Quantum Gates: Single qubit gates: quantum NOT gate, Pauli Z gate, Hadamard gate, Phase gate (or S Gate), T gate.

Multiple Qubit Gates: Controlled gate - CNOT Gate, (discussion of 4 different input states). Representation of swap gate, controlled - Z gate, Toffoli gate. Problems.

Self-study: Quantum Entanglement, quantum teleportation and quantum computers

Suggested Learning Resources:

I. Text books:

1. Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018.
2. Engineering Physics, S L Kakani, Shubra Kakani, 3rd Edition, 2020, CBS Publishers and Distributers Pvt. Ltd., 2018.
3. Solid State Physics, S. O. Pillai, New Age International, 2022.

4. Quantum Computing, Parag K Lala, McGraw Hill, 2020.

II. Reference books / Manuals:

1. Beiser, A. (2002). Concepts of Modern Physics (6th ed.). McGraw-Hill Education.
2. Griffiths, D. J. (2018). Introduction to Quantum Mechanics (2nd or 3rd ed.). Pearson.
3. Tinkham, M. (2004). Introduction to Superconductivity (2nd ed.). Dover Publications.
4. Mishra, P. K. (2009). Superconductivity – Basics and Applications. Ane Books.
5. LASERS and Non-Linear Optics, B B Loud, New Age International.
6. Saleh, B. E. A., & Teich, M. C. (2019). Fundamentals of Photonics (3rd edition) Wiley.
7. Nielsen, M. A., & Chuang, I. L. (2010). Quantum Computation and Quantum Information (10th Anniversary ed.). Cambridge University Press.
8. Vishal Sahani, Quantum Computing, McGraw Hill Education, 2007 Edition.
9. Introduction to Superconductivity, Michael Tinkham, McGraww Hill, INC, II Edition.

III. Web links and Video Lectures (e-Resources):

1. NPTEL – Quantum Mechanics I (IIT Madras): https://nptel.ac.in/courses/115106066
2. NPTEL – Physics: Introductory Quantum Mechanics (NOC): https://archive.nptel.ac.in/courses/115/104/115104096
3. Solid State Physics – NPTEL (IIT Madras) https://nptel.ac.in/courses/115106127
4. A Brief Course on Superconductivity – NPTEL IIT Guwahati (Prof. Saurabh Basu)
5. Playlist Introduction Video: https://www.youtube.com/watch?v=SHoGV-sezNI
6. Full playlist available via the YouTube channel description or archive link.
7. Concepts in Magnetism and Superconductivity – NOC (IIT Kharagpur) Series start (Lecture 1): https://digimat.in/nptel/courses/video/115105131/L01.html
8. Introduction to Photonics – NPTEL (IIT Madras, Prof. Balaji Srinivasan) Lecture 03 to Lecture 12 cover: Direct video link (start Lecture 03): https://nptel.ac.in/courses/108106135/03
9. Semiconductor Optoelectronics – NPTEL (IIT Delhi, Prof. M. R. Shenoy) Direct video link (start relevantlecture): https://nptel.ac.in/courses/108108174/05
10. 10. Lecture 04 – Quantum Computing Basics: https://www.youtube.com/watch?v=-fttE1SzpD8
11. Lecture 08 – Quantum Gates and Circuits Part 1: https://www.youtube.com/watch?v=nGPr1QM_XrY
12. **Virtual LAB:** https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
13. **Virtual LAB:** https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1

Activity-Based Learning/Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in
3. https://virtuallabs.merlot.org/vl_physics.html
4. https://phet.colorado.edu
5. https://www.myphysicslab.com

Teaching-Learning Process (Innovative Delivery Methods):

1. Chalk and Talk
2. Blended Mode of Learning
3. Simulations, Interactive Simulations and Animations
4. NPTEL and Other Videos for theory topics
5. Smart Class Room
6. Flipped Class
7. Lab Experiment Videos

Assessment Structure:

Component	Type of assessment	Max. Marks	Reduced to	Total	Total Marks
CIE – Theory	CCA	10	05	50	50
	Test 1	40	10		
	Test 2	40	10		
CIE – Lab	Test	50	25		
SEE	Semester End Exam	100	50		50
Grand Total Marks					100

Course objectives:

1. To impart the knowledge of concept and applications of quantum mechanics and quantum computation
2. To provide insight to the electrical properties of metals, semiconductors, and superconductors, and their engineering applications
3. To understand the principles of LASERs and optical fibers, and explore their practical implications

CO-PO mapping with strength:

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3	2									
CO2					1				1	1	
CO3				3							

List of Lab activities:

1. Wavelength of LASER by diffraction
2. Divergence angle of a LASER
3. Numerical aperture of an optical fiber
4. Wavelength of LEDs/Planck's constant
5. Fermi energy of copper
6. Dielectric constant of a material by charging and discharging of a capacitor
7. Energy gap of a semiconductor using four probe method
8. V-I characteristics of a photodiode
9. Frequency response of series and parallel LCR circuits
10. Black box
11. Attenuation coefficient of OFC
12. GNU step interactive simulations
13. Study of motion using spread sheet
14. PHET Interactive Simulations (https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)
15. Quantum Experiments using Qiskit

Curriculum Structure:

Course Code	Course Title	Teaching and Learning Scheme				
		Classroom Instruction (CI) (in hours per semester)	Lab Instruction (LI) (in hours per semester)	Team Work (TW) and Self Learning (SL) (TW + SL) (in hours per semester)	Total No. of Hours per Semester	Total Credits (C) * (Total Hours/30)
25PH1BSPCS / 25PH2BSPCS	QUANTUM PHYSICS AND COMPUTATION FOR COMPUTER SCIENCE ENGINEERING STREAM	40	30	10 + 40 = 50 (CCA=10 hrs) (SL=8*5=40 hrs)	120	4

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Quantum Physics and Sensors for Electronics Engineering		Semester	I/II
Course Code	25PH1BSPEC / 25PH2BSPEC	**CIE Marks**	50
Credit Distribution (L-T-P)	3-0-1	**SEE Marks**	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	**Total Marks**	100
Total Credits	**04**	**Exam Hours**	03
Examination type (SEE)	**Theory**		

Course Outcomes (Course Skill Set)

CO1: Understand and Apply the principles of quantum mechanics, transport phenomena in metals, properties of semiconducting and superconducting materials, construction and working principle of LASERs, optical fibers, and electronic sensors.

CO2: Use appropriate **Tools** to develop the concept of physics, perform as a **member of team** to design a model and make an oral presentation.

CO3: **Conduct**, **Analyze** and **Interpret** the data and results from Physics experiments.

Module-1: Quantum Mechanics **8 Hours**

de-Broglie hypothesis – derivation by analogy. Definition of phase velocity and group velocity. Relation between group velocity and phase velocity, relation between group velocity and particle velocity, relation between group velocity, phase velocity and velocity of light (qualitative). Heisenberg's uncertainty principle - statement and physical significance. Application of uncertainty principle – non-existence of electron in the nucleus.

Wave function-properties, physical significance. Born Interpretation, expectation value, and its physical significance. Probability density and normalization of wave function. Setting up of one-dimensional time independent Schrödinger's wave equation. Particle in a one-dimensional potential well of infinite height and finite width (particle in a box) - Eigen functions, probability density and Eigen values for the first two states. Problems.

Self-study: Ehrenfest theorem, Quantum dots

Module-2: Electrical Properties Of Metals And Semiconductors **8 Hours**

Introduction to classical free electron theory and its failures. Mechanisms of electron scattering in solids, Matheissen's rule. Assumptions of Quantum Free Electron Theory, density of states (qualitative), Fermi energy, expression for Fermi energy (qualitative), Fermi velocity, Fermi temperature. Fermi factor, variation of Fermi factor with temperature and energy. Merits of quantum free electron theory.

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Self-study: Semiconductors in electronics applications

Module-3: Superconductivity **8 Hours**

Introduction to superconductors – Zero resistance state, temperature dependence of resistivity, persistent current, three critical parameters - critical temperature, critical magnetic field and critical current: Silsbee effect. Derivation of critical current for a cylindrical wire using ampere's law. Meissner effect. Type-I and Type-II superconductors. Formation of vortices.

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Self-study: Principle and working of MRI

Module-4: Photonics **8 Hours**

LASERs: Introduction, characteristics of LASERs. Interaction of radiation with matter – Einstein's A and B coefficients. Expression for energy density of a system under thermal equilibrium in terms of Einstein's A and B coefficients. Conditions for Laser action. Requisites of a LASER system. Construction and working of He-Ne LASER. Applications of LASERs: Mach-Zehnder interferometer.

Optical Fiber: Introduction, principle of propagation, angle of acceptance, and numerical aperture. Expression for numerical aperture and condition for propagation. Number of modes: V-number. Classification of optical fibers. Attenuation- attenuation coefficient (qualitative), causes of attenuation. Applications of optical fibers: fiber optic displacement sensor and fiber optic temperature sensor. Problems.

Self-study: Various applications of LASERs

Module-5: Semiconductor Devices And Sensors **8 Hours**

Classification of semiconductors: Direct and indirect band gap with E-K diagram. Application of direct band gap semiconductor- construction and working of semiconducting diode LASER.

Devices: Photodiode and power responsivity, experimental determination of energy gap (E_g) using four probe method.

Sensors: Light Dependent Resistor (LDR), Resistance Temperature Detectors (RTD), Sensing mechanisms, Piezo-electric sensors, Metal Oxide Semiconductor (MOS) sensors for gas sensing. Problems.

Self-Study: Electronic devices, VLSI and embedded systems

Suggested Learning Resources:

I. Text books:

1. Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018.
2. Engineering Physics, S L Kakani, Shubra Kakani, 3rd Edition, 2020, CBS Publishers and Distributers Pvt. Ltd.
3. Solid State Physics, S. O. Pillai, New Age International, 2022.
4. Basic Electronics, B L Theraja, Multi-color Edition, S Chand, 2006.

II. Reference books / Manuals:

1. Engineering Physics, S Mani Naidu, Pearson, Fourteenth Impression, 2024.
2. Beiser, A. (2002). Concepts of Modern Physics (6th ed.). McGraw-Hill Education.
3. Griffiths, D. J. (2018). Introduction to Quantum Mechanics (2nd or 3rd ed.). Pearson.
4. Tinkham, M. (2004). Introduction to Superconductivity (2nd ed.). Dover Publications.
5. Mishra, P. K. (2009). Superconductivity – Basics and Applications. Ane Books.
6. Ghatak, A., & Thyagarajan, K. (2005). Optical Electronics. Oxford University Press.
7. Saleh, B. E. A., & Teich, M. C. (2019). Fundamentals of Photonics (3rd edition) Wiley.

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9. Semiconductor Optoelectronics – NPTEL (IIT Delhi, Prof. M. R. Shenoy)Direct video link (start relevant lecture): https://nptel.ac.in/courses/108108174/05
10. Sensors and Actuators – NPTEL (IISc Bangalore, Prof. Hardik J. Pandya) Lecture Introduction to Sensors, Transducers & Actuators, incl. Hall, RTDs, Thermistors https://digimat.in/nptel/courses/video/108108147/L01.html
11. Smart Sensors – NPTEL Lecture 34 – Covers various sensors including gas, pressure, MOS sensors, photodetectors like SNSPD https://www.youtube.com/watch?v=oRydUfgMdgA
12. Lecture 32 – Superconducting Qubits (includes Charge Qubit / Cooper-Pair Box) https://www.youtube.com/watch?v=iYo8ALJ-Mls
13. **Virtual LAB:** https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
14. **Virtual LAB:** https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1

Activity-Based Learning/Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in
3. https://virtuallabs.merlot.org/vl_physics.html
4. https://phet.colorado.edu
5. https://www.myphysicslab.com

Teaching-Learning Process (Innovative Delivery Methods):

1. Chalk and Talk
2. Blended Mode of Learning
3. Simulations, Interactive Simulations and Animations
4. NPTEL and Other Videos for theory topics
5. Smart Class Room
6. Flipped Class
7. Lab Experiment Videos

Assessment Structure:

Component	Type of assessment	Max. Marks	Reduced to	Total	Total Marks
CIE – Theory	CCA	10	05	50	50
	Test 1	40	10		
	Test 2	40	10		
CIE – Lab	Test	50	25		
SEE	Semester End Exam	100	50		50
Grand Total Marks					100

Course objectives:

1. To impart the knowledge of quantum mechanics and its applications
2. To provide insight to the electrical properties of metals, semiconductors, and superconductors, and their engineering applications
3. To understand the principles of LASERs, optical fibers and electronic sensors to explore their practical implications

CO-PO mapping with strength:

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3	2									
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CO3				3							

List of Lab activities:

1. Wavelength of LASER by diffraction
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4. Wavelength of LEDs/Planck's constant
5. Fermi energy of copper
6. Dielectric constant of a material by charging and discharging of a capacitor
7. Energy gap of a semiconductor using four probe method
8. V-I characteristics of a photodiode
9. Frequency response of series and parallel LCR circuits
10. Black box
11. Attenuation coefficient of OFC
12. GNU step interactive simulations
13. Study of motion using spread sheet
14. PHET Interactive Simulations

(https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

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Course Code	Course Title	Teaching and Learning Scheme				
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25PH1BSPEC / 25PH2BSPEC	Quantum Physics and Sensors For Electronics Engineering	40	30	10 + 40 = 50 (CCA=10 hrs) (SL=8*5=40 hrs)	120	4

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Physics of Materials for Electrical Engineering		Semester	I
Course Code	25PH1BSPEE	CIE Marks	50
Credit Distribution (L-T-P)	3-0-1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	03
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

CO1: Understand and Apply the principles of quantum mechanics, transport phenomena in metals, properties of dielectric, magnetic, semiconducting and superconducting materials, construction and working principle of thermoelectric devices.

CO2: Use appropriate Tools to develop the concept of physics, perform as a member of team to design a model and make an oral presentation.

CO3: Conduct, Analyze and Interpret the data and results from Physics experiments.

Module-1: Quantum Mechanics **8 Hours**

de-Broglie hypothesis – derivation by analogy. Definition of phase velocity and group velocity. Relation between group velocity and phase velocity, relation between group velocity and particle velocity, relation between group velocity, phase velocity and velocity of light (qualitative). Heisenberg's uncertainty principle - statement and physical significance. Application of uncertainty principle – non-existence of electron in the nucleus.

Wave function-properties, physical significance. Born Interpretation, expectation value, and its physical significance. Probability density and normalization of wave function. Setting up of one-dimensional time independent Schrödinger's wave equation. Particle in a one-dimensional potential well of infinite height and finite width (particle in a box) - Eigen functions, probability density and Eigen values for the first two states. Problems.

Self-study: Ehrenfest theorem, Quantum dots

Module-2: Electrical Properties of Metals And Semiconductors **8 Hours**

Introduction to classical free electron theory and its failures. Mechanisms of electron scattering in solids, Matheissen's rule. Assumptions of Quantum Free Electron Theory, density of states (qualitative), Fermi energy, expression for Fermi energy (qualitative), Fermi velocity, Fermi temperature. Fermi factor, variation of Fermi factor with temperature and energy. Merits of quantum free electron theory.

Introduction to Semiconductors, expression for concentration of electrons in conduction band, expression for hole-concentration in valance band (qualitative). Expression for intrinsic carrier concentration. Fermi level for intrinsic (derivation) and extrinsic semiconductor (qualitative), expression for electrical conductivity of semiconductors and energy band gap. Hall effect, expressions for Hall voltage, Hall coefficient, and its applications. Problems.

Self-study: Semiconductors in electronics applications

Module-3: Superconductivity	**8 Hours**
Introduction to superconductors – Zero resistance state, temperature dependence of resistivity, persistent current, three critical parameters - critical temperature, critical magnetic field and critical current: Silsbee effect. Derivation of critical current for a cylindrical wire using ampere's law. Meissner effect. Type-I and Type-II superconductors. Formation of vortices. BCS Theory - two-fluid model, formation of Cooper pairs, phase coherent state. Limitations of BCS theory, examples of systems with low and high electron-phonon coupling. Cooper pair tunneling (Andreev reflection). Josephson junction, flux quantization, DC and AC SQUIDs (qualitative), MAGLEV vehicle. Problems. **Self-study:** Principle and working of MRI	
Module-4: Dielectric and Magnetic Materials	**8 Hours**
Dielectric Materials: Introduction, electrical polarization, types of polarization, expression for electronic polarizability. Expression for internal field in one dimensional liquids and solids, Lorentz field. Clausius–Mossotti relation. Applications of dielectrics in capacitors, transformers (oils), SF6 in high voltage application. **Magnetic Properties of Materials:** Classification of magnetic materials. Ferromagnetic materials – Weiss's domain theory. Importance of Curie temperature, ferromagnetic hysteresis and its explanation using domain theory. Soft and hard magnetic materials. Applications: transformer cores, armature, inductors and chokes, permanent magnets. Problems. **Self-study:** Dielectric and magnetic materials in electrical appliances	
Module-5: Thermoelectric and Electrical Engineering Materials	**8 Hours**
Thermo emf and thermo current, Seebeck effect, Peltier effect, Seebeck and Peltier coefficients, figure of merit and its tuning (qualitative). Thermocouple and thermopiles (qualitative). Construction and working of thermoelectric generators (TEG) and thermoelectric coolers (TEC), Applications: exhaust of automobiles and refrigerator. Ceramics: types, materials, applications. Electrostriction: strain proportional to square of the electric field, materials, applications. Magnetostriction: materials, applications. Piezoelectric effect, materials, applications. Problems. **Self-Study**: Radioisotope thermoelectric generator (RTG), wearable flexible devices	

Suggested Learning Resources:

I. Text books:

1. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.
2. Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018.
3. A Text book of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar, S Chand, 2014, Revised Edition.
4. Smart Materials and Structures, M. V. Gandhi and B. S. Thompson, Chapman & Hall.

I. Reference books / Manuals:

1. Engineering Physics, S L Kakani, Shubra Kakani, 3rd Edition, 2020, CBS Publishers and Distributers Pvt. Ltd., 2018.
2. Tinkham, M. (2004). Introduction to Superconductivity (2nd ed.). Dover Publications.
3. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
4. Electrical Engineering Materials, R. K. Shukla, Tata McGraw-Hill Education, India, 2017 reprint edition.

II. Web links and Video Lectures (e-Resources):

1. Mod-02 Lec-20: Dielectrics – Prof. D. K. Ghosh, IIT Bombay https://www.youtube.com/watch?v=P9VyW2wq9ZE
2. Mod-01 Lec-16: Dielectric (Insulating) Solids – Prof. G. Rangarajan, IIT Madras https://www.youtube.com/watch?v=etjZmdmrjSU
3. Lecture 41: Thermoelectric Generators – Functioning and Applications https://www.youtube.com/watch?v=G9NgoxHMPwk
4. NPTEL course: Solid State Physics – Prof. A.K. Raychaudhuri, IIT Kharagpur Course link: https://archive.nptel.ac.in/courses/115/105/115105099
5. Mod-01 Lec-27: Superconductivity – Perfect Conductivity & Diamagnetism – Prof. G. Rangarajan, IIT Madras https://www.youtube.com/watch?v=GglT1RoBPzg
6. Lecture 01: PMMC Instrument – https://www.youtube.com/watch?v=n1MinLtvnPY
7. Lecture 02: Electrodynamic / Moving Iron Instruments – https://www.youtube.com/watch?v=n1MinLtvnPY&list=PLbRMhDVUMngcoKrA4sHzvbNVSE6IpEio & index=2
8. Lecture 03: Measurement Systems Characteristics – https://www.youtube.com/watch?v=Hlvbr5DCEfM
9. Electrical Measurement course Prof Avishek Chatterjee IIT Kharagpur : https://www.youtube.com/playlist?list=PLbRMhDVUMngcoKrA4sH-zvbNVSE6IpEio
10. **Virtual LAB:** https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
11. **Virtual LAB:** https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1

Activity-Based Learning/Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in
3. https://virtuallabs.merlot.org/vl_physics.html
4. https://phet.colorado.edu
5. https://www.myphysicslab.com

Teaching-Learning Process (Innovative Delivery Methods):

1. Chalk and Talk
2. Blended Mode of Learning
3. Simulations, Interactive Simulations and Animations

4. NPTEL and Other Videos for theory topics
5. Smart Class Room
6. Flipped Class
7. Lab Experiment Videos

Assessment Structure:

Component	Type of assessment	Max. Marks	Reduced to	Total	Total Marks
CIE – Theory	CCA	10	05	50	50
	Test 1	40	10		
	Test 2	40	10		
CIE – Lab	Test	50	25		
SEE	Semester End Exam	100	50		50
Grand Total Marks					100

Course objectives:

1. To impart the knowledge of quantum mechanics and its applications
2. To provide insight to the electrical properties of metals, dielectric, semiconductors and superconductors, and their engineering applications
3. To understand the essentials of thermoelectric, magnetic and engineering materials for practical applications

CO-PO mapping with strength:

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3	2									
CO2					1				1	1	
CO3				3							

List of Lab activities:

1. Wavelength of LASER by diffraction
2. Divergence angle of a LASER
3. Numerical aperture of an optical fiber
4. Wavelength of LEDs/Planck's constant
5. Fermi energy of copper
6. Dielectric constant of a material by charging and discharging of a capacitor
7. Energy gap of a semiconductor using four probe methods

8. V-I characteristics of a photodiode
9. Frequency response of series and parallel LCR circuits
10. Black Box
11. Attenuation coefficient of OFC

Curriculum Structure:

Course Code	Course Title	Teaching and Learning Scheme				
		Classroom Instruction (CI) (in hours per semester)	Lab Instruction (LI) (in hours per semester)	Team Work (TW) and Self Learning (SL) (TW + SL) (in hours per semester)	Total No. of Hours per Semester	Total Credits (C) * (Total Hours/30)
25PH1BSPEE	Physics Of Materials For Electrical Engineering	40	30	10 + 40 = 50 (CCA=10 hrs) (SL=8*5=40 hrs)	120	4

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
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Course Title: Physics of Structural Systems for Civil Engineering		Semester	I
Course Code	25PH1BSPCV	CIE Marks	50
Credit Distribution (L-T-P)	3-0-1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	03
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

CO1: Understand and Apply the concept of vibrations, elastic properties of materials, natural hazards and their safety measures, acoustic design, various material characterization techniques to obtain the desired parameters.

CO2: Use appropriate Tools to develop the concept of physics, perform as a member of team to design a model and make an oral presentation.

CO3: Conduct, Analyze and Interpret the data and results from physics experiments.

Module-1: Oscillations **8 Hours**

Theory of free vibrations: Periodic motion, simple harmonic motion (SHM), equation of a simple harmonic oscillator, expressions for period and frequency, energy considerations-total energy, conversion of energy from kinetic to potential energy in SHM.

Theory of damped vibrations: Resistive forces, equation of motion-expression for decaying amplitude, three cases of damping. Logarithmic decrement, relaxation time and quality factor (qualitative).

Theory of forced vibrations: Equation of motion-expression for amplitude and Phase, three cases of forcing.

Resonance: Phenomenon of resonance. Example of resonance, LCR circuit. Problems.

Self-study: Coupled vibrations, Musical instruments, ESR and NMR

Module-2: Elasticity **8 Hours**

Stress, strain and their types. Hooke's law. Stress-strain diagram. Young's Modulus (q), bulk modulus (k), rigidity modulus (η) and Poisson's ratio (σ). Relation between Young's modulus (q), Bulk modulus (k) in terms of α and β (or σ). Relation between Rigidity modulus (η), Young's modulus (q) in terms of α and β (or σ). Relation between σ, k and η. Relation between all the three-elastic modulus (q, k and η). Work done per unit volume in a strain. Expression for twisting couple per unit twist.

Beams: Bending moment and derivation of expression.

Cantilever: Expression for depression at free end of Cantilever. Problems.

Self-study: Types of pendulums, various types of bridges and structures

Module-3: Waves And Their Role In Structural Behavior	**8 Hours**
Types of waves, wave propagation in beams, rods, and slabs, boundary effects, wave dispersion, damping in structures, energy dissipation techniques in structures. Introduction to earthquakes, general characteristics, P-waves, S-waves, love waves, and Rayleigh waves. Physics of earthquakes, Richter scale of measurement and earthquake-resistant measures, tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), seismometer and seismograph. Landslide - causes such as excess rainfall, geological structure change, human excavation. Problems. **Self-study:** Ultrasonic waves and applications, natural hazards	
Module-4: Acoustics, Radiometry and Photometry	**8 Hours**
Introduction to acoustics, types of acoustics, reverberation and reverberation time, absorption power and absorption coefficient, requisites for acoustics in auditorium, Sabine's formula (derivation), measurement of absorption coefficient, factors affecting the acoustics and remedial measures, sound insulation and its measurements. Noise and its measurements, impact of noise in multi-storied buildings. Radiometry and photometry: radiation quantities, spectral quantities, relation between luminance and radiant quantities, reflectance and transmittance. Photometry (cosine law and inverse square law). Problems. **Self-study:** Design of auditorium and radiation hazards	
Module-5: Materials Characterization and Instrumentation Techniques	**8 Hours**
Materials properties: introduction, crystal systems, planes in a crystal. Miller indices – expression for interplanar spacing in terms of Miller indices. Relation between lattice constant and bulk density. Co-ordination number, relation between atomic radius and lattice constant. Atomic packing factor for simple cubic, BCC and FCC lattices. Instrumentation techniques: Bragg's law, X-ray diffractometer (XRD), crystallite size determination by Scherrer equation. Principle, construction, working and applications of Scanning Electron Microscope (SEM). Problems. **Self-Study**: Analysis using XPS, AFM, FTIR and UV-Vis	

Suggested Learning Resources:

I. Reference books / Manuals:

1. Physics, Oscillations and Waves, Optics and Quantum Mechanics, H M Agarwal and R M Agarwal, Pearson, 2025.
2. Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018.
3. Dynamics of Structures - Theory and Applications to Earthquake Engineering Anil K. Chopra, University of California at Berkeley, Fourth Edition. Prentice Hall.
4. Vibrations and Waves, A P French, MIT introductory Physics, 2003
5. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 Edition, Dhanpat Rai Publications Ltd., New Delhi-110002.

6. Engineering Physics, S L Kakani, Shubra Kakani, 3rd Edition, 2020, CBS Publishers and Distributers Pvt. Ltd., 2018.
7. Introduction to Seismology, Earthquakes, and Earth Structure, Stein, Seth, and Michael Wysession. Blackwell Publishing, 2003.
8. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd Edition.
9. Engineering Physics, S Mani Naidu, Pearson, 2025.
10. Building Science: Lighting and Acoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltd.
11. A Text book of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
12. Timoshenko, S. and Goodier J.N. "Theory of Elasticity", 2nd Edition, McGraw Hill Book Co, 2001.
13. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, 1997.
14. Solid State Physics - S O Pillai, 8th Ed- New Age International Publishers-2018.
15. Characterization of Materials- Mitra P. K. Prentice Hall India Learning Private Limited.
16. An Introduction to Disaster Management, Natural Disaster & Man-Made Hazards, S. Vaidyanathan, IKON Books.
17. Natural Hazards, Edward Bryant, Cambridge University Press, 2nd Edition.
18. Natural hazards, Earthquakes, Volcanoes, and landslides by Ramesh P Singh, and Darius Bartlett, CRC Press, Taylor and Francis group.
19. Principles of Fire Safety Engineering Understanding Fire & Fire Protection, Akhil Kumar Das, PHI Learning, II Edition.
20. Disaster Management, R. Subramanian, S. Chand Publishing, 2018.

II. Web links and Video Lectures (e-Resources):

1. **Simple Harmonic motion:** https://www.youtube.com/watch?v=k2FvSzWeVxQ
2. **Stress-strain curves:** https://web.mit.edu/course/3/3.11/www/modules/ss.pdf
3. **Stress curves:** https://www.youtube.com/watch?v=f08Y39UiC-o
4. **Acoustics:** https://www.youtube.com/watch?v=fHBPvMDFyO8
5. **Fundamentals of Acoustics:** https://www.youtube.com/watch?pp=0gcJCfwAo7VqN5tD&v=rT9B44Q4Rko
6. **Fundamentals of Acoustics playlist:** https://www.youtube.com/playlist?list=PLgMDNELGJ1CYWnDbcbVET5zCbN4aLEbZQ
7. **Virtual lab:** https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
8. **Material characterization:** https://onlinecourses.nptel.ac.in/noc20_mm14/preview

Activity-Based Learning/Practical-Based Learning:

1. http://nptel.ac.in
2. https://swayam.gov.in
3. https://virtuallabs.merlot.org/vl_physics.html
4. https://phet.colorado.edu
5. https://www.myphysicslab.com

Teaching-Learning Process (Innovative Delivery Methods):

1. Chalk and Talk
2. Blended Mode of Learning
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6. Flipped Class
7. Lab Experiment Videos

Assessment Structure:

Component	Type of assessment	Max. Marks	Reduced to	Total	Total Marks
CIE – Theory	CCA	10	05	50	50
	Test 1	40	10		
	Test 2	40	10		
CIE – Lab	Test	50	25		
SEE	Semester End Exam	100	50		50
Grand Total Marks					100

Course objectives:

1. 1. To impart the knowledge of elasticity and vibrations in advanced materials and mechanical structures
2. To provide overview of natural hazards and their prevention protocols
3. To understand the physics of waves and acoustics, and their implications in structural design
4. To emphasize on advanced characterization tools for analyzing materials properties

CO-PO mapping with strength:

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3	2									
CO2					1				1	1	
CO3				3							

List of Lab activities:

1. Young's modulus by single cantilever
2. Rigidity modulus by torsional pendulum
3. Series LCR circuits
4. Parallel LCR circuits
5. X-ray film analysis
6. Spring constant
7. Divergence angle of a LASER
8. Numerical aperture of an optical fiber
9. Wavelength of LASER by diffraction
10. Resistivity by four probe method
11. Fermi energy of copper
12. Study of motion using spread sheet
13. GNU step interactive simulations
14. PHET Interactive simulations (https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

Curriculum Structure:

Course Code	Course Title	Teaching and Learning Scheme				
		Classroom Instruction (CI) (in hours per semester)	Lab Instruction (LI) (in hours per semester)	Team Work (TW) and Self Learning (SL) (TW + SL) (in hours per semester)	Total No. of Hours per Semester	Total Credits (C) * (Total Hours/30)
25PH1BSPCV	Physics Of Structural Systems For Civil Engineering	40	30	10 + 40 = 50 (CCA=10 hrs) (SL=8*5=40 hrs)	120	4

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
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Course Title: Physics of Materials for Mechanical Engineering Stream		Semester	II
Course Code	25PH2BSPME	**CIE Marks**	50
Credit Distribution (L-T-P)	3-0-1	**SEE Marks**	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	**Total Marks**	100
Total Credits	**04**	**Exam Hours**	03
Examination type (SEE)	**Theory**		

Course Outcomes (Course Skill Set)

CO1: Understand and Apply the concept of vibrations, elastic properties of materials, thermoelectric effects, cryogenics and various material characterization techniques to obtain the desired parameter.

CO2: Use appropriate Tools to develop the concept of physics, perform as a member of team to design a model and make an oral presentation.

CO3: Conduct, Analyze and Interpret the data and results from physics experiments.

Module-1: Oscillations **8 Hours**

Theory of free vibrations: Periodic motion, simple harmonic motion, equation of a simple harmonic oscillator, expressions for period and frequency, energy considerations-total energy, conversion of energy from kinetic to potential energy in SHM.

Theory of damped vibrations: Resistive forces, equation of motion-expression for decaying amplitude, three cases of damping. Logarithmic decrement, relaxation time and quality factor (qualitative).

Theory of forced vibrations: Equation of motion-expression for amplitude and phase, three cases of forcing.

Resonance: Phenomenon of resonance. Example of resonance, LCR circuit. Problems.

Self-study: Coupled vibrations, Musical instruments, ESR and NMR

Module-2: Elasticity **8 Hours**

Stress, strain and their types. Hooke's law. Stress-strain diagram. Young's Modulus (q), bulk modulus (k) and rigidity modulus (η). Poisson's ratio (σ). Relation between Young's modulus (q), Bulk modulus (k) in terms of α and β (or σ). Relation between Rigidity modulus (η), Young's modulus (q) in terms of α and β (or σ). Relation between σ, k and η. Relation between all the three-elastic modulus (q, k and η). Work done per unit volume in a strain. Expression for twisting couple per unit twist.

Beams: Bending moment and derivation of expression.

Cantilever: Expression for depression at free end of cantilever. Problems.

Self-study: Types of pendulums, various types of bridges and structures

Module-3: THERMOELECTRIC MATERIALS AND PROPERTIES	**8 Hours**
Thermo emf and thermo current, Seebeck effect, Peltier effect, Seebeck and Peltier coefficients, figure of merit (Mention Expression), laws of thermoelectricity. Expression for thermo emf in terms of T_1 and T_2. Thermo couples and thermopile (Qualitative). Thermal conductivity, expression for thermal conductivity of a conductor using classical free electron theory. Wiedemann–Franz law, calculation of Lorentz number using classical and quantum assumptions. Theory and determination of thermal conductivity using Forbe's and Lee–Charlton's methods. Problems. **Self-study:** Transducers, exhaust of automobiles and refrigerators.	
Module-4: CRYOGENICS	**8 Hours**
Introduction to thermodynamics, Carnot's principle, efficiency, production of low temperature - Joule Thomson effect (Derivation with 3 cases), porous plug experiment with theory, thermodynamical analysis of Joule Thomson effect, liquefaction of oxygen by cascade process, Lindey's air liquefier, liquefaction of helium and its properties (superfluidity), platinum resistance thermometer, applications of cryogenics: aerospace, Dewar flask. Problems. **Self-study:** Cryogenic engines and CE-20 in GSLV	
Module-5: Materials Characterization and Instrumentation Techniques	**8 Hours**
Materials properties: Introduction, crystal systems, planes in a crystal. Miller indices – Expression for interplanar spacing in terms of Miller indices. Relation between lattice constant and bulk density. Co-ordination number, Relation between atomic radius and lattice constant. Atomic packing factor for Simple Cubic, BCC and FCC lattices. Instrumentation techniques: Bragg's law, X-ray diffractometer (XRD), crystallite size determination by Scherrer equation. Principle, construction, working and applications of Scanning Electron Microscope (SEM). Problems. **Self-Study**: Analysis using XPS, AFM, FTIR and UV-Vis	

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3. A Text book of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar, S Chand, 2014, Revised Edition.
4. Fundamentals of Cryogenic Engineering, Mamata Mukhopadhyay, PHI Learning (India).
5. Characterization of Materials - Mitra P.K. Prentice Hall India Learning Private Limited.
6. Vibrations and Waves (MIT introductory Physics Series), A P French, CBS, 2003 Edition.
7. Elements of Properties of Matter, D S Mathus, S Chand, Reprint 2016.

8. Engineering Physics, S L Kakani, Shubra Kakani, 3rd Edition, 2020, CBS Publishers and Distributers Pvt. Ltd.
9. Cryogenics: A Text Book, S.S. Thipse, Alpha Science International, Limited 2013.
10. Treatise on Heat, M N Saha and B N Srivastava, 2nd Edition, Indian Press, 1935; Original from, the University of California.
11. Materials Characterization Techniques-Sam Zhang, Lin Li, Ashok Kumar, CRC Press, First Edition, 2008.
12. Solid State Physics - S O Pillai, 8th Ed- New Age International Publishers - 2018.

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2. **Stress-strain curves:** https://web.mit.edu/course/3/3.11/www/modules/ss.pdf
3. **Stress curves:** https://www.youtube.com/watch?v=f08Y39UiC-o
4. **Cryogenic Engineering:** https://www.youtube.com/watch?v=4gGMBNEzeuc
5. **Liquefaction of gases:** https://www.youtube.com/watch?v=aMelwOsGpIs
6. **Virtual lab:** https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
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B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
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Assessment Structure:

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	Test 1	40	10		
	Test 2	40	10		
CIE – Lab	Test	50	25		
SEE	Semester End Exam	100	50		50
Grand Total Marks					100

Course objectives:

1. To impart the knowledge of elasticity and vibrations in advanced materials and mechanical structures
2. To provide insight to the principles of thermoelectric for realization in thermo-electric appliances
3. To understand the physics of low-temperature and its implications in cryogenic engineering
4. To emphasize on advanced characterization tools for analyzing materials properties

CO-PO mapping with strength:

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3	2									
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CO3				3							

List of Lab activities:

1. Young's modulus by single cantilever
2. Rigidity modulus by torsional pendulum
3. Series LCR circuits
4. Parallel LCR circuits
5. Thermal conductivity of a good conductor by Forbe's method
6. Thermal conductivity of a poor conductor by Lee Charlton's method
7. Spring constant
8. X-ray film analysis
9. Fermi energy of copper

10. Numerical aperture of an optical fiber
11. Wavelength of LASER by diffraction
12. Divergence angle of a LASER
13. Study of motion using spread sheet
14. GNU step interactive simulations
15. PHET Interactive Simulations
    (https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

Curriculum Structure:

Course Code	Course Title	Teaching and Learning Scheme				
		Classroom Instruction (CI) (in hours per semester)	Lab Instruction (LI) (in hours per semester)	Team Work (TW) and Self Learning (SL) (TW + SL) (in hours per semester)	Total No. of Hours per Semester	Total Credits (C) * (Total Hours/30)
25PH2BSPME	Physics Of Materials For Mechanical Engineering Stream	40	30	10 + 40 = 50 (CCA=10 hrs) (SL=8*5=40 hrs)	120	4

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
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Course Title: Computer-Aided Engineering Drawing		Semester	I/II
Course Code	25ME1ESCED / 25ME2ESCED	CIE Marks	50
Credit Distribution (L-T-P)	1-0-2	SEE Marks	100
Pedagogical Hours (L:T:P:SL)	(14:0:56:20)	Total Marks	100
Total Credits	03	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to ….

CO1: Draw orthographic and Isometric projections of geometrical entities in various positions.

CO2: Develop 2D, 3D models and lateral surfaces of solids.

CO3: Use modern engineering tool (CAD software) necessary for engineering visualization

CO4: Interpret and communicate with sketches and engineering drawings with enhanced spatial visualization skills.

Module-1: **29 Hours**

A: Introduction: Engineering Visualization, Principles of Engineering Graphics and their significance, BIS Conventions, dimensioning, scales, line conventions, material conventions, sketching.
Introduction to CAD software, standard tool bar menu and description of most commonly used tool bars, and navigational tools. **[1L + 0T+2P Hrs.]**

B: Orthographic Projections

Introduction, quadrant system, Planes of projection, reference line and conventions employed, Projections of points in First and Third quadrants. Projections of straight lines (located in first quadrant and without reference to traces), True and apparent lengths, True and apparent inclinations to reference planes, simple application problems. **[2L +0T+ 6P Hrs.]**

Student's work : Assignment-1 **5 Hrs.**

Projections of Plane Surfaces (First Angle Projection Only)

Introduction, Projections of plane surfaces: triangle, square, rectangle, rhombus, circle, regular pentagon and regular hexagon in different positions by change of position method.

[2L + 0T+ 6P Hrs.]

Student's work : Assignment-2 **5 Hrs.**

Module-2: **25 Hours**

Projections of solids (First Angle Projection Only)

Introduction, Projections of regular upright solid: tetrahedron, cube, prism, pyramid, cylinder and cone in different positions by change of position method.

Student's work : Assignment-3 **8 Hrs.**

Module-3:	**18 Hours**
A: Isometric Projection (Using Isometric Scale only) Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron, right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (maximum of two solids) **B**: 3-D Modelling: Use of solid-modeling software for creating simple components: Solid and hollow right regular prisms and cylinders, solid pyramids, cones, spheres, and combination of solids and extracting orthographic views, sectional and Isometric views. **[3L+0T+ 12P Hrs.]**	
Student's work : Assignment-4	**3 Hrs.**
Module-4 :	**16 Hours**
Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones & their frustums and truncations (resting with base on HP only).	**[2L+ 0T+ 10P Hrs.]**
Student's work : Assignment-5	**4 Hrs.**
Module-5:	**02 Hours**
Multidisciplinary Applications Evaluation through Alternate assessment only 1. Civil stream: Modelling Basic Building Component (columns, beams, slabs, walls, doors, windows, staircase), drafting a 2D floor plan for a simple single-storey residential building, Converting the floor plan into 3D model with walls 2. Mechanical Stream: 3D Modelling of simple machine parts (Applying material properties and rendering for realistic visualization), Concept of Industrial drawing 3. Electric/Electronics Stream: 2D drawing of switches, sockets, panels, junction boxes, antenna: Single element patch antenna, antenna array, electric/electronics circuits 4. CSE stream: 2D Network drawing with wired and wireless, Network topology - wired and wireless, Modelling of Raspberry Pi / Arduino boards, Router & switches, IoT devices **[0L+ 0T+ 02P Hrs.]**	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Engineering Drawing Vol 1 & 2 Combined, K. R. Gopala Krishna, ISBN 39789383214235, Subhas Stores, Bangalore,2017.
2. Textbook of Computer Aided Engineering Drawing by K.R. Gopalakrishna, Sudhir Gopalakrishna, ISBN-135551234102489, 2017.

II. Reference books:

1. Engineering Drawing, N.D. Bhat& V.M. Panchal, 45 Edition, Charotar Publishing, Gujarat, 2000
2. Fundamental of Engineering Drawing & Graphics Technology, French, Thomas E., Vierck, C. J. and Foster, R. J., McGraw Hill Book Company (2005).

3. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production- Luzadder Warren J., Duff John M Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi.
4. A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belagavi.
5. Electrical Engineering Drawing, Bhattacharya S. K., New Age International publishers, second edition 1998, reprint 2005.
6. Printed Circuit Board Design using AutoCAD, Chris Schroder, Newnes, 1997.
7. Introduction to Architectural and Technical Drawing: Roksaneh Rahbarianyazd – Hourakhsh A. Nia, 2020

III. E-Books:

1. Siemens Solid Edge Exercises 200 Practice Drawings for Solid Edge and Other Feature-Based Modelling Software y Sachidanand Jha · 2019, ISBN:9781096479147, 1096479141, Amazon Digital Services LLC - KDP Print US.
2. Solid Edge 2020 for Designers, 17th Editionbooks.google.co.in., Prof. Sham Tickoo, CADCIM Technologies, 2020.

IV. Web links and Video Lectures (e-Resources):

1. NPTEL course on ENGINEERING DRAWING AND COMPUTER GRAPHICS https://nptel.ac.in/courses/112/105/112105294/#

Teaching-Learning Process (Innovative Delivery Methods):

1. The Laboratory session shall be held every week as per the time table and the performance of the student shall be evaluated in every session the average of marks over number of units is considered for 20 marks.
2. Project/Assignment/Experiential Learning covering syllabus

Assessment Structure:

CIE marks are finalized as per the details given below

Sl. No	Evaluation Method	Unit	Marks	Weightage
1.	CIE-Test 1	1B	40	20
2.	CIE-Test 2	2	40	
3.	CIE-Test 3	3,4	40	
4.	Sketching and lab assignments	1B -4	60	20
5.	Stream based Experiential Learning	5	10	10
			100	**50**

SEE:

1. Manual sketching and drafting using CAD Software as in table
2. **UNIT** 1A & 5 shall not be considered for SEE

3. Candidate shall answer 4 full questions selecting one from each unit.

Sl. No	Unit	Number of questions	Weightage (To Answer one full question from each unit)		
			Sketching	Software	Total
1	1B	02	20	--	20
2	2	02	0	30	30
3	3	02	0	30	30
4	4	02	20	0	20
	Total	**08**	**40**	**60**	**100**

COs and POs Mapping

COs	POs										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3				2						
CO2	3				3						
CO3	3				3						
CO4		3			3						

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Building Science and Mechanics		Semester	I/II
Course Code	25CV1ESBSM/ 25CV2ESBSM	CIE Marks	50
Credit Distribution (L-T-P)	3-0-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:0:48)	Total Marks	100
Total Credits	03	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to:

CO1: Discuss the scope of civil Engineering, various building construction materials and explain fundamentals of sustainable construction.

CO2: Apply the concepts to find the resultant and equilibrium of a coplanar force system.

CO3: Locate the centroid of simple and composite plane laminas.

Module-1: Introduction to Building Science **08 Hours**

Importance and Scope of various Civil Engineering disciplines: Surveying, Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Transportation Engineering, Environmental Engineering, Construction Planning and Project Management.

Basic Materials of Construction: Production and Quality requirements of Cement, Burnt Clay bricks, Concrete blocks; Applications of Mortar, Plain and Reinforced Concrete, Pre cast concrete, Structural Steel; Life cycle analysis (concept of 4 phase analysis only)

Building components: Concept and functionalities of Foundation, Plinth, Column, Beam, Slab, Lintel, Chejja, Masonry wall and Staircase.

Module-2: Sustainable Construction Practices **08 Hours**

Sustainability components: Green Buildings- Features, Necessity and benefits; Major Energy consumptive activities in buildings and efficient practices- Daylighting, Waste water treatment, Rain water harvesting.

Green Materials: Material selection criteria, Conventional construction materials and Green Materials, Carbon footprint, Availability and Applications of Green Materials: Stabilized Mud blocks, Lime pozzolana Cement, Lightweight/ Aerated Concrete (AAC) blocks, Bamboo.

Green building rating systems: IGBC, LEED – Purpose - Key highlights - Point System with Differential weightage.

Module-3: Force Systems: Resultant of coplanar forces **08 Hours**

Concept of idealization, System of forces, Principles of transmissibility of a force, Law of Parallelogram of forces, Composition and Resolution of forces, Resultant of forces, Concurrent and non-concurrent coplanar force systems, Moment of forces, Couple, Varignon's theorem: Numerical examples.

Module-4: Force systems: Equilibrium of coplanar forces	**08 Hours**
Free body diagram, Equations of equilibrium, Lami's Theorem, Equilibrium of Coplanar Concurrent force systems, Equilibrium of Non -concurrent force systems (Point load, UDL and Simple support beam cases): Numerical examples.	
Module-5: Centroid of Plane lamina	**08 Hours**
Centroid of Plane areas: Introduction, Locating the centroid of rectangle, triangle, circle, semicircle and quadrant of a circle using method of integration, centroid of composite areas and simple built-up sections, Numerical examples	

Suggested Learning Resources:

I. Textbooks:

1. Rangwala, Building Construction,33rd Edition, 2016, Charotar Publishing House Pvt. Ltd., ISBN-10 : 9385039040, ISBN-13 : 978-9385039041

2. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 3rd Edition, 2015, Laxmi Publications, ISBN: 9789380856674.

3. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 11th Edition, 2018, Eastern Book Promoters Belgaum [EBPB], ISBN: 5551234003896

4. G Harihara Iyer, Green Building Fundamentals, 2022, Notion Press Publications, ISBN: 9798886416091

II. Reference books:

1. Beer F.P. and Johnston E. R., Mechanics for Engineers: Statics and Dynamics, 4th Edition, 1987, McGraw Hill, ISBN: 9780070045842

2. Meriam J. L. and Kraige L. G, Engineering Mechanics-Statics, Vol I–6th Edition,2008, Wiley publication.

3. Irving H. Shames, Engineering Mechanics-Statics and Dynamics, 4th Edition, 2002, Prentice-Hall of India(PHI).

4. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press, New Delhi.

5. Timoshenko S, Young D. H., Rao J. V., Sukumar Patil, Engineering Mechanics, 5th Edition, 2017,McGraw Hill Publisher, ISBN: 9781259062667

6. Bhavikatti S S, Engineering Mechanics, 4th Edition, 2018, New Age International Publications.

7. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 3rd Edition 2013, BS Publications.

8. Dr. Adv. HarshulSavla, Green Building: Principles & Practices, 2021, Notion Press, ISBN: 9781685866044

III. Web links and Video Lectures (e-Resources):

NPTEL: Introduction to Civil Engineering Profession, https://nptel.ac.in/courses/105106201

2. NPTEL: Engineering Mechanics, https://nptel.ac.in/courses/112103108

3. NPTEL: Sustainable Materials and Green Buildings, https://nptel.ac.in/courses/105102195

Teaching-Learning Process:

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

1. Chalk and talk.
2. PowerPoint presentation, Site/ Laboratory visits for materials and building component demonstrations.
3. Flipped Classroom
4. NPTEL and other videos for theory topics

Individual teachers can device innovative pedagogy to improve teaching-learning.

Assessment Structure:

Component	Type of Assessment	Max. Marks	Reduced Marks	Total	Min. Marks for Eligibility	Total marks
CIE- Theory	Quiz / AAT	20	10	50	20	50
	Test 1	40	20			
	Test 2	40	20			
	Test 3					
SEE	Semester End Exam	100	50		35	50
Grand Total						100

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks**.
- To pass the **SEE**, a student must score at least **35% of 100 marks**.

Notwithstanding the above, a student is considered to have **passed the course,** provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Suggested Learning Activities may include (but are not limited to):

1. Case Study Presentation
2. Assignments
3. Quiz
4. Course Project
5. Any other relevant and innovative academic activity
6. Use of MOOCs and Online Platforms

Suggested Innovative Delivery Methods may include (but are not limited to):

1. Case-Based Teaching
2. Flipped Classroom
3. Problem-Based Learning (PBL)
4. ICT-Enabled Teaching

CO-PO mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
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Course Title: Introduction to Electrical Engineering		Semester	I/II
Course Code	25EE1ESIEE / 25EE2ESIEE	CIE Marks	50
Credit Distribution (L-T-P)	3-0-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:0:48)	Total Marks	100
Total Credits	03	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

At the end of the course, the student will be able to:

1. Understand the concepts of various energy sources, behavior of AC and DC circuits and fundamentals of electric machines (motor, Transformer, EV etc.).
2. Apply the knowledge of fundamentals to solve AC and DC circuits.
3. Analyze the behavior of transformers and DC motors.
4. Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.
5. Ability to engage in individual/team work to make effective technical presentation on electrical concepts and communicate effectively to the audience

Module-1:	**08 Hours**
Power Generation: Conventional and non-conventional energy sources, (Wind, Hydro, Solar, Nuclear: block diagram approach) Single-line diagram of power supply system showing power station, transmission system and distribution system. Definition of power grid. **DC circuits:** Ohm's law and its limitations, Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. Numerical. (Only Branch current method approach and current source numerical not included).	
Module-2:	**08 Hours**
AC Circuits: Types of supplies (single phase and three phases), advantages, limitations and its applications. Generation of single-phase system. Equation of AC voltage and current, average value, RMS value, form factor, peak factor and their relations. Voltage and current relationships in R, L and C circuits, analysis of R-L, R-C and R-L-C series circuits (No-power derivations), concept of power, reactive power, apparent power and power factor. Numerical.	
Module-3:	**08 Hours**
DC Generator: Principle of operation, constructional details, induced emf expression, Relation between induced emf and terminal voltage. Numerical. **DC Motor:** Principle of operation, back emf and its significance. Torque equation, types of motors (series and shunt), and applications of DC motors. Numerical.	
Module-4:	**08 Hours**
Transformers: Introduction to transformers, necessity of transformer, principles of operation, constructional features, types (shell and core) of single-phase transformers. EMF equation, losses, variation of losses with respect to load. Calculation of efficiency at different loads, condition for maximum efficiency, numerical.	

Electric Vehicle: Introduction, block diagram approach, types of EV, Advantages and its limitations.
Module-5: **08 Hours**
Domestic Wiring: Two-way and three-way control of loads. **Electricity Bill:** Definition of "unit" used for consumption of electrical energy, power rating of common household appliances. Two-part electricity tariff, simple problems. **Equipment Safety measures:** Working principle of fuse and miniature circuit breaker (MCB), merits and demerits. Definitions of rated current, fusing current, fusing factor. **Personal safety measures:** Electric shock, safety precautions to avoid shock. Earthing and types: Plate earthing and pipe earthing.

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015

II. Reference books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014
   Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016

III. Web links and Video Lectures (e-Resources): www.nptel.ac.in

1. Principle of Electrical Sciences, Prof Sanjay Agrawal, Indira Gandhi National Open University.
2. Electricity and Electrical Wiring, Dr. Antara Mahanta Barua, Krishna Kanta Handiqui State Open University, Guwahati

Teaching-Learning Process (Innovative Delivery Methods):

Chalk and Talk

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	10	10	10	50	20	50
	Test 1	40	80 (Best 2 of 3 tests)	40			
	Test 2	40					
	Test 3	40					
	CIE			50		20	
SEE	End Exam	100		50		35	50
Grand Total Marks						40	100

Two best scores out of the three tests will be considered for CIE. CIE methods/question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

- Ten questions to be set; two questions from each unit with internal choice.
- Student should answer one question from each unit

AAT:

Presentation and Report Submission

Self-Study Component:

Assignment for Each Units

Mapping of CO's and PSO's

	Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3										
CO2		3									
CO3		3									
CO4						2					
CO5								1	1		

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
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Course Title: Introduction to Electronics and Communication Engineering		Semester	I/II
Course Code	25EC1ESIEL/25EC2ESIEL	CIE Marks	50
Credit Distribution (L-T-P)	3-0-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:0:48)	Total Marks	100
Total Credits	03	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to ….

CO1: Apply the basic principles of electronics to solve analog and digital circuits.

CO2: Analyze and Identify a suitable electronic system for a given application.

CO3: Design the basic electronic circuits for a given specification to address engineering applications.

CO4: Demonstrate the ability to simulate basic analog and digital logic circuits using modern tools with effective presentation and report

Module-1: **08 Hours**

Basic Electronic devices: PN junction, Diode, Forward bias diode, Reverse biased diode, I-V Characteristics of diode, Diode approximations

Power Supplies –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.

Transistor: BJT structure and operation (NPN), circuit symbol, configurations, relation between transistor currents, BJT as a switch.

Amplifiers – Definition, Types of amplifier, gain, Input-Output Resistance, Multi-stage amplifier.

Module-2: **08 Hours**

Operational amplifiers - Ideal op-amp; characteristics of ideal and practical op-amp; Practical opamp circuits: Inverting and non-inverting amplifiers, voltage follower, summer, subtractor, integrator, differentiator

Oscillators – Barkhausen criterion, Classification of oscillators, Ladder network oscillator, Wein bridge oscillator, Crystal oscillator (Only Concepts, working, and waveforms. No mathematical derivations).

Module-3: **08 Hours**

Communication: Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Wired and Wireless, Noise, Receiver, Multiplexing, Types of communication systems.

Modulation Schemes: Amplitude Modulation and Frequency Modulation

Introduction to Cellular Communication, Computer Communication Networks

Module-4: **08 Hours**

Embedded Systems – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC

Sensors and Interfacing – Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display	
Module-5:	**08 Hours**
Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements (1's and 2's complement), Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates **Combinational logic**: Introduction, Design procedure, Adders- Half adder, Full adder	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Basic Electronics- Devices, circuits and IT fundamentals- By Santiram Kal- PHI, 2012
2. Op-amps and Linear Integrated Circuits, Ramakanth A Gayakwad, Pearson Education, 4th Edition
3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8

II. Reference books:

1. Electronic Devices and Circuit Theory, R Nashelsky and L Nashelsky, 11th Edition, Pearson, 2012
2. D.P Kothari and I J Nagrath, Basic electronics, Second Edition, McGraw Hill Education Pvt ltd, 2018
3. John G. Proakis, Masoud Saleh, Fundamentals of Communication Systems, Second Edition, Pearson Educations, Inc., 2014

III. Web links and Video Lectures (e-Resources):

1. https://www.elsevier.com/books/basic-electronics/holbrook/978-0-08-006865-7
2. http://www.worldcat.org/title/basic-electronics/oclc/681543319
3. https://nptel.ac.in/courses/122106025
4. https://onlinecourses.swayam2.ac.in/nou23_ec06/preview

Teaching-Learning Process (Innovative Delivery Methods):

1. Technology Integration
2. Collaborative (Team) learning
3. Learning through simulation

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
Theory	Self -Learning (simulation)	10	10	10	10	20	50
	Test 1	40	80	20	40		
	Test 2	40		20			
	Test 3	40		20			
CIE				50		**20**	
SEE	End Exam	100		50		35	50
Grand Total Marks						**40**	**100**

Two best scores out of the three tests will be considered for CIE.

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy

as per the outcome defined for the course.

Semester End Examination:

1. Each unit consists of two full questions.
2. Five full questions to be answered

Course outcomes (Course Skills Set)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1	3										
CO2		3									
CO3			3								
CO4					3			1	1		

Continuous Comprehensive Assessments (CCA):

I. Simulation based Self-Learning

Proteus is an **Electronic Design Automation (EDA) software tool** widely used for simulating, designing, and testing electronic circuits without physical hardware. It supports analog, digital, and embedded system circuits. It provides schematic capture, circuit simulation, PCB layout design, and virtual testing tools like oscilloscopes and logic analyzers.

1. **Learning of Tool**: 10 Hours
2. **Design of experiment**: 10 Hours
3. **Simulation in EDA tool**: 10 Hours
4. **Demonstration and Documentation**: 20 Hours

II. List of Simulation Experiments for Self-learning

1. Half wave rectifier with and without capacitor filter
2. Voltage doubler
3. Voltage Tripler
4. Transistor as a switch
5. Demonstrating characteristics of transistor in CE configuration.
6. Op-amp circuits – Inverting and Non-Inverting
7. Op-amp circuits – Summing and Subtractor
8. Op-amp circuits – Integrator and Differentiator
9. Simplification and realization of Boolean expression using basic logic gates
10. Simplification and realization of Boolean expression using universal gates

Self-Learning Evaluation Rubrics

Rubrics	Description	4	3	2	1
R1 (05)	Demonstrates an understanding of electronics systems and Simulation tool **(PO1, PO5)**	Explains concepts clearly, accurately, and with insightful connections	Explains concepts accurately with minor gaps in detail	Shows basic understanding of concepts but lacks depth or has some inaccuracies	Understanding is limited, with errors or confusion
R2 (03)	Technical writing ability (Report) **(PO9)**	report is clear, specific, and well justified with context	report is clear and specific but lacks strong justification	report is understandable but somewhat vague or incomplete	report is unclear or too broad
R3 (02)	Individual contribution to the entire project **(PO8)**	Active participation	Good participation	Fair participation	Minimal participation

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Course Title: Introduction to Mechanical Engineering		Semester	I/II
Course Code	25ME1ESIME/25ME2ESIME	CIE Marks	50
Credit Distribution (L-T-P)	3-0-0	SEE Marks	100
Pedagogical Hours (L:T:P:SL)	(42:0:0:48)	Total Marks	100
Total Credits	03	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

CO1: Describe & discuss fundamental principles of Mechanical Engineering as applied in the domains of machining, thermal, automotive and futuristic technologies.

CO2: Differentiate and compare among various mechanical systems (such as energy, metal joining, IC engines etc.)

CO3: Determine performance-related parameters for IC engines.

Module-1: **8 Hrs, 10 Hrs(SSA)**

Introduction to Mechanical Engineering:
Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors and contribution to GDP (Not for CIE/SEE).

Energy Sources and Power Plants:
Introduction and application of energy sources, Construction and working of Hydel power plant, Solar power plant (Helio-thermal process, flat and parabolic collectors), Wind power plant, and Biogas Plant, Environmental issues like Global warming and ozone depletion

Module-2: **8 Hrs, 10 Hrs(SSA)**

Fundamentals of Machine Tools and Operations:
(Machine tool sketches are not included for CIE/SEE)
Working principle of Lathe, Milling and Drilling machine tools.
Lathe Operations: Turning, Facing, Taper Turning and Knurling,
Drilling Operation: drilling, boring, and reaming.
Milling Operation: Plane milling and slot milling.

Modern Manufacturing Tools and Techniques:
CNC: Introduction, components of CNC, advantages and applications of CNC.
3D printing: Introduction and steps involved

Module-3: **8 Hrs, 10 Hrs(SSA)**

Introduction to IC Engines: Classification, Working of 4-Stroke (petrol and diesel) engines, numerical on Power and Mechanical efficiency calculations, applications.

Insight into future mobility technology: Introduction to Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles (block diagram only). Advantages and disadvantages of EVs and Hybrid vehicles.

Module-4 :	**8 Hrs, 10 Hrs(SSA)**
Materials and its Industrial Applications: (*Definitions, types and list of applications only*) Metals- Ferrous: Tool steels and stainless steels, Non-ferrous: Aluminium. Ceramics- Glass, optical fibre glass, cermet's. Composites- Fibre reinforced composites, Metal matrix composites Smart materials: Piezoelectric materials, shape memory alloys, semiconductors and super-insulators. **Metal Joining Processes:** Soldering, Brazing and Welding: Classification, definitions and principles of operation. Procedure followed in soldering, brazing and welding. Brief description of arc welding.	
Module-5:	**8 Hrs, 10 Hrs(SSA)**
Introduction to Robotics and Mechatronics: Robot anatomy, Joints & links, common robot configurations. Applications of Robotics. Concept of open-loop and closed-loop control systems, examples of Mechatronic systems. **Automation in Industry**: Definition, types - fixed, programmable and flexible automation, basic elements with block diagrams and advantages Drones, UAV, Types of UAV, fixed wing and multi-rotors, Applications	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Elements of Mechanical Engineering, K R GopalaKrishna, Subhash Publications, 2019.
2. Elements of Mechanical Engineering, V. K. Manglik, PHI Learning, 2019

II. Reference books:

1. Textbook of Elements of Mechanical Engineering, S. Trymbaka Murthy, Medtech, 2019.
2. Elements of Mechanical Engineering, Kestoor Praveen, Suggi Publishing, 2019
3. Thermal Management in Electronic Equipment, HCL Technologies, 2010
4. Fundamentals of Robotics: Analysis and Control, Robert J. Schilling, Pearson Education (US).

III. Web links and Video Lectures (e-Resources):

1. **https://www.tlv.com/global/TI/steam-theory/principal-applications-for-steam.html**
2. **https://www.forbesmarshall.com/Knowledge/SteamPedia/About-Steam/Fundamental-Applications-of-Steam**
3. **https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing-and-process-industry/**
4. **Videos | Makino (For Machine Tool Operation)**

5. **Mechanisms and mechanical devices 4e.pdf (e-book- Mechanical Linkages)**

Teaching-Learning Process (Innovative Delivery Methods):

1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.
2. Arrange visits to show the live working models other than laboratory topics.
3. Adopt collaborative (Group Learning) Learning in the class.
4. Adopt Problem Based Learning (PBL), which foster student analytical skills and develops thinking/ analyzing skills

Course outcomes (Course Skills Set):

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3						2				
CO2	3						2				
CO3	2										

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	10	10	10	50	20	50
	Test 1	40		20			
	Test 2	40		20			
	Test 3	40		20			
SEE	End Exam	100		50			50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

- Answer five full questions selecting one from each module.

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Course Title: Essentials of Information Technology		Semester	I/II
Course Code	25CS1ESEIT/25CS2ESEIT	CIE Marks	50
Credit Distribution (L-T-P)	3-0-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:0:48)	Total Marks	100
Total Credits	03	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

At the end of the course, the student will be able to:

CO1: Understand the concepts of data storage, representation, manipulation, and computer architecture concepts.

CO2: Apply the concepts of operating systems, algorithms, and networking to analyse and solve basic computing problems.

CO3: Comprehend basic cybersecurity concepts and identify simple ethical issues related to information technology.

Module-1:	**8 Hours**
Data Storage: Bits and Their Storage, Main Memory, Mass Storage, Representing Information as Bit Patterns, The Binary System, Storing Integers. **Data Manipulation:** Computer Architecture, Machine Language, Program Execution, Arithmetic/Logic Instructions, Communicating with Other Devices. Textbook 1: Chapter-1 (1.1-1.7), Chapter-2 (2.1-2.5)	
Module-2:	**8 Hours**
Operating Systems: The History of Operating Systems, Operating System Architecture, Coordinating the Machine's Activities. **Algorithms:** The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery. Textbook 1: Chapter-3, Chapter-5 (5.1-5.3)	
Module-3:	**8 Hours**
Networking and the Internet: Network Fundamentals, The Internet, The World Wide Web, Internet Protocols, Security. **Cybersecurity: Overview**—What is Cybersecurity?, Brief History of Cybersecurity Events, The Basic Information Security Model, Cyber Hygiene, Teams in Cybersecurity. **Ethical Issues in Information Technology:** Overview, Ownership Rules, Ethics and Online Content. Textbook 1: Chapter-4 Textbook 2: Chapter-16, Chapter-17	

Module-4 :	**8 Hours**
Software Engineering: The Software Engineering Discipline, The Software Life Cycle, Software Engineering Methodologies, Modularity, Tools of the Trade. **Database Systems:** Database Fundamentals, The Relational Model. Textbook 1: Chapter-7 (7.1-7.5), Chapter-9 (9.1-9.2)	
Module-5:	**Hours**
Introduction to HTML and Website Development: What is HTML?, Cascading Style Sheets (CSS), Website Design and Storyboarding, Structure of a Website. **Computer Graphics:** The Scope of Computer Graphics, Overview of 3D Graphics. Textbook 2: Chapter-12. Textbook 1: Chapter-10 (10.1-10.4)	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. J. Glenn Brookshear and Dennis Brylow, Computer Science: An Overview, 12th Edition, Pearson Education Limited, 2017
2. Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manish, "Fundamentals of Information Technology", Digital Commons at The University of South Florida (2023)

II. Reference books:

1. V. Rajaraman, "Introduction to Information Technology", Third Edition, PHI Learning, 2018
2. "INTRODUCTION TO INFORMATION TECHNOLOGY", 2ND EDN, Pearson, 2012
3. Pelin Aksoy, Information Technology in Theory, First Edition, Cengage

III. Web links and Video Lectures (e-Resources):

1. Information Technology: https://onlinecourses.swayam2.ac.in/cec20_cs05/preview
2. Computer Organization and Architecture: https://nptel.ac.in/courses/106103068
3. Introduction To Internet: https://nptel.ac.in/courses/106105084

Assessment Structure for AAT:

Activity -1: Quiz (05 Marks)

Activity -2: Self-Learning Activity - Practical Assignment (Individual) (Marks- 05)

Instruction: Students must demonstrate the solutions to the course instructor for the below list of lab activities and submit the record containing method (steps), program (if applicable), document (if applicable) and results/output

Course outcomes (Course Skills Set)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3									
CO2	3	3	3								
CO3						3	2	2			
Average	3	3	3			3	2	2			

List of Lab activities:

1. Locate the templates available for a word processing application that you have access to. Search the templates for a "Resume". Review the "Resume" template of your choice. Identify all the word processing features used in the "Resume" template. Use the "Resume" template to create your own resume. As you fill out the template, be sure to use the application to check your spelling and grammar. Verify the print layout of your resume. Save the resume and print a copy
2. Consider the following data: Student First Name, Student Last Name, Student Age, Student Grade, Student School, Telephone Number, Sport (Volleyball, Basketball, Softball, Baseball, Soccer, or Football). Considering the data required in the list above, create a spreadsheet and add at least 10 rows of data to your spreadsheet. Once you add all the data to the spreadsheet, calculate the average age of the students under each category of sports
3. Create a Power point presentation that meets the requirements of marketing of brand-new product. Apply a theme, background, and professional layout for chosen product
4. Create a Web page with basic HTML elements (tags). Insert lists, images, drop down lists and tables. Apply CSS properties for the web page
5. Create a relational database model (MS Access or any other) for storing information about courses taken by students. Develop suitable queries to insert data onto tables, update fields, delete rows and query relevant information from the database model

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Engineering Mechanics		**Semester**	I
Course Code	25CV1PSENM	**CIE Marks**	50
Credit Distribution (L-T-P)	3-0-1	**SEE Marks**	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	**Total Marks**	100
Total Credits	**04**	**Exam Hours**	3
Examination type (SEE)	**Theory**		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to:

CO1: Apply the concepts to find the resultant and equilibrium of coplanar force system.

CO2: Calculate friction forces acting on objects.

CO3: Compute the Centroid and Moment of Inertia of laminas.

CO4: Conduct investigation on basic construction materials, analyze the forces, interpret the data and write report.

Module-1: Coplanar force system: Resultant of Forces **08 Hours**

Basic dimensions and units, Idealization, Force, Classification of force system, Composition and resolution of forces, Principle of transmissibility of a force, Free body diagrams, Resultant of coplanar concurrent and non-concurrent force system, Moment, Couple and Characteristics of couple, Varignon's theorem: Numerical Examples.

Module-2: Coplanar force system: Equilibrium of Forces **08 Hours**

Conditions of static equilibrium, Equilibrium of coplanar concurrent force systems, Lami's theorem, Equilibrium of coplanar non-concurrent force system, Numerical examples. Types of supports, loadings and beams, Concept of statically determinate and indeterminate beams. Support reactions for statically determinate beams subjected to various loadings: Numerical examples.

Module-3:Friction **08 Hours**

Introduction, Types of friction, Laws of friction, Angle of repose, Cone of friction, Equilibrium of blocks on horizontal and inclined plane, Ladder friction: Numerical examples

Module-4:Centroid **08 Hours**

Introduction, definitions of centroid and centre of gravity. Axes of symmetry, Locating the centroid of square, rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, Centroid of composite areas and simple built-up sections: Numerical examples.

Module-5: Moment of Inertia of plane areas	**08 Hours**
Introduction, Moment of inertia about an axis, Parallel axes theorem, Perpendicular axes theorem, Polar moment of inertia, Radius of gyration, Moment of inertia of square, rectangular, triangular and circular areas from the method of Integration, Moment of inertia of composite areas and simple built-up sections: Numerical Examples.	

Suggested Learning Resources:

I. Textbooks:

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 3rd Edition, 2015, Laxmi Publications, ISBN: 9789380856674.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 11th Edition, 2018, Eastern Book Promoters Belgaum [EBPB], ISBN: 5551234003896
3. Ramamrutham.S, Engineering Mechanics, Dhanpat Rai Books, 2013,ISBN: 9789352164271.
4. M. L. Gambhir : Concrete Manual : Dhanpat Rai & sons New – Delhi, ISBN-135551234001965.
5. Soil Mechanics and foundation Engineering by B C Punmia, Ashok kumar jain, Arun kumar jain, 18th edition, 2023, Laxmi Publications New Delhi.

II. Reference books:

1. Beer F.P. and Johnston E. R., Mechanics for Engineers: Statics and Dynamics, 4th Edition, 1987, McGraw Hill, ISBN: 9780070045842
2. Meriam J. L. and Kraige L. G, Engineering Mechanics-Statics, Vol I–6th Edition,2008, Wiley publication.
3. Irving H. Shames, Engineering Mechanics-Statics and Dynamics, 4th Edition, 2002, Prentice-Hall of India(PHI).
4. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press, New Delhi.
5. Timoshenko S, Young D. H., Rao J. V., Sukumar Patil, Engineering Mechanics, 5th Edition, 2017,McGraw Hill Publisher, ISBN: 9781259062667
6. Bhavikatti S S, Engineering Mechanics, 4th Edition, 2018, New Age International Publications.
7. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 3rd Edition 2013, BS Publications.
8. J K Gupta and S K Gupta, Engineering Mechanics and Applied Mechanics, first edition, 2021, Cengage learning. ISBN: 9789353505851.

III. Web links and Video Lectures (e-Resources):

1. NPTEL: Introduction to Civil Engineering Profession, https://nptel.ac.in/courses/105106201
2. NPTEL: Engineering Mechanics, https://nptel.ac.in/courses/112103108

Laboratory Component

PART -A: Conventional Experiments

1. Specific Gravity of **a)** Fine aggregates. **b)** Coarse aggregates. **c)** Cement. **d)** Soil.
2. Sieve analysis of soil/sand-Graphical representation of the gradation curve.
3. Bulk density of aggregates and Void percentage.
4. Basic tests of building materials:

a) Burnt Clay Bricks- Dimension, Compressive strength and Water absorption.

b) Concrete Blocks- Dimension, Compressive strength and Water absorption.

5. Field tests on cement for quality assurance: Lump test, Float test and Sieve test.
6. Verification of Parallel force system/Support reactions- Simply supported beam.
7. Visual identification and applications of:

a) Crushed Sand and River sand **b)** Bitumen **c)** Fly-Ash and GGBS **d)** Steel Bars of Various Sizes.

PART -B: Typical Open-Ended Experiments

Open-ended experiments are a type of laboratory activity where the outcome is not predetermined, and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

1. Chalk and talk.
2. PowerPoint presentation, Site/ Laboratory visits for materials and building component demonstrations.
3. Flipped Classroom
4. NPTEL and other videos for theory topics
5. Individual teachers can device innovative pedagogy to improve teaching-learning.

Assessment Structure:

Component	Type of Assessment	Max. Marks	Reduced Marks	Total	Min. Marks for Eligibility	Total marks
CIE- Theory	Quiz / AAT	10	5	**25**	**10**	**50**
	Test 1	40	10			
	Test 2	40	10			
CIE- Lab	Record and Performance	10	10	**25**	**10**	
	Lab test	15	15			
CIE				50	20	
SEE	**Semester End Exam**	**100**	50		35	**50**
Grand Total						100

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks,** combined from both Theory and Lab component**, ensuring a minimum of 10 marks is scored individually in both Theory and Lab component**.
- To pass the **SEE**, a student must score at least **35% of 100 marks.**

Not with standing the above, a student is considered to have **passed the course,** provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Suggested Learning Activities may include (but are not limited to):

1. Case Study Presentation
2. Assignments
3. Quiz
4. Course Project
5. Any other relevant and innovative academic activity
6. Use of MOOCs and Online Platforms

Suggested Innovative Delivery Methods may include (but are not limited to):

1. Case-Based Teaching
2. Flipped Classroom
3. Problem-Based Learning (PBL)
4. ICT-Enabled Teaching

CO-PO mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1: Apply the concepts to find the resultant and equilibrium of coplanar force system.	3	2	-	-	-	-	-	-	-	-	-
CO2: Calculate friction forces acting on objects.	3	2	-	-	-	-	-	-	-	-	-
CO3: Compute the Centroid and Moment of Inertia of laminas.	3	2	-	-	-	-	-	-	-	-	-
CO4: Conduct investigation on basic construction materials; analyse the forces, interpret the data and write report.	3	-	-	3	-	-	-	-	-	-	-

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Course Title: Basics of Electrical Engineering		Semester	I
Course Code	25EE1PSBEE	CIE Marks	50
Credit Distribution (L-T-P)	3-0-1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

At the end of the course, the student will be able to:

CO1: Understand the fundamental concepts of DC and AC circuits, electro-magnetism.

CO2: Apply the fundamental laws for AC and DC circuits.

CO3: Analyze electricity billing, domestic wiring and safety measures against electricity.

CO5: Conduct the experiments and study the performance of AC and DC circuits.

CO6: Engage in individual/team work to make effective technical presentation on electrical concepts and communicate effectively to the audience.

Module-1:	**8 Hours**

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. (Branch Current method only), Star-delta transformation, numerical.

Electromagnetism: Faraday's laws of Electromagnetic induction, Lenz's law, dynamically and statically induced emf, Fleming's right-hand rule, Fleming's left-hand rule. Inductance and mutual inductance, coefficient of coupling, energy stored and its applications, numerical.

Module-2:	**8 Hours**

Network Theorem: Thevenin's theorem, Superposition theorem, Norton's Theorem, Maximum Power Transfer Theorem. Numerical. (Using branch current and Nodal analysis)

Module-3:	**8 Hours**

Single-phase Circuits: Generation of sinusoidal voltage, frequency of generated voltage, Expression of average value, RMS value, form factor and peak factor of sinusoidal voltage and current. Phasor representation of alternating quantities. Analysis of R, L and C circuits. Series and parallel R-L, R-C and R-L-C circuits with phasor diagrams, calculation of real power, reactive power, apparent power, and power factor, illustrative examples.

Module-4:	**8 Hours**

Three- phase Circuits: Generation of three-phase system, definition of phase sequence, star and delta (mesh) connections, relation between phase and line values of voltages and of currents of star and delta connections, considering the phasor diagram. Definition of balanced and unbalanced source and load. Power, reactive power and power factor. Problems on balanced loads. Measurement of 3-phase power by 2-wattmeter method. Expression of power factor in terms wattmeter readings. Effect of power factor on wattmeter readings. Comparison between single phase and three-phase systems.

Module-5:	**8 Hours**
Domestic Wiring: Wiring for two-way and three-way control of load. **Domestic Electricity Bill:** Power-rating of household connected loads. Sanctioned Load. Practical unit of measuring energy, energy expressed for commercial purposes - Unit, its definition. Electricity bill [as per Electricity Supply Companies (escom)]: Tariff method considered: two-part tariff. Particulars considered for billing: sanctioned load and units consumed. Calculation of electricity bill for domestic consumers. **Equipment Safety Measures:** Working principles of fuse and miniature circuit breaker (MCB), the merits and demerits of fuse and MCB. Definition for current rating, fusing current and fusing factor. **Personal safety measures:** Electric shock, possible effects of shocks. Safety precautions to avoid personal shock while dealing with electricity. Earthing: Pipe and plate.	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. A textbook of Electrical Technology by B.L. Theraja, Volume-1, S Chand and Company, Reprint Edition 2014. [Covers modules 1 to 4]
2. Basic Electrical Engineering, D.C. Kulshreshtha, McGraw Hill, 2nd Edition, 2024. [Covers all modules]

II. Reference books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw Hill 2nd edition, 3rd Reprint 2024.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016.
4. Basic Electrical and Electronics Engineering, S.K Bhattacharya, et al, Pearson. 2nd edition, 2017.
5. Handbook of Electrical Engineering formulae, Harish C Rai, CBS Publications, 2018.

III. Web links and Video Lectures (e-Resources): www.nptel.ac.in

1. Principle of Electrical Sciences, Prof Sanjay Agrawal, Indira Gandhi National Open University.
2. Electricity and Electrical Wiring, Dr. Antara Mahanta Barua, Krishna Kanta Handiqui State Open University, Guwahati.

List of Lab activities:

The laboratory syllabus consists of PART-A and PART-B. While PART-A has 8 conventional experiments, PART-B has 4 typical open-ended experiments. The maximum marks for laboratory course is 25.

Both PART-A and PART-B are considered for CIE.

Students have to answer 1(one) question from PART-A and 1(one) question from PART-B.
PART-A is evaluated for 35 marks out of the maximum 50 marks.
The open-ended question shall be evaluated for 15 marks.

PART – A CONVENTIONAL EXPERIMENTS
1. Verification of Ohm's law. 2. Verification of Kirchhoff's laws. 3. Measurement of resistance, inductance, impedance and power factor using voltmeter, ammeter and wattmeter in single-phase AC circuits. 4. Verification of Superposition Theorem. 5. Verification of voltage and current relationship in a three-phase a) Star connected system and b) Delta connected system. 6. Measurement of three-phase power of a resistive load by 2-wattmeter method, when the load is star connected. 7. Measurement of three-phase power of a resistive load by 2-wattmeter method, when the load is delta connected. 8. Measurement of earth's resistance by 3-electrode method. (Demo)
PART – B TYPICAL OPEN-ENDED EXPERIMENTS
Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning. 1. Wiring an appropriate electric circuit, understanding the basic principle used for 2-way and 3-way control of load. 2. Fuse and MCB operation. 3. Energy calculations for variable load. 4. Power and power factor measurement for various lighting loads.

Teaching-Learning Process (Innovative Delivery Methods):
Chalk and Talk
Experiential learning

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	10	10	5	25	10	50
	Test 1	40	80 (Best 2 of 3 tests)	20			
	Test 2	40					
	Test 3	40					
CIE – Lab	Record	10	25	10	25	10	
	Lab Test – Write up, Conduction, Results, Viva	15		15			
	CIE			50		20	
SEE	End Exam	100		50		35	50
Grand Total Marks						40	100

Two best scores out of the three tests will be considered for CIE. CIE methods/question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

- Ten questions to be set; two questions from each unit with internal choice.
- Student should answer one question from each unit

Continuous Comprehensive Assessments (CCA):

CCA will be conducted for a total of 5 marks. It is recommended to include any one learning activity aimed at enhancing the holistic development of students. This activity should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity -1: (Marks- 5)

Rubrics for Learning Activity 1, Maximum marks:5 (Based on the nature of learning activity, design the rubrics for each activity)						
Activity type	**Performance Indicator**	**Excellent**	**Very Good**	**Good**	**Fair**	**Needs Improvement**
Presentation/ Seminar (5)	**PO10.1**: Communicate effectively both in written and oral form. (5)	Presents ideas confidently, clearly, and engagingly with excellent audience interaction. (5)	Presents clearly the topic contents but falters while delivering the content. (4)	Presents the contents properly but struggles to deliver. (3)	Presents imprecise contents and finds difficulty in delivery. (2)	Presents imprecise contents and fails to deliver. (1)
	PO8.1: Demonstrate professional and ethical behavior. (5)	Adheres to high ethical standards, shows strong professional conduct. (5)	Mostly adheres to ethical standards with minor lapses. (4)	Understands ethics but inconsistently applies them. (3)	Shows limited awareness of ethical standards (2)	Shows disregard to ethics and professionalism (1)

	Programme Outcomes										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3										
CO2		3									
CO3						2					
CO4								3			
CO5									1		

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Course Title: Fundamentals of Electronics & Communication Engineering		Semester	I/II
Course Code	25EC1PSECE/25EC2PSECE	CIE Marks	50
Credit Distribution (L-T-P)	3-0-1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to ….

CO1: Apply the basic principles of Electronics to comprehend Analog and Digital circuits.
CO2: Analyze the characteristics and performance parameters of basic Electronic devices and Circuits.
CO3: Design Electronic Circuits for the given basic applications.
CO4: Conduct hardware-based experiments to design, implement, and validate the performance of analog and digital circuits.
CO5: Involve in independent and team learning by exploring modern Tool or Software to simulate electronic circuits, and document the results.

Module-1: Semiconductor Diode & Applications **08 Hours**

Diode: Working principle Characteristics, Parameters and Specifications, Shockley's Equation. Half-Wave and Bridge Rectifier: Working principle and parameters Ripple Factor and Efficiency Derivations, Peak Inverse Voltage, shunt Capacitor Filter. **Zener Diode:** Zener Diode Characteristics and ratings, Application as Voltage Regulator, Regulated Power Supply.

Module-2: Bipolar Junction Transistors **08 Hours**

Introduction, BJT Voltages & Currents, BJT Amplification, Common Base and Common Emitter Characteristics, BJT Biasing, Fixed Biasing and Voltage Divider, DC Load line and Bias point, Transistor as a Switch. **Feedback:** Feedback Principle, types of feedback: Positive and Negative feedback, advantages of negative feedback

Module-3: Operational Amplifiers **08 Hours**

Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, Slew rate, Bandwidth, input offset voltage, input bias Current and Input Offset Current, The Ideal Op-Amp, Equivalent Circuit of Op-Amp, Open Loop Op-Amp, Closed Loop Configurations: Inverting and Non-Inverting Amplifiers. Basic Op-Amp Applications: Summing, Scaling and Averaging circuit, Subtractor, Voltage Follower, Basic Integrator and Differentiators.

Module-4: Communication **08 Hours**

Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium –Wired and Wireless, Noise, Receiver, Multiplexing, Types of communication systems.

Types of modulation-: Amplitude Modulation, Frequency and Phase Modulation, Waveforms. Applications: Introduction to Cellular Communication, Computer Communication Networks.
Module-5: Digital Electronics and Number Systems **08 Hours**
Number Systems (Binary, Octal, Decimal and Hexadecimal), Number Base Conversion, 1's and 2's Complement Operations, Binary Addition and Subtraction, Binary Logic. **Boolean Algebra:** Basic Definitions, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates, NAND And NOR as Universal Gates, **Applications:** Combinational logic, Design procedure, Adders- Half adder, Full adder Sequential logic: Introduction, flip-flops- SR, D, T and JK flip-flops, 2-bit Binary Counters

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. **Basic Electronics- Devices, circuits and IT fundamentals-** By Santiram Kal- PHI, 2012
2. **Op-amps and Linear Integrated Circuits,** Ramakanth A Gayakwad, Pearson Education, 4th Edition
3. **Digital Logic and Computer Design,** M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8

II. Reference books:

1. **Electronic Devices and Circuit Theory**, R Nashelsky and L Nashelsky, 11th Edition, Pearson, 2012
2. D.P Kothari and I J Nagrath, **Basic electronics**, Second Edition, McGraw Hill Education Pvt ltd, 2018
3. John G. Proakis, Masoud Saleh, **Fundamentals of Communication Systems**, Second Edition, Pearson Educations, Inc., 2014

III. Web links and Video Lectures (e-Resources):

1. https://www.elsevier.com/books/basic-electronics/holbrook/978-0-08-006865-7
2. http://www.worldcat.org/title/basic-electronics/oclc/681543319
3. http://nptel.ac.in/courses/117103063/
4. https://swayam.gov.in/course/3595-basic-electronics

Teaching-Learning Process (Innovative Delivery Methods):

1. Technology Integration
2. Collaborative (Team) learning
3. Hands-on experience.
4. Learning through hardware components.

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
Theory	Self - Learning (simulation)	10	10	05	05	10	50
	Test 1	40	80	10	20		
	Test 2	40		10			
	Test 3	40		10			
Lab	CIE	10	10	10	25	10	
	Test	15	15	15			
CIE				50		**20**	
SEE	End Exam	100		50		35	50
Grand Total Marks						**40**	**100**

Two best scores out of the three tests will be considered for CIE.
CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

1. Each module consists of two full questions.
2. Five full questions to be answered, selecting one full question from each module

Course outcomes (Course Skills Set)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1	3										
CO2		1									
CO3			1								
CO4				3							
CO5					2			1	1		

Activity 1: Simulation based Self-Learning: Implementation of given problem in Proteus simulation tool and demonstration with submission of report.

I. **Proteus** is an **Electronic Design Automation (EDA) software tool** widely used for simulating, designing, and testing electronic circuits without physical hardware. It supports analog, digital, and embedded system circuits. It provides schematic capture, circuit simulation, PCB layout design, and virtual testing tools like oscilloscopes and logic analyzers.

II. List of Simulation Experiments for Self-learning

1. Half wave rectifier with and without capacitor filter
2. +5V power supply unit
3. Transistor as an amplifier
4. Demonstrating characteristics of transistor in CB configuration.
5. Op-amp circuits – Summing and Subtractor
6. Op-amp circuits – Integrator and Differentiator
7. Simplification and realization of Boolean expression using basic logic gates
8. Simplification and realization of Boolean expression using universal gates
9. SR and D Flip flop
10. T and JK Flip flop
11. 2-bit Binary Counter

III Self-Learning Evaluation Rubrics

Rubrics	Description	4	3	2	1
R1 (05)	Demonstrates an understanding of electronics systems and Simulation tool **(PO1, PO5)**	Explains concepts clearly, accurately, and with insightful connections	Explains concepts accurately with minor gaps in detail	Shows basic understanding of concepts but lacks depth or has some inaccuracies	Understanding is limited, with errors or confusion
R2 (03)	Technical writing ability (Report) **(PO9)**	report is clear, specific, and well justified with context	report is clear and specific but lacks strong justification	report is understandable but somewhat vague or incomplete	report is unclear or too broad
R3 (02)	Individual contribution to the entire project **(PO8)**	Active participation	Good participation	Fair participation	Minimal participation

List of Lab activities:

PART – A **CORE/BASIC HARDWARE EXPERIMENTS**
1. Measurement of Amplitude, Time Period, and Frequency using CRO
2. Study of V–I Characteristics of a PN Junction Diode
3. Design and Testing of a Bridge Rectifier with and without Filter
4. Investigation of Inverting and Non-Inverting Op-Amp Configurations
5. Verification of Truth Tables of Basic Logic Gates
6. Verification of De-Morgan's Laws using Logic Gates
7. Design and Implementation of Half Adder and Full Adder Circuits
PART – B **OPEN ENDED HARDWARE/ SIMULATION EXPERIMENTS**
1. Analysis of BJT Characteristics in Common Emitter Configuration.
2. Verification of BJT Operation as a Switching Device.
3. Implementation of Boolean Expressions using Logic Gates.
4. Testing of Op-Amp as Voltage Follower and Weighted Summer with Waveform Analysis.

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Course Title: Structured Programming in C		Semester	I/II
Course Code	25CS1PSSPC/25CS2PSSPC	CIE Marks	50
Credit Distribution (L-T-P)	3-0-1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skillset)

At the end of the course, the student will be able to:

CO1: Apply knowledge of fundamental programming concepts for various applications.

CO2: Analyze the logical solutions using control structures, arrays, and modular functions to solve basic computational problems.

CO3: To conduct practical experiments for given requirements using C.

CO4: Design C programs/ applications for a given requirement.

Module-1: An Overview of C, Expressions, Console I/O	**08 Hours**
Algorithm and Flowchart. A Brief History of C, C Is a Middle-Level Language, C Is a Structured Language, C Is a Programmer's Language, Compilers Vs. Interpreters, The Form of a C Program, The Library and Linking, Separate Compilation, Compiling a C Program, C's Memory Map. The Basic Data Types, Modifying the Basic Types, Identifier Names, Variables, The Four C Scopes, Type Qualifiers, Storage Class Specifiers, Variable Initializations, Constants, Operators, Expressions. Reading and Writing Characters, Reading and Writing Strings, Formatted Console I/O, Printf(), Scanf()	
Module-2: Statements	**08 Hours**
True and False in C, Selection Statements, Iteration Statements, Jump Statements, Expression Statements, Block Statements.	
Module-3: Arrays, Strings and Pointers	**08 Hours**
Single-Dimension Arrays, generating a Pointer to an Array, Passing Single-Dimension Arrays to Functions, Strings, Two-Dimensional Arrays, Multidimensional Arrays, Array Initialization, Variable - Length Arrays. What Are Pointers? Pointer Variables, The Pointer Operators, Pointer Expressions, Pointers and Arrays, Multiple Indirection, Initializing Pointers.	
Module-4: Functions	**08 Hours**
The General Form of a Function, Understanding the Scope of a Function, Function Arguments, argc and argv—Arguments to main (), The return Statement, What Does main() Return?, Recursion, Function Prototypes, Declaring Variable Length Parameter Declarations, The inline Keyword, pointers to Functions, C's Dynamic Allocation Functions, restrict-Qualified Pointers, Problems with Pointers.	

Module-5: Structures, Unions, Enumerations, and typedef	**08 Hours**

Structures, Arrays of Structures, Passing Structure to Functions, Structure Pointers, Arrays and Structures within Structures, Unions, Bit-Fields, Enumerations, using sizeof to Ensure Portability, typedef.

PART – A

1. A robot needs to find how far it must travel between two points on a 2D plane. Develop a C program to calculate the straight-line distance between the given coordinates.

2. Develop a C program that takes a student's marks as input and displays their grade based on the following criteria: 90 and above: Grade A
   75 to 89: Grade B
   60 to 74: Grade C
   50 to 59: Grade D
   Below 50: Grade F
   Choose a suitable control structure to implement this logic efficiently.

3. Develop a C program that takes a unique identification input like PAN_Number, AADHAR_Number, APAAR_Id, Driving License, Passport and checks it against a set of stored KYC records. Based on the input, display whether the individual is verified or not. Use an appropriate control structure to handle multiple possible ID matches. Assume all Unique identification are of integer type.

4. A math app needs to determine the type of roots for a quadratic equation based on user input. Develop a C program to calculate and display the roots based on the given coefficients.

5. A sensor in a robotic arm needs to calculate the angle of rotation in real-time, but the hardware doesn't support built-in trigonometric functions. Develop a C program to approximate the value of sin(x) using a series expansion method for improved performance.

6. Write a C program that accepts a course description string and a keyword from the user. Search whether the keyword exists within the course description using appropriate string functions. If found, display: "Keyword '<keyword>' found in the course description." Otherwise, display: "Keyword '<keyword>' not found in the course description."

7. Develop a C program that takes marks for three subjects as input. Use a function to check if the student has passed (minimum 40 marks in each subject). Display the average and whether the student passed or failed.

8. In an ATM system, two account balances need to be swapped temporarily for validation. Develop a C program that accepts two balances and uses a function with pointers to swap them. Display the balances before and after swapping.

PART – B

1. A college library has a digital bookshelf system where each book is assigned a unique Book ID. The bookshelf is organized in ascending order of Book IDs. Develop a C Program to quickly find whether a book with a specific Book ID is available in the shelf.
2. A sports teacher has recorded the scores of students in a 100-meter race. To prepare the result sheet, the teacher wants the scores arranged in **descending order** (from highest to lowest). Write a C program to sort the scores.
3. A small warehouse tracks how many units of different products are shipped from multiple branches. Another dataset shows how much revenue each product generates per unit. Combine these datasets to calculate the total revenue generated by each branch.
4. A basic mobile contact manager stores first and last names separately. For displaying full names in the contact list, you need to join them manually. Additionally, the system must check the length of each full name to ensure it fits the screen. Perform these operations without using built-in string functions.
5. A currency exchange booth allows users to convert between two currencies. Before confirming the exchange, the system simulates a swap of the values to preview the result without actually changing the original data. In other cases, it updates the actual values. Demonstrate both behaviours. (Call by Value and Call by reference).

A local library needs to store and display details of its books, including title, author, and year of publication. Design a structure that can hold these details and display a list of all books entered.

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Schildt, Herbert. "C the complete reference." (2021), 4th Edition
2. E Balgurusamy, Programming in ANSI C , 9th Edition , McGraw Hill

II. Reference books:

1. BrianW.KernighanandDennisM.Ritchie,The'C'ProgrammingLanguage,PrenticeHallofIndia
2. ReemaThareja,ProgramminginC,2ndEdition,OxfordUniversityPress,2015
3. E. Balagurusamy, ProgramminginANSIC,8thEdition, McGraw-Hill Education

III. Weblinks and Video Lectures(e-Resources):

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. **Introduction to Programming in C** [https://onlinecourses.nptel.ac.in/noc23_cs02/preview]
3. **C for Everyone: Programming Fundamentals** [https://www.coursera.org/learn/c-for-everyone]
4. **Computer Programming Virtual Lab** [https://csc02-iiith.vlabs.ac.in/exp/pointers/]
5. **C Programming: The ultimate way to learn the fundamentals of the C language**

[https://www.pdfdrive.com/c-programming-the-ultimate-way-to-learn-the-fundamentals-of-the-c-language-e187584209.html]

6. **C Programming: The Complete Reference**
   [https://viden.io/knowledge/programming-in-c-language/attachment/28313/c-the-complete-reference-herbert-schildt-4th-edition-pdf/preview]
7. **https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0138432370393 7433634517_shared/overview**

Teaching Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

1. Flipped Classroom
2. Interactive Coding Platforms

Course outcomes (Course Skills Set)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	3										
2		3									
3					3						
4			3		3			2	2		

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	AAT	10	10	5	25	10	50
	Test 1	40	120	20			
	Test 2	40					
	Test 3	40					
CIE – Lab	Lab Test1 (10)	20	20	20	25	10	
	Lab Test2 (10)						
	Record & Performance	5	5	5			
CIE				50		**20**	
SEE		100		50		35	50
Grand Total Marks						**40**	**100**

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Self-Learning Activity

Mini-Project on Design and Development of Real-word applications using C Programming (10 Marks)

INSTRUCTIONS (Conducted for 10M and reduced to 5M)

In this activity, students work in pairs to analyze and implement a real-world application using C within a given time frame. The problem to be implemented should be selected from co-courses such as **Physics**, **Electrical Engineering**, or other related domains. After completing the implementation, students will present their code and explain their understanding of the underlying concepts of C. Every team is also required to submit a concise report of the problem implemented.

1. A group of 2 students are given to develop an application by the respective faculty. Students as a team of 2 are made to implement the application with suitable outputs.
2. Students shall present their code. Marks will be awarded based on their understanding of concepts and code.
3. A report of maximum 5 pages be submitted by each group comprising front page, Description (Abstract), Design (Flowchart/Sequence Diagram) and Outcome of the application (Result and Conclusion).
4. Submission of the code through Github

Rubric	Excellent	Very Good	Good	Fair
Program Correctness	Program always works correctly and meets the specifications (8M)	Program functions correctly in majority cases (6M)	Program often exhibits incorrect behavior. (4M)	Program only functions correctly in very limited cases or not at all. (2M)
Usage of appropriate C concept	Necessary C concepts are covered in the program assignment. (4M)	Necessary C concepts are covered in the program assignment. (3M)	No proper usage of C concepts are covered in the program assignment. (2M)	No proper usage of C concepts are covered in the program assignment. (1M)
Code Efficiency	Code uses the best/optimal approach in	Code uses approaches that	Code uses poorly-chosen approaches in at	Many things in the code could have been

	every case. (4M)	could be improved (3M)	least one place. (2M)	accomplished in an easier, faster or otherwise better fashion (1M)
Documentation	No errors, code is clean, understandable and well-organized. Code is well-commented (4M)	No errors, minor issues with general organization. Places that could benefit from comments which are missing. (3M)	At least one major issue with indentation, whitespace, variable names, or organization. Sections of code uncommented or lacking meaningful comments. (2M)	Major problems with at three or four of the readability subcategories. No file header or comments present. (1M)

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Course Title: Elements of Biotechnology and Biomimetics		Semester	I
Course Code	25BT1PSEBB	CIE Marks	50
Credit Distribution (L-T-P)	3-0-1	SEE Marks	100
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to

CO1: Understand the fundamental concepts of Biotechnology.

CO2: Demonstrate a foundational understanding of core biotechnological techniques (PO1)

CO3: Apply interdisciplinary thinking to address challenges in engineering sectors using biotechnology and biomimetics (PO1, PO5, PO6)

CO4: Conduct experiments on biotechnological techniques or biomimicry and interpret the data (PO2, PO4, PO9, PO10).

Module-1: Basics of Biology **09 Hours**

Structure and functions of prokaryotic and eukaryotic cells. Central dogma of Biology (DNA to RNA to Protein), Biomolecules of life - Carbohydrates (examples of Mono, Di, Polysaccharides), Proteins (examples of enzymes, structural proteins, transport proteins, regulatory proteins, and hormones), Structure and types of DNA & RNA,. vitamins and enzymes.

Module-2: Overview of Biotechnology **07 Hours**

History, scope, and branches/types of biotechnology such as medical biotechnology (red) - focusing on healthcare; agricultural biotechnology (green): improving crops; basics of industrial biotechnology, basic concepts of environmental biotechnology, yellow biotechnology (food production):probiotics and basics of bioinformatics

Module-3: Biotechnology Processes & Sustainability **06 Hours**

Bioprocess stages: Bio Ethanol production from Agri-waste, Biosafety levels, containment, cGMP/GLP and IPR issues). Circular bioeconomy and biotechnology's role in UN SDGs, Ethical, legal, and social issues in biotechnology, GI tags, specific case studies related to Basmati or Turmeric.

Module-4 : AI in Biological Research **10 Hours**

Role of AI in genomics. Role of AI in drug development, AI-assisted target design, AI in medical imaging and disease diagnosis, AI-driven personalized medicine and predictive healthcare, Role of AI in agriculture and crop improvement, Role of AI in fermentation industry and bioprocess optimization, Role of AI in Protein and enzyme engineering, Role of AI in biosensors and diagnostics.

Module-5: Bioinspired Engineering and applications	**08 Hours**
Basics, history, and scope of biomimetic, Levels and approaches of biomimetic Bioinspired materials: nacre, bone, spider silk, cuticle-based composites, Self-cleaning surfaces and living materials. Bioinspired mechanisms: hygromorphic actuators, fish/bird locomotion, termite mound passive cooling, Seashell-based, spider web-inspired, and insect eye-inspired innovations, mosquito proboscis inspired needles, drug delivery inspired by biology, Bioinspired energy and solar systems	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. P. K. Gupta, Elements of Biotechnology, Rastogi Publications, 468, 2010
2. Vogel, Steven. Cats' Paws and Catapults: Mechanical Worlds of Nature and People. W. W. Norton & Company, 2000

II. Reference books:

1. Singh B.D., Biotechnology: Expanding Horizons, Kalyani Publishers, 768 pages, 2019
2. Barnum, Susan R., Biotechnology: An Introduction, Cengage Learning, 432 pages, 2021
3. Bar-Cohen, Yoseph, Biomimetics: Nature-Based Innovation, CRC Press, 788 pages, 2012
4. Mukherjee, A.K., and Ghosh, S.K., Biomimicry: Nature Inspired Solutions, Narosa Publishing House, 260 pages, 2018
5. Vincent, Julian F.V., Structural Biomaterials, Princeton University Press, 252 pages, 2012
6. Herren, Ray V., Introduction to Biotechnology, Cengage Learning, 672 pages, 2018
7. Nath, Bhaskar, Advances in Biotechnology, Atlantic Publishers, 300 pages, 2020

III. Web links and Video Lectures (e-Resources):

1. Bioengineering: An Interface with Biology and Medicine, https://onlinecourses.nptel.ac.in/noc21_bt05/preview?utm_source=chatgpt.com.
2. Introduction to Biomimicry (Multi-Disciplinary), https://onlinecourses.nptel.ac.in/noc22_ge24/preview?utm_source=chatgpt.com.
3. Industrial Biotechnology, https://onlinecourses.nptel.ac.in/noc20_bt21/preview?utm_source=chatgpt.com
4. Fundamentals of Bioprocess Engineering, https://onlinecourses.nptel.ac.in/noc25_bt84/preview?utm_source=chatgpt.com.
5. Medical Biomaterials, https://onlinecourses.nptel.ac.in/noc20_bt12/preview?utm_source=chatgpt.com.

List of Lab activities:

I. COVENTIONAL EXPERIMENTS

1. Preparation of standard buffers
2. Estimation of carbohydrates and protein with error analysis Microbial techniques
3. Sterilization of glassware using dry and wet heat Microscopy & Staining
4. Onion root tip — stages of mitosis & mitotic index
5. Observation of prokaryotic and eukaryotic cells (Preparation of permanent slides
6. Observation of natural microstructures (leaf, insect wing, feather) under microscope.

II. OPEN ENDED EXPERIMENTS

Open-ended experiments are a type of laboratory activity where the outcome is not predetermined, and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

Concept: Antimicrobial activity: Antimicrobial Sensitivity Testing using Plant Extracts or Antibiotics

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.
The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

1. Flipped class
2. Chalk and talk
3. NPTEL and other videos for theory topics
4. Partial Delivery of course by Industry expert/ industrial visits
5. ICT-Enabled Teaching.
6. Activity based learning.
7. Keep fundamentals as the core teaching content.
8. Present recent trends as short "industry snapshot" segments at the end of each module (e.g., 15–20 minutes), not as examinable depth topics.
9. Use case studies, videos, or demonstrations for the advanced concepts so students see applications without getting bogged down in mechanisms. Example – Lotus leaf effect → self-cleaning surfaces, Shark skin → drag reduction in swimsuits.
10. Make the trends part of assessments via assignments, mini-seminars, or group presentations, so the main lecture hours focus on the basics.

Flipped Classroom: Students watch short video lectures before class; class time used for discussion/problem-solving.

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks**.
- Practical Assignment will be given for 5 marks. **Best of 2 internal tests will be considered for 20 marks. The total CIE marks(theory) will be for 25.**
- To pass the **SEE**, a student must score at least **35% of 50 marks**, i.e., **18 marks**.

The student's performance in a course shall be judged individually and together based on the results of CIE and SEE. **The lab component will be included in CIE for 25 marks** (Open ended and continuous evaluation). **Total CIE marks for the course is 50**. Both PART-A (Theory) and PART-B(Lab) are considered for CIE and SEE

Course outcomes (Course Skills Set)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1											
CO2	3										
CO3	2				2	2					
CO4		3		3					3	3	

Continuous Comprehensive Assessments (CCA):

Continuous Internal Evaluation (CIE): includes mid-term tests, weekly/fortnightly class tests, homework assignments, problem solving, group discussions, quiz, seminar, mini-project and other Alternate Assessment Tools (AAT) prescribed by the faculty handling a course prior to beginning of the classes.

It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity - 1: Case Study / Practical Assignment (Marks – 5)

INSTRUCTIONS:

I. Course instructor will refer to relevant textbooks, NPTEL resources, or recent research articles to derive the questions for problem-solving and application.

II. Course instructor must identify problems or activities from these areas:

1. Biotechnology Fundamentals (DNA/RNA structure, biomolecules, cell ultrastructure)
2. Biotechnological Techniques (PCR, gel electrophoresis, blotting, gene transfer

methods)

3. Applications (insulin production, stress-resistant plants, bioremediation, gene therapy)
4. Biomimetics Basics (natural materials, bioinspired designs)
5. Applications of Biomimetics (civil engineering, medical devices, robotics, energy systems)

III. Course instructor will assign THREE tasks from the above areas to the students for:

1. Background study of the concept
2. Experimental design or application design
3. Data collection/analysis or feasibility study

IV. Students must demonstrate the solutions, experimental results, or design prototypes to the course instructor and submit the record containing:

1. Introduction & objectives
2. Methodology / approach used
3. Observations & results
4. Analysis & discussion
5. Conclusion & future scope

Suggested Learning Activities may include (but are not limited to):

1. Course Project
2. Case Study Presentation: Students will be given case study questions to be solved in class in relevance to the course module. This activity will be done as a group study.
   for ex: Carbohydrates section
   Sample case study: Why do athletes eat banana before match.
   Students need to look into the importance of carbohydrates and the mechanism of action with respect to the metabolism and as energy source. This question will directly apply the course content towards a suitable application of the case
3. Tool/Software Exploration
4. Any other relevant and innovative academic activity
5. Use of MOOCs and Online Platforms
6. Innovations in the field of red and green biotechnology in today's world. Students will be asked to look into different Biotechnology companies and start ups to understand the current trends in the sector

Suggested Innovative Delivery Methods may include (but are not limited to):

1. Flipped Classroom
2. Problem-Based Learning (PBL)
3. Case-Based Teaching
4. Simulation and Virtual Labs
5. Partial Delivery of course by Industry expert/ industrial visits
6. ICT-Enabled Teaching
7. Role Play

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Course Title: Soft Skills		**Semester**	I/II
Course Code	25MA1HSSSK / 25MA2HSSSK	**CIE Marks**	100
Credit Distribution (L-T-P)	NCMC	**SEE Marks**	-NA-
Pedagogical Hours (L:T:P:SL)	(14:0:0:16)	**Total Marks**	100
Total Credits	NCMC	**Exam Hours**	-NA-
Examination type (SEE)	**-NA-**		

Course Outcomes (Course Skill Set)

CO 1: Apply social skills for clear communication, persuasion, self-awareness, and active listening

CO 2: Use emotional skills to build confidence, manage stress, and adapt to change

CO 3: Set ambitious goals, practice empathy, and apply creativity for problem-solving

CO 4: Demonstrate discipline, time management, and structured problem-solving

CO 5: Work in teams, negotiate, resolve conflicts, and think critically

Module-1: **03 Hours**

- **Communication:** Principles of clear and effective exchange of ideas in professional and social contexts.
- **Persuasion:** Techniques to influence and convince through logical, emotional, and ethical appeals.
- **Self-Awareness:** Identifying personal strengths, weaknesses, opportunities, and challenges (SWOC analysis).

Active Listening: Paraphrasing, questioning techniques, and demonstrating attentiveness

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during sessions build both conceptual understanding and real- world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, activities, peer feedback. Eclectic Approach
Language Lab	Quicklrn.com
Experiential Learning Methods	To embed skills, participants get hands-on through: Guided reflections and explainers to connect concepts with relatable real-life situations Guided visualization to prompt reflection and self-discovery Role-plays and activities to practice behaviours in context
	Peer discussions to gain diverse perspectives.
Assessment Methods	**Formative:** Role-plays, activities, group discussions, peer feedback. **Summative:** Presentations, written reflections, problem-solving exercises.

Module-2: **03 Hours**

Emotional Skills I :

- Emotional Intelligence (EI): Recognizing and managing emotions, empathy, relationship management, and conflict resolution.
- Stress Management: Identifying stress triggers, relaxation techniques, work-life balance strategies, and mindfulness practices.
- Time Management: Prioritization (Eisenhower Matrix), setting SMART goals, avoiding procrastination, and effective scheduling.
- Adaptability & Resilience: Handling change, bouncing back from setbacks, and developing a growth mindset.

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during lab sessions those build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, activities, peer feedback. Eclectic Approach
Language Lab	Quicklrn.com
Experiential Learning Methods	• To embed skills, participants get hands-on through: • Guided reflections and explainers to connect concepts with relatable real-life situations • Guided visualization to prompt reflection and self- discovery • Role-plays and activities to practice behaviours in context Peer discussions to gain diverse perspectives.
Assessment Methods	**Formative:** Role-plays, activities, group discussions, peer feedback. **Summative:** Presentations, written reflections, problem- solving exercises.

Module-3: **03 Hours**

Emotional Skills II:

- Ambition & Goal Setting: Defining personal and professional aspirations, creating SMART goals, and aligning actions with long-term vision.
- Sympathy & Empathy: Understanding emotional perspectives, differentiating between the two, and applying them in workplace and social interactions.
- Creativity & Innovation: Generating original ideas, problem-solving, and applying creative thinking techniques (mind-mapping, SCAMPER).

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during lab sessions those build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, activities, peer feedback. Eclectic Approach
Language Lab	Quicklrn.com
Experiential Learning Methods	• To embed skills, participants get hands-on through: • Guided reflections and explainers to connect concepts

	with relatable real-life situations • Guided visualization to prompt reflection and self-discovery • Role-plays and activities to practice behaviours in context Peer discussions to gain diverse perspectives.
Assessment Methods	Formative: Role-plays, activities, group discussions, peer feedback. Summative: Presentations, written reflections, problem-solving exercises.

Module-4 : **03 Hours**

Professional Skills I:

- **Problem Solving:** Identifying root causes, analysing options, and implementing solutions using methods like 5 Whys and Fishbone Diagram.
- **Discipline:** Building consistency, accountability, and professional habits.
- **Time Management:** Prioritizing tasks (Eisenhower Matrix), scheduling, avoiding procrastination

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during lab sessions those build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, activities, peer feedback. Eclectic Approach.
Language Lab	Quicklrn.com
Experiential Learning Methods	To embed skills, participants get hands-on through: Guided reflections and explainers to connect concepts with relatable real-life situations Guided visualization to prompt reflection and self-discovery Role-plays and activities to practice behaviours in context Peer discussions to gain diverse perspectives.
Assessment Methods	**Formative:** Role-plays, activities, group discussions, peer feedback. **Summative:** Presentations, written reflections, problem-solving exercises.

Module-5: **03 Hours**

Professional Skills II:

- Collaboration & Teamwork: Working effectively in diverse teams, fostering trust, and achieving shared goals.
- Negotiation & Conflict Resolution: Strategies to resolve differences and reach win– win outcomes.
- Critical Thinking: The ability to analyze, evaluate, and synthesize information to make well-reasoned decisions.

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during lab sessions those build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, peer feedback. Eclectic Approach
Language Lab	Quicklrn.com
Experiential Learning Methods	To embed skills, participants get hands-on through: Guided reflections and explainers to connect concepts with relatable real- life situations Guided visualization to prompt reflection and self-discovery Role-plays and activities to practice behaviours in context Peer discussions to gain diverse perspectives.
Assessment Methods	**Formative:** Role-plays, group discussions, peer feedback. **Summative:** Presentations, written reflections, problem-solving exercises.

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Principles of Scientific and Technical Writing, 1e, By Pratap K. J. Mohapatra, Sanjib Moulick, © 2025 | Published: December 23, 2024
2. Soft Skills, 1e, By Soma Mahesh Kumar © 2024 | Published: June 8, 2023
3. Effective Technical Communication, 3e, By Ashraf M. Rizvi, Priyadarshi Patnaik, © 2024 | Published: September 12, 2024
4. Yadav, D. P. (2022). *A course in English pronunciation*. Notion Publications

II. Reference books:

1. Oxford Advance Learners Dictionary
2. Cambridge English Skills Real Listening and Speaking by Miles Craven
3. Communicative English for Professionals by Nitin Bhatnagar and Mamta Bhatnagar

III. Web links and Video Lectures (e-Resources):

1. Google Docs + Voice Typing - https://docs.google.com
2. LearnEnglish – https://learnenglish.britishcouncil.org/
3. TakeIELTS - https://www.britishcouncil.in/exam/ielts
4. British Council Apps - bbcLearnEnglishonline Grammar
   LearnEnglish Podcasts IELTS
   Word Power
   Bbclearningenglishgrammer
   online Sounds Right (Phonemic Chart)

Assessment Structure:

Continuous Internal Evaluation (CIE)		
CIE 1	Multiple choice questions (MCQs)	50 marks
Alternate Assessments AAT	SWOC analysis	10 marks
	Poster Presentation (Group)	20 marks
	Assignment- Report writing	20 marks
	Total	**100 marks**

Course outcomes (Course Skills Set)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1									1	3	2
CO2										3	2
CO3										3	2
CO4									1	3	2
CO5								1	1	3	1

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Course Title: Innovation and Design Thinking		Semester	I/II
Course Code	25ME1AEIDT/25ME2AEIDT	CIE Marks	50
Credit Distribution (L-T-P)	1-0-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(14:0:0:16)	Total Marks	100
Total Credits	01	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

CO1: Identify the situations, which need application of concepts of design thinking.
CO2: Develop ideas to solve the identified societal and industrial problems through design thinking tools.
CO3: Demonstrate the qualities pertaining to design thinking process through group activities.

Module-1:	04 Hours
Introduction: Scope and importance, steps in design thinking- Empathize, Define, Ideate, Prototype and Test with examples	
Module-2:	**06 Hours**
Empathy: Introduction, its role in creation of a successful product/service/brand, its consideration in design of product/service, Skills needed to implement design thinking	
Module-3:	**06 Hours**
Tools for Design Thinking: Creativity and innovation-scope and importance, defining the problem, ideation methods- mind mapping, brainstorming, story boarding, journey mapping, root cause analysis, suggestion box, visualization etc.	
Module-4 :	**06 Hours**
Prototyping and Testing- virtual, conventional and 3D printing, simulation, look alike, functional models- clay, foam, wood etc. Testing: destructive, non-destructive, user testing, role of social media in concept testing during early stages	
Module-5:	**04 Hours**
Application of Design Thinking in IT: Design Thinking to Business Process modeling – Agile in Virtual collaboration environment **Assessment and Review: (04 Hours)**	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009

2. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve– Apply", Springer, 2011
3. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013

II. Reference books:

1. Yousef Haik and Tamer M. Shahin, "Engineering Design Process",Cengage Learning, Second Edition, 2011.
2. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

III. Web links and Video Lectures (e-Resources):

1. www.tutor2u.net/business/presentations/
2. https://support.google.com/docs/answer/179740?hl=en
3. www.designthinkingformobility.org

Teaching-Learning Process (Innovative Delivery Methods):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video films to explain concepts
3. Encourage collaborative (Group Learning) Learning in the class
4. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE	Quiz	20	50			20	50
	AAT	30					
SEE	Poster presentation	50				20	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

The SEE shall include Viva-voce group wise through Poster Presentation/Concept Video/power point presentation.

COs and POs Mapping

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2		3									
CO3								3	3		3

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: ಬಳಕೆ ಕನ್ನಡ		Semester	I/II
Course Code	25MA1HSBAK / 25MA2HSBAK	CIE Marks	50
Credit Distribution (L-T-P)	1-0-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(14:0:0:16)	Total Marks	100
Total Credits	01	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After successfully completing the course, the student will be able to understand the topics:

CO1: To create an awareness regarding the necessity of learning local language for a comfortable living and to know more about Kannada culture and literature

CO2: To develop proper speaking, reading and writing skills in Kannada

CO3: To engage as a member of a team and enhance the skill in group communication and presentation

Module-1: **03 Hours**

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activities.
3. Key to Transcription. Kannada Language Script.
4. ವ್ಯಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯ ಸೂಚಕ / ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words

Module-2: **03 Hours**

1. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತುಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು – Possesive forms of nouns, dubitive question and Relative nouns.
2. ಗುಣ ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣ ಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and colour Adjectives, Numerals.
3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು –ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) -Predictive Forms, Locative Case.

Module-3: **03 Hours**

1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative cases, and numerals.
2. ಸಂಖ್ಯಾವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು – Ordinal numerals and Plural markers.
3. ನ್ಯೂನ/ ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು & ವರ್ಣ ಗುಣವಾಚಕಗಳು -Defective/Negative Verbs & Colour Adjectives.

Module-4 :	**03 Hours**
1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು. Permission, Commands, encouraging and Urging words (Imperative words and sentences) 2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು. Accusative Cases and Potential Forms used in General Communication. 3. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯ ಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು. – Helping verbs "iru and iralla", corresponding Future and negation verbs.	
Module-5:	**03 Hours**
1 ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ, ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ. Comparitive, Relationship, Identification and Negation Words. 2 Kannada Vocabulary List: ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. **ಬಳಕೆ ಕನ್ನಡ:** ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

Teaching-Learning Process (Innovative Delivery Methods):

1. ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು.

Assessment Structure:

Component	Type of assessment	Max. Marks	Total
CIE – Theory	CIE 1	25	100
	CIE 2	25	
SEE	End Exam	50	

Two CIEs will be conducted for 25 Marks each. SEE paper shall be set for 50 Questions, each of the 01 marks. The pattern of the Question paper is MCQ (Multiple Choice Questions). The time allotted 01 hour.

Course outcomes (Course Skills Set):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1										3	
CO2										3	
CO3									1		

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		Semester	I/II
Course Code	25MA1HSSAK / 25MA2HSSAK	CIE Marks	50
Credit Distribution (L-T-P)	1-0-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(14:0:0:16)	Total Marks	100
Total Credits	01	Exam Hours	3
Examination type (SEE)	Thoery		

Course Outcomes (Course Skill Set)

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು:

CO 1: ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ.

CO 2: ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳ ಹಾಗೂ ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿ ಮೂಡುತ್ತದೆ

CO 3: ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ, ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.

ಘಟಕ - 1 **03 Hours**

ಲೇಖನಗಳು:

1. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ: ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ.
2. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಘಟಕ - 2 **04 Hours**

ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ:

1. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕ ಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಜೇಡರದಾಸಿಮಯ್ಯ , ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ. ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ.
2. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ - ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಘಟಕ - 3 **03 Hours**

ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ:

1. ಡಿ. ವಿ. ಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲ ಭಾಗಗಳು
2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ. ರಾ. ಬೇಂದ್ರೆ .
3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು

ಘಟಕ - 4 **03 Hours**

1. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ: ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ ಎನ್ ಮೂರ್ತಿರಾವ್
2. ಯುಗಾದಿ: ವಸುಧೇಂದ್ರ

ಘಟಕ - 5 **02 Hours**

ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ ಚಿ ಬೋರಲಿಂಗಯ್ಯ

Suggested Learning Resources: (Textbook/Reference Book):

I. ಪಠ್ಯ ಪುಸ್ತಕ:

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಡಾ. ಹಿ. ಚಿ. ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

1. ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪ್ಟ್ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು

Assessment Structure:

Component	Type of assessment	Max. Marks	Total
CIE – Theory	CIE 1	25	100
	CIE 2	25	
SEE	End Exam	50	

Two CIEs will be conducted for 25 Marks each. SEE paper shall be set for 50 Questions, each of the 01 marks. The pattern of the Question paper is MCQ (Multiple Choice Questions). The time allotted 01 hour.

Course outcomes (Course Skills Set):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1										3	
CO2										3	
CO3									1		

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Applied Chemistry for Smart Systems (Computer science engineering stream)		Semester	I/II
Course Code	25CY1BSCCS/25CY2BSCCS	CIE Marks	50
Credit Distribution (L-T-P)	3-0-1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	03
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course, students will be able to:

CO1: Explain and Apply the principles of chemistry involved in corrosion, energy systems, materials and sensors for smart systems.

CO2: Analyze the engineering problems and draw meaningful inferences through concepts of chemistry.

CO3: Implement sustainable solutions through concepts of applied chemistry in the field of materials, energy and environment.

CO4: Engage in self-study and make an effective presentation on contribution of chemistry to society.

CO5: Apply the knowledge of chemistry to investigate engineering materials by analytical techniques.

Module-1: Electrochemistry of corrosion and sensors **8 Hours**

Smart systems-introduction, types and importance.

Electrochemistry: Introduction, electrode potential, concentration cell, numerical problems. Reference electrodes-Calomel electrode-construction and working. Ion selective electrodes – pH electrode-construction and working.

Corrosion: Introduction, electrochemical theory of corrosion, types-differential metal and differential aeration corrosion, corrosion control by cathodic protection methods and corrosion inhibitors for computer circuit boards, corrosion penetration rate (CPR) - definition, importance and numerical.

Sensors: Introduction, terminologies - transducer, actuators and sensors, principle and applications of -conductometric sensors for the estimation of acid mixture and electrochemical gas sensors for the detection of NOx. Biosensor-principle and application for detection of glucose in biofluids.

Self learning: Galvanization and anodization.

Module-2: Sustainable energy systems **8 Hours**

Batteries: Introduction and classification of batteries. Construction, working and applications of Li-ion battery.

Next generation energy systems: Introduction, construction and working of sodium ion battery and redox flow battery for EV applications. Introduction to supercapacitors, construction and working of ultra-small asymmetric supercapacitor in IoT/wearable device applications.

Clean energy: Introduction, fuel cell, difference between fuel cell and battery. Construction, working, applications and limitations of solid-oxide fuel cell (SOFCs). Production of green hydrogen by photocatalytic water splitting using TiO_2 and its advantages.

Quantum Dots: Introduction, size dependent properties - quantum confinement effect, surface-to-volume ratio & band gap. Quantum dot sensitized solar cells (QDSSCs)-construction, working and

applications. **Self learning:** Synthesis and applications of Cd-Se quantum dots by wet chemical method.
Module-3: Polymers for advanced systems **8 Hours**
Polymers: Introduction, terminology, molecular weight of polymers - number and weight average molecular weight of polymers, numerical. Structure-property relationship of polymers, synthesis and properties of nylon-12 and its advantages in 3D printing applications. Synthesis and properties of CPVC and PMMA for device applications. **Conducting polymers-** Introduction, synthesis of polyaniline, conduction mechanism and its engineering applications. **Biomaterials**: Introduction, synthesis and properties of polylactic acid (PLA) and polyethylene glycol (PEG) for touch screen applications. Properties and applications of alginate hydrogel for Brain-Computer Interfaces (BCIs). **Self-learning:** Definition and significance of glass transition temperature.
Module-4: Functional materials for memory and display systems **8 Hours**
Memory devices: Introduction, difference between organic and inorganic memory devices, organic semiconductors; types of organic semiconductors used in memory devices - p-type semiconductors and n- type semiconductors. Construction, working and advantages of organic semiconductor chip. Resistive RAM (ReRAM) materials: Introduction, synthesis of nano-TiO_2 by sol-gel method, properties and applications in ReRAM. **Display systems:** Introduction, liquid crystals (LCs) - classification, properties and their applications in Liquid Crystal Displays (LCDs), Jablonski diagram. Construction, working and applications of OLEDs, and Quantum Light Emitting Diodes (QLEDs). **Self learning:** Active-Matrix Organic Light Emitting Diodes (AMOLEDs)
Module-5: Green materials and E-waste management **8 Hours**
Green materials: 12 principles of green chemistry (numerical on atom economy), properties and applications of green solvents for server heat management. Biosynthesis and properties of glycerol trioleate ester for server and IT infrastructure applications. Green synthesis of ZnO nanoparticles for magnetic radio frequency identification (RFID) & Internet of Nano Things (IONT) system applications. **E-waste:** Introduction, sources, composition of e-waste, effects of e-waste on environment and human health. Extraction of metals from e-waste – gold by bioleaching method, copper by hydrometallurgical method. Direct recycling method of lithium-ion batteries. **Self learning:** Role of artificial intelligence in e-waste management and its applications.

Suggested learning resources:

I. Textbooks:

1. Engineering Chemistry, Dr. S. Vairam and Dr. Suba Ramesh, 2nd Edition, 2013, Wiley.
2. Engineering Chemistry, Jain and Jain 2015, 17th edition, Dhanpat Rai Publishing Company.

II. Reference books:

1. Semiconducting Materials and Devices, Deepak Verma, 2022, Agrotech Publishing Academy, ISBN: 9789394777712

2. High Quality Liquid Crystal Displays and Smart Devices – Ishihara, Kobayashi & Ukai (2019, IET), ISBN: 9781785619397
3. Conducting Polymers, Fundamentals and Applications: Including Carbon Nanotubes and Graphene: Prasanna Chandrasekhar (IIT Delhi alumnus), Springer, 2019 (2nd ed.), ISBN 13: 978 3030098858.

III. Web links and Video Lectures (e-Resources):

1. http://nptel.ac.in/
2. https://swayam.gov.in/
3. https://www.vlab.co.in/broad-area-chemical-sciences
4. https://chemcollective.org/vlabs

Teaching-Learning Process (Innovative Delivery Methods):

1. Flipped classroom
2. Project based learning
3. Simulation and Virtual labs
4. Partial delivery of course content by industry expert

Assessment Structure:

<table>
<tr><th>Component</th><th>Type of assessment</th><th colspan="2">Max. Marks</th><th>Weightage</th><th>Total Marks</th></tr>
<tr><td rowspan="4">CIE-Theory</td><td>AAT/CCA</td><td colspan="2">20</td><td>5</td><td rowspan="4">25</td></tr>
<tr><td>Test 1</td><td>40</td><td rowspan="3">Best of Two tests</td><td rowspan="3">20</td></tr>
<tr><td>Test 2</td><td>40</td></tr>
<tr><td>Test 3</td><td>40</td></tr>
<tr><td rowspan="2">CIE-Lab</td><td>Record and observation</td><td colspan="2">200 (100+100)</td><td>10</td><td rowspan="2">25</td></tr>
<tr><td>Test</td><td colspan="2">50</td><td>15</td></tr>
<tr><td>SEE</td><td>Sem End Exam</td><td colspan="2">100</td><td>50</td><td>50</td></tr>
<tr><td colspan="5">Grand Total Marks</td><td>100</td></tr>
<tr><td colspan="6">AAT includes assignment from self-study components
*Minimum CIE marks ≥ 20 to gain eligibility to write the SEE</td></tr>
</table>

Continuous Comprehensive Assessments (CCA):

1. A team of 4–5 students to collaborate for a presentation on a specific topic or work on a project and demonstrate in the class.
2. A detailed project report on the chosen topic or project to be submitted by the student group.
3. Self learning: To encourage the students to gather information on the specified topics for advanced learning.

Course objectives:

To impart the knowledge of Chemistry involved in Electrochemical cells, Corrosion and its control; sensors; electrochemical and renewable sources of energy; polymers; functional materials in memory and display systems; green materials; e-waste management; nanomaterials and water analysis.

CO-PO mapping with strength:

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2		2									
CO3						2					
CO4											1
CO5	2				1						

List of Lab activities:

I. Compulsory experiments:

1. Estimation of iron in rust sample using potentiometric sensor.
2. Determination of pKa of a weak acid using pH sensor.
3. Estimation of mixture of strong and weak acid using conductometric sensor.
4. Estimation of copper in e-waste by optical sensor.
5. Estimation of total hardness of water by EDTA method.
6. Determination of chemical oxygen demand (COD) of an industrial effluent sample.
7. Estimation of percentage of copper in brass by iodometry.
8. Estimation of iron in TMT bar by external indicator method.
9. Determination of calorific value of a solid fuel by bomb calorimeter.
10. Estimation of sodium in effluent by flame photometry.

II. Open-ended experiments:

1. Green synthesis of copper nanoparticles for conductive ink applications.
2. Determination of viscosity coefficient of lubricant using Ostwald's viscometer.
3. Determination of corrosion penetration rate (CPR) by weight-loss method.
4. Smartphone based colorimetric estimation of total phenolic content in beverages.
5. Chemical structure drawing using software: Chem Draw/ Chem Sketch.

Suggested Learning Activities:

1. Case Study Presentation
2. Tool/Software Exploration
3. Literature Review
4. Assignments
5. Use of MOOCs and Online Platforms
6. https://chemcollective.org/vlabs
7. https://www.vlab.co.in/broad-area-chemical-sciences

Curriculum Structure:

Course Code	Couse Title	Teaching and Learning Scheme					
		Classroom instruction (CL) (in hours per semester)		Lab instruction (CL) (in hours per semester)	Term work (TW) and self learning (SL) (TW+SL) (in hours per semester)	Total no. of hours per semester	Total Credits (C) (Total hours/30)
		L	T	P	SL		
25CY1BSCCS/ 25CY2BSCCS	Applied Chemistry for Smart Systems	40	0	30	50	120	4

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Applied Chemistry for Emerging Electronics and Futuristic Devices (Electrical and electronics engineering stream)		Semester	I/II
Course Code	25CY1BSCEE/25CY2BSCEE	**CIE Marks**	50
Credit Distribution (L-T-P)	3-0-1	**SEE Marks**	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	**Total Marks**	100
Total Credits	**04**	**Exam Hours**	3
Examination type (SEE)	**Theory**		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to

CO1: Explain and Apply the principles of chemistry involved in corrosion, energy systems, materials, quantum dots, sensors for emerging electronics and futuristic devices.

CO2: Analyze the engineering problems and draw meaningful inferences through concepts of chemistry.

CO3: Implement sustainable solutions through concepts of applied chemistry in the field of materials, energy and electronic devices.

CO4: Engage in self-study and make an effective presentation on contribution of chemistry to society.

CO5: Apply the knowledge of chemistry to investigate engineering materials by analytical techniques.

Module-1: Electrode Systems and Corrosion Science **8 Hours**

Electrochemistry: Introduction, types of electrodes, concentration cell, numerical problems. Reference electrode-calomel electrode-construction, working. Ion selective electrode – pH electrode- construction, working, determination of pH using glass electrode.

Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion differential metal corrosion in electronic circuits and differential aeration corrosion. Corrosion control- cathodic protection - impressed current method. Corrosion penetration rate (CPR)- definition, importance and numerical problems.

Metal Finishing: Introduction, difference between electroplating & electroless plating, electroplating of gold, electroless plating of copper on PCBs.

Self learning: Galvanization and anodization.

Module-2: Energy – Sources, Conversion and Storage **8 Hours**

Chemical fuel: Calorific values, determination of calorific values by bomb calorimeter, numerical problems. Petroleum cracking- Definition with an example, Reformation of petrol- Definition with an example.

Energy Storage Devices: Introduction, classification of batteries-primary, secondary and reserve battery, characteristics (capacity, power density, energy efficiency & cycle life). Construction and working of lithium-ion battery - advantages and EV applications. Introduction to super capacitors, construction and working of ultra-small asymmetric super capacitor in IoT/wearable device applications.

Energy Conversion Devices: Introduction, construction, working, advantages and applications

of photovoltaic (PV) cell. Introduction to MEMS-based energy harvesters, working principle and applications.

Self learning: Introduction, construction and working of sodium ion battery.

Module-3: Functional Polymers in Flexible Electronics **8 Hours**

Polymer: Introduction, terminology, molecular weight of polymers - number and weight average molecular weight of polymers, numerical problems. Conducting polymers: Introduction, synthesis, conduction mechanism and applications of polyaniline in electronic devices. Synthesis, properties and applications of polydimethylsiloxane (PDMS) in RFID (radio frequency identification). Synthesis, properties and applications of polyvinylidene fluoride (PVDF) in E-nose devices.

Polymeric semiconductors: Introduction, n-type and p-type polymeric semiconductor materials, organic photovoltaics - poly(3-hexylthiophene) (P3HT) as a donor and phenyl C61-butyric acid methyl ester (PCBM) as an acceptor, construction, working and applications.

Polymer Composites: Introduction, synthesis and properties of epoxy resin- Fe_3O_4 composite for sensors applications, synthesis of Kevlar Fiber Reinforced Polymer (KFRP)-properties and smart electronic devices applications.

Self learning: Difference between organic and inorganic semiconductors.

Module-4: Quantum Dot Materials for Electronics Applications **8 Hours**

Nanomaterials: Introduction, size dependent properties of nanomaterials - surface area, catalytic, optical and electrical properties.

Quantum Dot Materials: Introduction, quantum confinement effect, band gap. Inorganic Quantum Dot Materials (IQDMs): Introduction, synthesis and properties of silicon based QDs by Sol-Gel method and CdSe quantum dots by hot injection method and applications in optoelectronic devices (QLED). Wet chemical synthesis, properties and applications of quantum dot-based copper conductive ink.

Quantum dot sensitized solar cells (QDSSCs)-construction, working principle and applications.

Organic Quantum Dot Materials (OQDMs): Introduction, synthesis and properties of chitosan-carbon quantum dots hydrogel applications in next-generation flexible and wearable electronics. Synthesis, properties and applications of graphene quantum dots in emerging electronics.

Self learning: Construction and working of OLEDs.

Module-5: Advanced Electronic Materials and E-waste Management **8 Hours**

Stretchable and Wearable Microelectronics: Introduction, basic principle and working of lithography for micro-patterned copper deposition. Applications of PDMS (Polydimethylsiloxane) in e-skin (electronic skin) applications.

Sensing Methods: Introduction, principle and instrumentation of colorimetric sensors, application in the estimation of copper in PCB industry. Principle and working of potentiometric sensors- applications in the estimation of iron in steel. Conductometric sensors-application in the estimation of acid mixture in a sample.

E-waste: Introduction, need of e-waste management, sources & effects of e-waste on environment and human health, extraction of gold from e-waste from bioleaching method.

Self learning: Extraction of lithium from spent lithium-ion batteries

Suggested learning resources:

I. Textbooks:

1. Engineering Chemistry, Dr. S. Vairam and Dr. Suba Ramesh, 2nd Edition, 2013, Wiley.
2. Engineering Chemistry, Jain and Jain 2015, 17th edition, Dhanpat Rai Publishing Company.

II. Reference books:

1. Semiconducting Materials and Devices, Deepak Verma, 2022, Agrotech Publishing Academy, ISBN: 9789394777712
2. Conducting Polymers, Fundamentals and Applications: Including Carbon Nanotubes and Graphene: Prasanna Chandrasekhar (IIT Delhi alumnus), Springer, 2019 (2nd ed.), ISBN 13: 978 3030098858.
3. Advances in corrosion science and technology, M.G. Fontana and R.W. Staettle, Springer, 2012, ISBN: 9781461590620.

III. Web links and Video Lectures (e-Resources):

1. http://nptel.ac.in/
2. https://swayam.gov.in/
3. https://www.vlab.co.in/broad-area-chemical-sciences
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Teaching-Learning Process (Innovative Delivery Methods):

1. Flipped classroom
2. Project based learning
3. Simulation and Virtual labs
4. Partial delivery of course content by industry expert

Assessment Structure:

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<tr><td>Test</td><td colspan="2">50</td><td>15</td></tr>
</table>

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SEE	Sem End Exam	100	50	50
Grand Total Marks				**100**
AAT includes assignment from self-study components ***Minimum CIE marks ≥ 20 to gain eligibility to write the SEE**				

Continuous Comprehensive Assessments (CCA):

1. A team of 4–5 students to collaborate for a presentation on a specific topic or work on a project and demonstrate in the class.
2. A detailed project report on the chosen topic or project to be submitted by the student group.
3. Self learning: To encourage the students to gather information on the specified topics for advanced learning.

Course objectives:

To impart the knowledge of Chemistry involved in electrochemical cells, Corrosion and its control; sensors; sources of energy; functional polymers; quantum dots; microelectronics; e-waste management; nanomaterials and water analysis.

CO-PO mapping with strength:

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2		2									
CO3						2					
CO4											1
CO5	2				1						

List of Lab activities:

I. Compulsory experiments:

1. Estimation of iron in rust sample using potentiometric sensor.
2. Determination of pKa of a weak acid using pH sensor.
3. Estimation of mixture of strong and weak acid using conductometric sensor.
4. Estimation of copper in e-waste by optical sensor.
5. Estimation of total hardness of water by EDTA method.
6. Determination of chemical oxygen demand (COD) of an industrial effluent sample.
7. Estimation of percentage of copper in brass by iodometry.
8. Estimation of iron in TMT bar by external indicator method.
9. Determination of calorific value of a solid fuel by bomb calorimeter.
10. Estimation of sodium in effluent by flame photometry.

II. Open-ended experiments:

1. Green synthesis of copper nanoparticles for conductive ink applications.
2. Determination of viscosity coefficient of lubricant using Ostwald's viscometer.
3. Determination of corrosion penetration rate (CPR) by weight-loss method.
4. Smartphone based colorimetric estimation of total phenolic content in beverages.
5. Chemical structure drawing using software: Chem Draw/ Chem Sketch.

Suggested Learning Activities:

1. Case Study Presentation
2. Tool/Software Exploration
3. Literature Review
4. Assignments
5. Use of MOOCs and Online Platforms
6. https://chemcollective.org/vlabs
7. https://www.vlab.co.in/broad-area-chemical-sciences

Curriculum Structure

Course Code	Couse Title	Teaching and Learning Scheme					
		Classroom instruction (CL) (in hours per semester)		Lab instruction (CL) (in hours per semester)	Term work (TW) and self learning (SL) (TW+SL) (in hours per semester)	Total no. of hours per semester	Total Credits (C) (Total hours/30)
		L	T	P	SL		
25CY1BSCEE/ 25CY2BSCEE	Applied Chemistry for Emerging Electronics and Futuristic Devices	40	0	30	50	120	4

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B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Applied Chemistry for Advanced Metal Protection and Sustainable Energy Systems (Mechanical engineering stream)		**Semester**	I
Course Code	25CY1BSCME	**CIE Marks**	50
Credit Distribution (L-T-P)	3-0-1	**SEE Marks**	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	**Total Marks**	100
Total Credits	**04**	**Exam Hours**	03
Examination type (SEE)	**Theory**		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to

CO1: Explain and Apply the principles of chemistry involved in corrosion, energy systems, materials and sensors for advanced metal protection and sustainable energy.

CO2: Analyze the engineering problems and draw meaningful inferences through concepts of chemistry.

CO3: Implement sustainable solutions through concepts of applied chemistry in the field of materials, energy and metal protection.

CO4: Engage in self-study and make an effective presentation on contribution of chemistry to society.

CO5: Apply the knowledge of chemistry to investigate engineering materials by analytical techniques.

Module-1: Electrochemistry of corrosion and coating technologies **8 Hours**

Electrochemistry: Introduction, electrode potential, concentration cell, numerical problems. Reference electrode: Calomel electrode- construction and working. Ion selective electrode – pH electrode- construction and working.

Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal, differential aeration corrosion and stress corrosion. corrosion control: surface conversion coating and cathodic protection, sacrificial anode method, corrosion penetration rate (CPR) - Introduction and numerical problems.

Coating Technologies: Introduction, technological importance, electroplating - electroplating of chromium; hard and decorative, electroless plating - electroless plating of nickel, difference between electroplating and electroless plating.

Self learning: Galvanization and Tinning

Module-2: Conventional and sustainable fuels **8 Hours**

Fuels: Introduction, calorific value, determination of calorific value using bomb calorimeter, numerical problems on GCV and NCV. Petroleum cracking- definition with an example. Octane number and cetane number. Reformation of petrol- definition with an example. Knocking in petrol engine - knocking mechanism and anti-knocking agents - methyl tertiary butyl ether (MTBE).

Green Fuels: Introduction, biodiesel - synthesis by trans-esterification method, advantages and its applications. Production of green hydrogen by photocatalytic water splitting and its advantages, hydrogen storage – physical and chemical storage methods, advantages and limitations.

Self learning: Power alcohol – properties, applications and its limitations.
Module-3: Polymers for engineering applications **8 Hours**
Engineering polymers: Introduction, terminology, molecular weight of polymers - numerical problems. Glass transition temperature (Tg), factor affecting Tg and its significance, structure and property relationship of polymers. Synthesis, properties and engineering applications of chlorinated-polyvinyl chloride (C-PVC), and polycarbonates. Polymer Composites: introduction, fiber-reinforced polymers (FRPs); Kevlar – Synthesis, properties and industrial applications. Carbon-fiber - preparation from polyacrylonitrile (PAN), properties and industrial applications. Biopolymers: Introduction, synthesis, properties and applications of polylactic acid (PLA) resin in 3D printing applications. **Self learning:** Synthesis, properties and applications of PMMA
Module-4: Energy systems and sensors **8 Hours**
Energy Systems: Batteries - Introduction, classification of batteries, characteristics-capacity, power density, and cycle life. Construction, working and applications of Li-ion battery. Fuel cells - Introduction, difference between fuel cell and battery, types of fuel cells, construction and working of solid oxide fuel cells (SOFCs), advantages and applications. Photovoltaic cells (PV cells) - construction, working, advantages and limitations of quantum dot thin film solar cells. Sensors: Introduction, potentiometric sensor - principle and its application in the estimation of iron in steel industry effluent. Conductometric sensor - principle and its application in the estimation of acids mixture. pH sensor - principle and its application in the estimation of pKa of weak acid. **Self learning:** Battery characteristics: Voltage, Shelf life
Module-5: Fluid technology and nanomaterials **8 Hours**
Lubricants: Introduction, classification, ideal properties and applications. Lubricant testing; Viscosity index - experimental determination of viscosity index, numericals. Industrial Coolants: Introduction, types- water and oil-based coolants, properties and industrial applications. Nanomaterials: Introduction, size-dependent properties of nanomaterial-surface area, catalytic, electrical and thermal conductivity. Synthesis of TiO_2 nanoparticles by sol-gel method. Carbon nanotubes (CNTs) - Synthesis by chemical vapor deposition method, properties and engineering applications, role of carbon nanotubes (CNTs) in energy devices. **Self learning:** Classification of nanomaterials based on dimensions with an example

Suggested learning resources:

I. Textbooks:

1. Engineering Chemistry, Dr. S. Vairam and Dr. Suba Ramesh, 2nd Edition, 2013, Wiley.
2. Engineering Chemistry, Jain and Jain 2015, 17th edition, Dhanpat Rai Publishing Company.
3. Applied Chemistry for Mechanical Engineering and Allied Branches, C Manasa, Vrushabendra B, Srikantamurthy N, 2023, Astitva Prakashan.

II. Reference books:

1. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev Sreedhar, 4th edition, 2023, Newage International Publishers.
2. Conducting Polymers, Fundamentals and Applications: Including Carbon Nanotubes and Graphene: Prasanna Chandrasekhar (IIT Delhi alumnus), Springer, 2019 (2nd ed.), ISBN 13: 978 3030098858.
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Teaching-Learning Process (Innovative Delivery Methods):

1. Flipped classroom
2. Project based learning
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Assessment Structure:

Component	Type of assessment	Max. Marks		Weightage	Total Marks
CIE-Theory	AAT/CCA	20		5	25
	Test 1	40	Best of Two tests	20	
	Test 2	40			
	Test 3	40			
CIE-Lab	Record and observation	200 (100+100)		10	25
	Test	50		15	

SEE	Sem End Exam	100	50	50
Grand Total Marks				**100**
AAT includes assignment from self-study components ***Minimum CIE marks ≥ 20 to gain eligibility to write the SEE**				

Continuous Comprehensive Assessments (CCA):

1. A team of 4–5 students to collaborate for a presentation on a specific topic or work on a project and demonstrate in the class.
2. A detailed project report on the chosen topic or project to be submitted by the student group.
3. Self learning: To encourage the students to gather information on the specified topics for advanced learning.

Course objectives:

To impart the knowledge of Chemistry involved in Electrochemical cells, Corrosion and its control; sensors; chemical fuels; energy systems; polymers; fluid technology; nanomaterials and water analysis.

CO -PO mapping with strength:

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2		2									
CO3						2					
CO4											1
CO5	2				1						

List of Lab activities:

I. Compulsory experiments:

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4. Estimation of copper in e-waste by optical sensor.
5. Estimation of total hardness of water by EDTA method.
6. Determination of chemical oxygen demand (COD) of an industrial effluent sample.
7. Estimation of percentage of copper in brass by iodometry.
8. Estimation of iron in TMT bar by external indicator method.
9. Determination of calorific value of a solid fuel by bomb calorimeter.
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II. Open-ended experiments:

1. Green synthesis of copper nanoparticles for conductive ink applications.
2. Determination of viscosity coefficient of lubricant using Ostwald's viscometer.
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5. Chemical structure drawing using software: Chem Draw/ Chem Sketch.

Suggested Learning Activities:

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Curriculum Structure:

Course Code	Couse Title	Teaching and Learning Scheme					
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		L	T	P	SL		
25CY1BSCME	Applied Chemistry for Advanced Metal Protection and Sustainable Energy Systems	40	0	30	50	120	4

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
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Course Title: Applied Chemistry for Sustainable Structures & Material Design (Civil Engineering stream)		Semester	II
Course Code	25CY2BSCCV	CIE Marks	50
Credit Distribution (L-T-P)	3-0-1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	03
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to

CO1: Explain and Apply the principles of chemistry involved in corrosion, energy systems, materials, sensors and water treatment for sustainable structures & material design.

CO2: Analyze the engineering problems and draw meaningful inferences through concepts of chemistry.

CO3: Implement sustainable solutions through concepts of applied chemistry in the field of materials, energy and environment.

CO4: Engage in self-study and make an effective presentation on contribution of chemistry to society.

CO5: Apply the knowledge of chemistry to investigate engineering materials by analytical techniques.

Module-1: Electrochemistry of corrosion and surface protection **8 Hours**

Electrochemistry: Introduction, electrode potential, concentration cell, numerical problems. Reference electrode-Calomel electrode-construction, working. Ion selective electrode – pH electrode- construction, working.

Corrosion: Introduction, electrochemical corrosion of steel in concrete, types- differential metal corrosion and differential aeration corrosion, stress corrosion in civil structures. Factors affecting rate of corrosion (pH, temperature, nature of corrosion product, conductivity of the medium) Corrosion control by cathodic protection method. corrosion penetration rate (CPR) - definition, importance and numerical problems.

Metal Finishing: Introduction, technological importance of metal finishing, electroplating of Chromium-decorative and hard coating.

Self learning: Galvanization and anodization

Module-2: Advanced energy systems **8 Hours**

Chemical fuel: Calorific values, determination of calorific values by Bomb calorimeter, numerical. Petroleum cracking- Definition with an example, Reformation of petrol- Definition with an example.

Silicon based solar cell- construction, working, advantages, applications and limitations.

Green Fuels: Introduction, green hydrogen production by photocatalytic method.

Energy systems: Introduction, classification of batteries, characteristics of battery (capacity, energy density, power density and cycle life), construction & working of Lithium-ion battery,

redox flow battery and its applications, fuel cell-definition, difference between battery and fuel cell, construction and working of solid oxide fuel cell **Self learning:** Power alcohol – properties, applications and its limitations
Module-3: Conventional and sustainable structural materials **8 Hours**
Polymer: Introduction, terminology, molecular weight of polymers: number average and weight average molecular weight of polymers, numerical, synthesis, properties and engineering applications of Chlorinated - PVC, butyl rubber, Kevlar fiber and epoxy resin. Polymer composites-properties and industrial applications of graphene and carbon nano-tubes as reinforced composites. Nanomaterials: Introduction, size dependent properties viz; surface area, thermal properties, water absorption, permeability, and antimicrobial activity, composition of nano-concrete, synthesis of TiO_2 nanoparticles by sol-gel method and its applications in construction technology. **Self learning:** biopolymer (polylactic acid-synthesis and applications)
Module-4: Water chemistry and analytical techniques **8 Hours**
Water Chemistry: Introduction, significance of water quality parameters-pH, turbidity, chlorides, dissolved oxygen and alkalinity for environmental and construction applications. Hard water - types, determination of total hardness by EDTA method, numerical. Waste water-definition of domestic and industrial effluents. Determination of dissolved oxygen by Winkler's method, COD-definition, determination, significance and numerical. **Analytical Techniques:** Introduction, potentiometric sensors - principle, instrumentation and application in estimation of iron in industrial effluents, conductometric sensors - principle, instrumentation and application in determination of acid mixture in water and industrial effluent, colorimetric sensor- principle, instrumentation and estimation of copper in industrial effluent. **Self learning:** Secondary treatment of sewage water
Module-5: Materials for structural integrity **8 Hours**
Metals and Alloys: Introduction, classification of metals: ferrous and non-ferrous, composition, properties, applications of iron and its alloys-wrought iron, cast iron, pig iron and steel, aluminium and its alloys-Duralumin and Magnalium. **Cement:** Introduction, composition, manufacturing process of cement-wet process, process of setting and hardening of cement, special cements-composition, properties and applications, concrete as composite material. **Geopolymer Concrete:** Introduction, mechanism of geopolymerization and manufacturing process. **Photochromic Coatings:** Introduction, spiropyran as photochromic coating, working principle with chemical reactions and applications in construction activities. **Self learning:** Properties and applications of smart concrete

Suggested learning resources:

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Course objectives:

To impart the knowledge of Chemistry involved in Electrochemical cells, Corrosion and its control; sensors; sources of energy; polymers; materials used in structures and water analysis.

CO-PO mapping with strength:

COs	POs										
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Curriculum Structure

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		L	T	P	SL		
25CY2BSCCV	Applied Chemistry for Sustainable Structures & Material Design	40	0	30	50	120	4

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Autonomous Institute, Affiliated to VTU

Course Title: Introduction to AI and Applications		Semester	I/II
Course Code	25CS1ETIAA/25CS2ETIAA	CIE Marks	50
Credit Distribution	3:0:0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:0:48)	Total Marks	100
Total Credits	03	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

At the end of the course, the student will be able to:

CO1: Understand the foundational principles, evolution, and core components of Artificial Intelligence and Machine Learning systems.

CO2: Apply basic AI, ML and prompt engineering concepts to identify and describe real-world problems that can be solved using intelligent approaches.

CO3: Analyze real-world AI and ML applications across various fields to understand their purpose and functioning.

Module-1:	**08 Hours**
Introduction to Artificial Intelligence: Definition of AI, How does AI work? History and evolution of AI, **Foundations of AI**: Logic, probability and cognitive science, Types of Artificial Intelligence: Weak AI, Strong AI, Reactive Machines, Limited Memory, Theory of Mind, Self-Awareness, Advantages and Disadvantages of Artificial Intelligence. **Agents and Environments**: Intelligent agents, Agent mechanisms, Problem formulation, Problem definition;	
Module-2:	**08 Hours**
Search Strategies: Uninformed Search: DFS, BFS, Uniform Cost Search. **Informed Search Algorithms**: **Heuristic search**: Generate-and-Test, Hill climbing: Simple Hill Climbing, Constraint Satisfaction, Means-End Analysis.	
Module-3:	**08 Hours**
Knowledge Representation: Introduction, Knowledge Representation, Knowledge-Based Agent, Types of Knowledge: Propositional Logic and First-order Logic – syntax, semantics, inference, Case study – Wumpus World.	
Module-4:	**08 Hours**
Machine Learning Foundations: Introduction to Machine Learning, Need for Machine Learning; Machine learning explained; Types of Machine Learning; Challenges of Machine Learning; Machine learning process and applications. **Regression Analysis**: Introduction to Linear Regression, Logistic Regression. **Prompt Engineering:** Introduction to Prompt Engineering, The Evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Work? The Advantages of Prompt Engineering.	
Module-5:	**08 Hours**

Introduction to ChatGPT: A Concise History: From GPT-1 to GPT-4; **Prompt Engineering Techniques for ChatGPT**: Zero, one, few-shot prompting.
Industrial Applications of AI: Application of AI in Healthcare, Application of AI in Finance, Application of AI in Retail, Application of AI in Agriculture, Application of AI in Education, Application of AI in Transportation, AI in Experimentation and Multi-disciplinary research.
Ethics in AI

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach* (4th Edition), Pearson Education, 2023
2. Elaine Rich, Kevin Knight, and Shivashankar B. Nair, *Artificial Intelligence*, McGraw Hill Education.
3. S Sridhar and M Vijayalakshmi, "Machine Learning", Oxford University Press, 2021.
4. Ajantha Devi Vairamani and Anand Nayyar, Prompt Engineering: Empowering Communication, 1st Edition, CRC Press, Taylor & Francis Group, 2024. (DOI: https://doi.org/10.1201/9781032692319)
5. Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti, "AI for Everyone – A Beginner's Handbook for Artificial Intelligence", Pearson, 2024.

II. Reference books:

1. Tom Taulli, *Prompt Engineering for Generative AI: ChatGPT, LLMs, and Beyond*, Apress, Springer Nature
2. Nilakshi Jain, Artificial Intelligence: Making A System Intelligent, First Edition, Wiley.

III. Web links and Video Lectures (e-Resources):

1. Elements of AI – *https://www.elementsofai.com*
2. CS50's Introduction to Artificial Intelligence with Python – Harvard *https://cs50.harvard.edu/ai/*
3. Google Machine Learning Crash Course – *https://developers.google.com/machine-learning/crash-course*
4. Learn Prompting (Open-Source Guide) – *https://learnprompting.org*
5. Google AI – Learn with Google AI *https://ai.google/education/*
6. Coursera – Machine Learning by Andrew Ng (Stanford University) *https://www.coursera.org/learn/machine-learning*
7. OpenAI Prompt Engineering Guide (for ChatGPT) *https://platform.openai.com/docs/guides/gpt-best-practices*
8. Prompt Engineering for Developers – DeepLearning.AI + OpenAI *https://www.deeplearning.ai/short-courses/chatgpt-prompt-engineering-for-developers/*

9. Ethics in AI – Google Responsible AI Practices
   https://ai.google/responsibilities/responsible-ai-practices/
10. Google Teachable Machine (Train AI models visually without code)
    https://teachablemachine.withgoogle.com
11. Course Link : https://www.coursera.org/learn/generative-ai-with-llms/home/

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching- learning process and facilitate the achievement of course outcomes.

1. Flipped Classroom
2. Problem-Based Learning (PBL)
3. Case-Based Teaching
4. Simulation and Virtual Labs
5. ICT-Enabled Teaching
6. Tool Demonstration

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

1. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.
2. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks.
3. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

Course outcomes (Course Skills Set)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1											
2	3										
3		2				3					

Continuous Comprehensive Assessments (CCA):

Learning Activity 1: Quizzes: Two quizzes will be conducted in online/offline mode. Each quiz will be evaluated for 10 marks. The sum of two quizzes will be finalized. Quiz 1 portions Module 1,2, and 3. Quiz 2 portions Module 4 and 5.

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Autonomous Institute, Affiliated to VTU

Course Title: Introduction to C Program		Semester	I/II
Course Code	25CS1ESICP/25CS2ESICP	CIE Marks	50
Credit Distribution	3:0:1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to

CO1: Apply the programming construct of C programming, to write simple programs.

CO2: Analyze logical solutions to solve a given computational problem.

CO3: To conduct experiment using arrays, functions, and strings to perform data operations and modularize code effectively.

CO4: Design and develop real-world problem solutions using C programming

Module-1: Introduction to C **08 Hours**

Basic Organization of a Computer, Program Design Tools (Algorithms, Flowcharts), Introduction to C, Structure of C program, Writing the first C Program, Compiling and Executing C Programs, C Tokens, Basic Data Types in C, Operators in C, Evaluating Expressions, Type Conversion and Typecasting, Example Programs.

Module-2: Decision Control and Looping Statements **08 Hours**

Introduction to Decision Control Statements, Conditional Branching Statements (if, if-else, if-else-if, switch), Iterative Statements (while, do-while, for), Nested Loops, Break and Continue Statements, Example Programs.

Module-3: Arrays **08 Hours**

Introduction, Declaration of Arrays, Accessing the elements of an Array, Storing values in Arrays, Operations on Arrays (Insertion, Deletion, Searching-Binary search, Linear search), Two-Dimensional Arrays, Operations on Two- Dimensional arrays -Sum, Difference.

Module-4: Functions and Strings **08 Hours**

Functions: Components of Functions (Function Declaration, Function Definition, Function Call), Passing Parameters to Functions, Example Programs.

Strings: Introduction, Operations on Strings (Length of a String, Converting Lowercase to Uppercase and Vice Versa, String Concatenation, String Comparison Using built in functions).

Module-5: Structures and Pointers **08 Hours**

Structures: Introduction, Arrays of Structures, Example Programs.

Pointers: Introduction to Pointers, Declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Passing Arguments to Functions using Pointers, Example Programs.

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. **Reema Thareja**, "Computer Fundamentals and Programming in C", 2nd Edition, Oxford Higher Education, 2016

II. Reference books:

1. **E. Balaguruswamy**, "Programming in ANSI C", 7th Edition, McGraw-Hill Education, 2018.
2. **J. R. Hanly and E. B. Koffman**, "Problem Solving and Program Design in C", 7th Edition, Pearson Education, 2013.

III. Web links and Video Lectures (e-Resources):

1. **Introduction to Programming in C** [https://onlinecourses.nptel.ac.in/noc23_cs02/preview]
2. **C for Everyone: Programming Fundamentals** [https://www.coursera.org/learn/c-for-everyone]
3. **Computer Programming Virtual Lab** [https://cse02-iiith.vlabs.ac.in/exp/pointers/]
4. **C Programming: The ultimate way to learn the fundamentals of the C language** [https://www.pdfdrive.com/c-programming-the-ultimate-way-to-learn-the-fundamentals-of-the-c-language-e187584209.html]
5. **C Programming: The Complete Reference** [https://viden.io/knowledge/programming-in-c-language/attachment/28313/c-the-complete-reference-herbert-schildt-4th-edition-pdf/preview]

List of Lab activities

Part A

1. Implement a C program to find the distance between two points.
2. Illustrate conditional branching statements to find the smallest of three numbers.
3. Develop a C program to solve simple arithmetic calculations, using arithmetic expressions and use of each operator leading to simulation of a commercial calculator. (No built-in math function).
4. Develop a C program to find all possible roots of a quadratic equation.
5. Develop a C program to print the sum of even numbers from M to N.
6. Develop a C program to compute the GCD of two numbers.

Part B

1. Develop a C program to search a Book ID from an organized bookshelf that has N number of books using appropriate searching technique.
2. Develop a C program to read a matrix and print the diagonal elements.
3. Write functions to implement String operations such as concatenation and String length using built-in functions.

4. Develop a C program for swapping values of two variables by using Parameter Passing techniques (Call by Value and Call by reference).
5. Develop a C program to read and display the student details using Structures.
6. Develop C program to test whether a number is positive, negative, or equal to zero using pointers.

Additional Programs

1. Develop a C program to convert Fahrenheit to Celsius.
2. A company decides to give a bonus to its employees on Diwali. A 5% bonus on salary is given to the Male workers and a 10% bonus on salary to the female workers. Write a program to enter the salary and gender of the employee if the salary of the employee is less than Rs.10,000 then the employee gets an extra 2% bonus on salary. Write a C program to calculate the bonus that has to be given to the employee and display the salary the employee will get.
3. Develop a C Program to display the following by reading the number of rows as input.

   1
   121
   12321
   1234321
4. Develop a C program to find the factorial of a number using functions.
5. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
6. Develop a C Program to Count the Number of Vowels, Consonants, digits, and special characters in a string. Implement structures to read, write and compute the average salary of the employees, and list the employees earning a salary above and below the average salary for a department of N employees.

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching- learning process and facilitate the achievement of course outcomes.

1. Flipped Classroom
2. Interactive Coding Platforms

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	AAT	20	20	5	25	10	50
	Test 1	40	120	20			
	Test 2	40					
	Test 3	40					
CIE – Lab	LAB	25	25		25	10	
CIE				50		20	
SEE		100		50		35	50
Grand Total Marks						**40**	**100**

Self-Learning Activity: Mini-Project on Design and development of real-world applications

In this activity, students work in pairs to analyze and implement a real-world application using C within a given time frame. The problem to be implemented should be chosen from the co-courses such as Physics, Chemistry, Electronics, Mechanical, Chemical etc. These activities enhance the learning ability, problem solving skills, programming skills, presentation skills and documentation of report.

- A group of 2 students are given to develop an application by the respective faculty. Students as a team of 2 are made to implement the application with suitable outputs.
- Students shall present their code. Marks will be awarded based on their understanding of concepts and code.
- A report of maximum 5 pages be submitted by each group comprising front page, Description (Abstract), Design (Flowchart/Sequence Diagram) and Outcome of the application (Result and Conclusion).
- Submission of the code through Github.

Course outcomes (Course Skills Set)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3										
CO2		3									
CO3					3						
CO4			3		3			2	2		

AAT evaluation Rubrics

Parameter	Excellent	Very Good	Good	Fair
Program Correctness	Program always works correctly and meets the specifications (8M)	Program functions correctly in majority cases (6M)	Program often exhibits incorrect behavior. (4M)	Program only functions correctly in very limited cases or not at all. (2M)
Usage of appropriate C concept	Necessary C concepts are covered in the program assignment. (4M)	Necessary C concepts are covered in the program assignment. (3M)	No proper usage of C concepts are covered in the program assignment. (2M)	No proper usage of C concepts are covered in the program assignment. (1M)
Code Efficiency	Code uses the best/optimal approach in every case. (4M)	Code uses approaches that could be improved (3M)	Code uses poorly-chosen approaches in at least one place. (2M)	Many things in the code could have been accomplished in an easier, faster or otherwise better fashion (1M)
Documentation	No errors, code is clean, understandable and well-organized. Code is well-commented (4M)	No errors, minor issues with general organization. Places that could benefit from comments which are missing. (3M)	At least one major issue with indentation, whitespace, variable names, or organization. Sections of code uncommented or lacking meaningful comments. (2M)	Major problems with at three or four of the readability subcategories. No file header or comments present. (1M)

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Course Title: Introduction to PYTHON Programming		Semester	I/II
Course Code	25CS1ESIPP/25CS2ESIPP	CIE Marks	50
Credit Distribution	3:0:1	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to

CO1: Apply knowledge of Python programming for various applications.

CO2: Analyse the given Python program to identify bugs.

CO3: To conduct practical experiments for given requirements using python

CO4: Design Python programs/ applications for a given requirement

Module-1: **08 Hours**

Python Basics: Variables, expressions, and statements: Values and types, Variables, Variable names and keywords, Statements, Operators and operands, Expressions, Order of operations, Modulus operator, String operations, Asking the user for input, Comments, choosing mnemonic variable names, Debugging,

Conditional execution: Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, catching exceptions using try and except, Short circuit evaluation of logical expressions

Iteration: Updating variables, the while statement, Infinite loops, break, finishing iterations with continue, Definite loops using for, Loop patterns, Counting and summing loops, Maximum and minimum loops

Module-2: **08 Hours**

Strings: A string is a sequence, Getting the length of a string using len, Traversal through a string with a loop, String slices, Strings are immutable, Looping and counting, the in operator, String comparison, string methods, Parsing strings, Format operator

Lists: A list is a sequence, Lists are mutable, traversing a list, List operations, List slices, List methods, Deleting elements, Lists and functions, Lists and strings, Parsing lines, Objects and values, Aliasing, List arguments

Module-3: **08 Hours**

Dictionaries: Dictionary as a set of counters, Dictionaries and files, Looping and dictionaries, Advanced text parsing

Tuples: Immutable, comparing tuples, Tuple Assignment, Dictionaries and Tuples, Multiple Assignments with Dictionaries, Using Tuples as keys in Dictionary

Functions: Function calls, Built-in functions, Type conversion functions, Random numbers, Math functions, Adding new functions, Definitions and uses, Flow of execution, Parameters and

250

arguments, Fruitful functions and void functions, Why functions
Module-4 : **08 Hours**
Object-Oriented Programming: Managing Larger Programs, Getting Started, Using Objects, Starting with Programs, Subdividing a Problem, Our First Python Object, Classes as Types, Object Lifecycle, Many Instances, Inheritance, Classes and Methods, Operator overloads **Exceptions:** Exception Class Hierarchy, User-Defined Exceptions
Module-5: **08 Hours**
Regular expressions: Character matching in regular expressions, extracting data using regular expressions, combining searching and extracting, Escape character **Files:** Persistence, opening files, Text files and lines, reading files, searching through a file, Letting the user choose the file name, Using try, except, and open, Writing files

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Python for Everybody: Exploring Data Using Python 3, Charles R. Severance, Fourth Edition, University of Michigan, 2016
2. Learning to Program using Python, Cody Jackson, Second Edition, Packt Publishing, 2018

II. Reference books:

1. Programming Python,MarkLutz,FirstEdition,O'Reilly Media,2010
2. Python Essential Reference,David M. Beazley,Fourth Edition,Pearson,2009
3. Core Python Applications Programming,Wesley J Chun,ThirdEdition,Pearson,2015

III. Web links and Video Lectures (e-Resources):

1. Think Python,Allen B. Downe,SecondEdition,Green Tea Press, Needham, Massachusetts,2014 [https://greenteapress.com/ thinkpython2/thinkpython 2.pdf]
2. A Hands-On, Project-Based Introduction to Programming,EricMatthes,FirstEdition,No Starch Press,2016 [https://t.ly/fEOq (URL Shortened)]

IV. MOOC Courses:

1. An Introduction to Interactive Programming in Python (Part 1),Coursera,2021 https://www.coursera.org/ course/interactivepython1
2. An Introduction to Interactive Programming in Python (Part 2),Coursera,2021 https://www.coursera.org/ course/interactivepython2
3. Introduction to Python Programming,edx,2021 https://www.edx.org/professionalcertificate/introduction- to python-programming

List of Lab activities:

1. Write a program that asks the user how many Fibonacci numbers to generate and then generates them. Make sure to ask the user to enter the number of numbers in the sequence

to generate.

2. Write a program that asks the user for a number and then prints out a list of all the divisors of that number.
3. Write a program to compute distance between two points taking input from the user (Pythagorean Theorem).
4. Write a Program for checking whether the given number is a even number or not.
5. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
6. Write a program to find the sum of all primes below two million.
7. a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure.

7. b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

8. a) Write a Python program that takes this list and makes a new list that has only the even elements of this list in it.

8. b) Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate Boolean.

9. a) Write a program to combine lists that combines these lists into a dictionary.

9 b) Write a program to print each line of a file in reverse order.

10. a) Write a program to count frequency of characters in a given file.

10. b) Write a program to compute the number of characters, words and lines in a file.

Assessment Details

<table>
<tr><th>Component</th><th>Type of assessment</th><th>Max. Marks</th><th>Total</th><th>Reduced Marks</th><th>Total</th><th>Min. Marks required for eligibility</th><th>Total Marks</th></tr>
<tr><td rowspan="4">CIE – Theory</td><td>AAT(Mini project)</td><td>20</td><td>5</td><td rowspan="4">25</td><td rowspan="4">25</td><td rowspan="4">10</td><td rowspan="6">50</td></tr>
<tr><td>Test 1</td><td>40</td><td rowspan="3">120</td></tr>
<tr><td>Test 2</td><td>40</td></tr>
<tr><td>Test 3</td><td>40</td></tr>
<tr><td rowspan="2">CIE – Lab</td><td>CIE</td><td>100</td><td rowspan="2">115</td><td>10</td><td rowspan="2">25</td><td rowspan="2">10</td></tr>
<tr><td>Lab Test1 (15)</td><td>15</td><td>15</td></tr>
<tr><td></td><td>CIE</td><td colspan="2"></td><td>50</td><td></td><td>20</td><td></td></tr>
<tr><td>SEE</td><td>End Exam</td><td colspan="2">100</td><td>50</td><td></td><td>35</td><td>50</td></tr>
<tr><td colspan="6">Grand Total Marks</td><td>40</td><td>100</td></tr>
</table>

Course outcomes (Course Skills Set)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	3										
2		3									
3					3						
4			3		3			2	2		

Self Learning Activity 1 : Mini Project

AAT: Mini-Project – Design and Implementation of Python Application
A group of 3 students will be formed and instructed to develop any one of the following concepts:

- Python application such as CGPA/SGPA calculator, Receipt generation for different business domains. UI Applications like Contact Book application, Simple Library Management System, Student Performance Analyzer, Mini Data Analyzer, Text File Analyzer, Password Strength Checker,.
- Games using Python programming like Number Guessing Game, Hangman, Tic-ToC Toe, Rock-Paper-Scissor, Simple Quiz Game, Snake -Water-Gun, Words Scramble.

The student will be evaluated on the following parameters:

- Presentation and demonstration
- Report submission

The evaluation will be conducted for 20M which will be reduced to 5M

Self-Learning Activity 2: Assignment

- The assignment is on Python Libraries and its usage in various applications

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Rubrics for AAT

Slno.	Rubric	Excellent	Very Good	Good	Fair
1.	Program Correctness (8M)	Program always works correctly and meets the specification(s). (8M)	Program functions correctly in majority cases (6M)	Program often exhibits incorrect behavior. (4M)	Program only functions correctly in very limited cases or not at all. (2M)
2.	Usage of appropriate C concept (4M)	Necessary C concepts are covered in the program assignment. (4M)	Necessary C concepts are covered in the program assignment. (3M)	No proper usage of C concepts are covered in the program assignment. (2M)	No proper usage of C concepts are covered in the program assignment. (1M)
3.	Code Efficiency (4M)	Code uses the best/optimal approach in every case. (4M)	Code uses approaches that could be improved (3M)	Code uses poorly-chosen approaches in at least one place. (2M)	Many things in the code could have been accomplished in an easier, faster or otherwise better fashion (1M)
4.	Documentation (4M)	No errors, code is clean, understandable and well-organized. Code is well-commented (4M)	No errors, minor issues with general organization. Places that could benefit	At least one major issue with indentation, whitespace, variable names, or organization. Sections of	Major problems with at three or four of the readability subcategories. No file header or comments

			from comments which are missing. (3M)	code uncommented or lacking meaningful comments. (2M)	present. (1M)

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Course Title: Communication Skills		Semester	I/II
Course Code	25MA1AECEN/25MA2AECEN	CIE Marks	50
Credit Distribution (L-T-P)	1-0-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(14:0:0:16)	Total Marks	100
Total Credits	01	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

CO 1 Build essential verbal, non-verbal, and phonetic communication skills for clarity and effectiveness

CO 2 Use interpersonal skills in group discussions, presentations, and professional interactions

CO 3 Apply formal writing, email etiquette, and creative content development for employability

CO 4: Communicate effectively in digital platforms, following netiquette and academic integrity

CO 5: Prepare job applications, resumes, and perform confidently in interviews

Module-1: **03 Hours**

COMMUNICATION SKILLS: Glimpses of Essential English for Engineers (General Overview). Communication Skills: Process, Verbal and Non-Verbal, Proxemics, Chronemics and Barriers. **Writing**: Word Classification – Parts of Speech, Sentence structures. **Speaking & Listening:** Listening to English Pronunciation – English Phonemes – Intelligible Accent – Speech Organs- Syllable Structures, Stress, Intonation, and Practice

Teaching Methodology	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	**Quiklrn.com**
Digital Tools	ALL 44 sounds of English in 75 minutes - https://www.youtube.com/watch?v=QxQUapA2w4&t=51s. AI-based grammar and writing tools (e.g., Grammarly, ChatGPT, Quillbot) to analyze and classify parts of speech. AI-based pronunciation tools (Google Speech-to-Text) for real-time feedback
Reading Material	**"The Chimney Sweeper" by William Blake** Martin Luther King Jr's "I Have a Dream" Speech
Assessment Techniques and Tools	**Role Play**: Formal/informal scenarios, **Group Discussion (GD), Case Studies Analysis**: Identify barriers and suggest solutions, **Mini-Presentation**: Focused on proxemics. Observation Rubric (for body language, tone, time cues), (Sample Rubric, please refer the annexure), Video Recording + Self-evaluation Sheet.

Module-2:	**03 Hours**

INTERPERSONAL SKILLS : **Speaking**: Role Play Exercises Based on Workplace Contexts, Introducing Oneself - PEP Talks- Personal Empowerment, Participating in Group Discussion and Debates, Giving Technical Presentation. **Reading:** Reading the Interview of an Achiever (Skimming and Scanning) (Case Studies). **Writing:** Writing a Short Biography of an Achiever Based on given reflections, **Grammar:** Sentence patterns. **Vocabulary** Development: Idioms and Phrases.

Teaching Methodology	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	**Quiklrn.com**
Digital Tools	Google Meet / Zoom + AI Transcription- Practice group discussions with live transcription. Grammarly - Highlights grammar issues with explanations. **Oxford Learner's Dictionaries** (https://www.oxfordlearnersdictionaries.com/) - Includes etymology,
Assessment Techniques and Tools	Group discussion performance (listening, turn-taking, clarity) Technical resentations (confidence, structure, clarity) Role plays (relevance, tone, spontaneity) Case studies Oral communication rubric (clarity, relevance, tone, confidence, non-verbal cues), **Activity**: Read a short **interview of an achiever** (e.g., A. P. J. Abdul Kalam, Sudha Murthy) **LMS (Learning Management Systems)**: Moodle or Google Classroom for submissions and reflections. **Video Submissions**: Students submit videos of role plays or presentations

Module-3:	**03 Hours**

ENGLISH FOR EMPLOYABILTY: **Writing:** Formal Letter writing (Enquiry, Order, and Complaint). Tenses – Reported Speech- Voice - Email Etiquettes, Structure, Writing and Responding to Emails. Paragraph Writing (Descriptive, Argumentative, Expository, Short Story, and Narrative), Blog Writing. **Reading**: Proof Reading (Spelling, Punctuation, Grammar). Error Identification Exercises. **Speaking:** Questions & Requests (non-Wh questions and Question tags).

Pedagogy	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	**Quiklrn.com**
Digital Tools	Grammarly – Check grammar, tone, spelling Canva – Free templates to create posters, ads, infographics Adobe Express – Visual storytelling and ad design
Assessment Techniques and Tools	**Paragraph Writing -** Descriptive, Argumentative, Expository, Short Story, Narrative - Paragraph rubric (structure, logic, vocabulary, grammar) Writing - **Tool**: Digital submission + rubric for content originality, reader engagement, clarity. **Speaking Skills -** Oral assessment rubric (intonation, clarity, accuracy) Email simulator (Google Forms/Canvas/Docs template)

Module-4 : **03 Hours**

ENGLISH IN DIGITAL WORLD: Writing: Framing of search terms / keywords in search engines/ Commands for search on open AIs - Tools to support synchronous communication such as webinar platforms, and asynchronous communication such as forums and social media - Online communication - Types – pros and cons of online communication. Acceptable online roles and behaviours – Netiquettes - Etiquettes of social media. Problems and opportunities in handling digital resources -Tools to check grammar. Writing: Citing information accurately from source material - Plagiarism – Infringement, Importance of academic integrity

Pedagogy	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	Quiklrn.com
Digital Tools	Google Meet - Integrated with Gmail, free for students Google Classroom - Forum, assignments, comments
Assessment Techniques and Tools	Write a short essay (150–200 words) on the problems and opportunities. Evaluation rubric (structure, coherence, grammar). Grammar assessment rubric (before vs after comparison, understanding of corrections).

Module-5: **03 Hours**

APPLYING FOR JOBS : Listening: TED Talks. Speaking: Mock Interview, Telephone Interviews. Reading: Reading a Job Interview- language used in formal professional settings, formal vs. informal tone, non- verbal communication cues, Statement of Purpose, Company Profile and Completing Comprehension Exercises Writing: Job Applications and Resumes Grammar: Conditional Clauses, Modal verbs Vocabulary Development: Technical Vocabulary, Purpose Statement

Pedagogy Language Lab	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	**Quiklrn.com**
Assessment Techniques and Tools	Listening to professional talks, analyzing tone and structure - https://www.ted.com/talks Non-verbal cues in professional reading - https://www.youtube.com/c/Mindsight
Assessment Techniques and Tools	TED Talk worksheet - Listening rubric (comprehension, inference, note-taking), Reading comprehension tests, Resume & Application rubric (content, layout, tone, language), Grammar MCQs / Editing worksheet, Scenario-based MCQs or roleplay, Vocabulary worksheet

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Kumar, A. R. (2008). *English for engineers and technologists*. Orient BlackSwan.
2. Raman, M., & Sharma, S. (2015). *Technical communication: Principles and practice* (3rd ed.). Oxford University Press.

3. Floyd, K., & Cardon, P. W. (2019). *Business and professional communication* (3rd ed.). Principles of Scientific and Technical Writing, 1e, By Pratap K. J. Mohapatra, Sanjib Moulick, © 2025 | Published: December 23, 2024
4. Effective Technical Communication, 3e, By Ashraf M. Rizvi, Priyadarshi Patnaik, © 2024 | Published: September 12, 2024
5. Yadav, D. P. (2022). *A course in English pronunciation*. Notion Publications

II. Reference books:

1. Oxford Advance Learners Dictionary
2. Cambridge English Skills Real Listening and Speaking by Miles Craven
3. Communicative English for Professionals by Nitin Bhatnagar and Mamta Bhatnagar

III. Web links and Video Lectures (e-Resources):

1. Google Docs + Voice Typing - https://docs.google.com
2. LearnEnglish – https://learnenglish.britishcouncil.org/
3. TakeIELTS - https://www.britishcouncil.in/exam/ielts
4. British Council Apps - bbcLearnEnglishonline Grammar
   LearnEnglish Podcasts IELTS
   Word Power
   Bbclearningenglishgrammer
   online Sounds Right (Phonemic Chart)

Teaching-Learning Process (General Instructions):

The strategies teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective:
Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.

1. Direct instructional method (Low/Old Technology),
2. Flipped classrooms (High/advanced Technological tools),
3. Blendedlearning (Combination of both),
4. Enquiry and evaluation-based learning,
5. Personalized learning,
6. Problems based learning through discussion,
7. Following the method of expeditionary learningTools and techniques
8. Use of audio-visual methods through language Labs in teaching of LSRW skills.

Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students in theoretical applied and practical skills in teaching of communicative skills in general.

Assessment Structure:

Component	Type of assessment	Max. Marks	Total
CIE – Theory	CIE 1	25	100
	CIE 2	25	
SEE	End Exam	50	

Two CIEs will be conducted for 25 Marks each. SEE paper shall be set for 50 Questions, each of the 01 marks. The pattern of the Question paper is MCQ (Multiple Choice Questions). The time allotted 01 hour.

Course outcomes (Course Skills Set)

After completing the course successfully, students will be able to:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1									3		
CO2									3		
CO3									3		
CO4										3	
CO5										3	

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Indian Constitution and Engineering Ethics		Semester	I/II
Course Code	25MA1HSICE /25MA2HSICE	CIE Marks	100
Credit Distribution (L-T-P)	NCMC	SEE Marks	-NA-
Pedagogical Hours (L:T:P:SL)	(14:0:0:16)	Total Marks	100
Total Credits	NCMC	Exam Hours	-NA-
Examination type (SEE)	-NA-		

Course Outcomes (Course Skill Set)

After completing the course successfully, the student will be able to understand the topics:

CO 1: Understand the Constitution's origin, structure, principles, and its role in ensuring dignity and equal rights

CO 2: Analyze the government structure, the election process, the amendments, and the emergency provisions in the Indian democracy

CO 3: Develop an understanding of ethical responsibility through the principles of engineering ethics

Module-1:	03 Hours
Introduction to the Indian Constitution: The Importance of the Constitution. Introduction to the Indian Constitution, The Making of the Constitution, The Role of the Constituent Assembly. The Preamble of the Indian Constitution. Salient features of the India Constitution.	
Module-2:	**03 Hours**
FR's, FD's, and DPSP's: Fundamental Rights and their reasonable restrictions in various complex scenarios. Directive Principles of State Policy (DPSP). Fundamental Duties: Their Role and Importance in Nation-Building	
Module-3:	**03 Hours**
Union Executive & State Executive: Union Executive - President, Vice President, Prime Minister, Parliament, Supreme Court of India. State Executive - Governor, Chief Minister, State Legislative Assembly, and High Courts.	
Module-4 :	**02 Hours**
Elections, Amendments, and Emergency Provisions: Election Commission, Elections & Electoral Process. Constitutional Amendments: Importance and Key Changes in India. Emergency Provisions.	

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Module-5:	**03 Hours**
Professional Ethics: Ethics & Values. Types of Ethics. Scope & Aims of Professional & Engineering Ethics. Clash of Ethics. Moral Development. The impediments to Responsibility. Trust & Reliability in Engineering, IPRs (Intellectual Property Rights), Risks, Safety, and Liability in Engineering.	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. An Introduction to Constitution of India and Professional Ethics" by Merunandan K.B. and B.R. Venkatesh, Meragu Publications, 3rd edition, 2011.
2. "Constitution of India & Professional Ethics & Human Rights" by Phaneesh K. R., Sudha Publications, 10th edition, 2016.
3. "Engineering Ethics", M.Govindarajan, S.Natarajan, V.S.Senthilkumar, Prentice – Hall, 2004

II. Reference books:

1. "Samvidhana Odu" - for Students & Youths by Justice HN Nagamohan Dhas, Sahayana, kerekon.
2. "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, and et al, published by Cengage Learning India, Latest Edition – 2019.
3. "Introduction to the Constitution of India", (Students Edition.) by Durga Das Basu (DD Basu): Prentice–Hall, 2008.
4. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022

Teaching-Learning Process (Innovative Delivery Methods):

The strategies teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective:

Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools like

1. Direct instructional method (Low/Old Technology),
2. Flipped classrooms (High/advanced Technological tools),
3. Blended learning (Combination of both),
4. Enquiry and evaluation-based learning,
5. Personalized learning,
6. Learning through discussion on Case studies

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Theory	Test 1	50	100	50	100
	Test 2	50		50	

Question Paper Pattern:
CIE Multiple Choice Questions

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Course outcomes (Course Skills Set)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						3					
CO2						3					
CO3							2				

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: IDEA Lab (Multidisciplinary)		Semester	I/II
Course Code	25ME1AEIDL/25ME2AEIDL	CIE Marks	50
Credit Distribution (L-T-P)	1-0-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(14:0:0:16)	Total Marks	100
Total Credits	01	Exam Hours	3
Examination type (SEE)	Practical / Presentation / Seminar		

Course Outcomes (Course Skill Set)

CO1: Identify real-world problems and formulate technology-driven solutions using IoT, Robotics, AR/VR, Drones, and Prototyping.

CO2: Design and build working prototypes using advanced tools like Arduino, Raspberry Pi, 3D printers, sensors, VR headsets, drones, and PCB design tools.

CO3: Evaluate the practicality, scalability, and social impact of solutions, and communicate them effectively to diverse audiences

Module-1: IoT and Robotics

Introduction to robotics and components: Arduino, motor driver, sensors, chassis, wheels, and power supply setup, Basics of Arduino programming, Blink an LED, Circuit connections and assembling the robotic car chassis, Control DC motors, IR sensor, Pulse Width Modulation (PWM), Wireless control using Bluetooth / Wi-Fi modules, Troubleshooting, Assembly and Testing, Calibration of robotic movements.

Hands-on Project:
Building and programming autonomous and Bluetooth-controlled robotic cars with line-following and obstacle-avoidance features.

Module-2: Augmented and Virtual Reality (AR/VR)

Introduction to Unity, Working with physics (rigid body, collider), Camera and UI basics, creation of Assets and Prefabs, Basic Scripting with C# (movement and rotation), prompts to debug the components.
Hands on project: Developing simple AR apps using mobile platforms, VR environments demo

Module-3: Drones and UAV Technology

Understanding drone mechanics, aero dynamics, flight controllers, calibration and sensors.
Hands-on project: Assembling and disassembling of drones, calibration, simulation and fly experience.

Module-4 : Prototyping

Introduction to prototyping tools and workflow: from concept to 3D printed model, 3D scanning: capturing physical objects and generating STL files, Editing and refining scanned models using CAD software (Fusion 360 /SolidWorks /Mesh mixer),Using slicer software for print preparation, parameter setting, and G-code generation, Operating 3D printers: machine setup, filament loading, calibration, and printing process, Post-processing techniques: support removal, surface finishing, and part assembly

Hands-on Project: scanning, and fabricating a functional 3D printed prototype from a real-world object.

Assessment Structure:

1. **CIE**

Sl. No.	Module	CIE Marks
1	Lab projects	30
2	Minor projects	20
Total		50

2. **SEE**

Sl. No.	Parameter	Marks
1	Prototype Demonstration	20
2	Final Presentation & report	20
3	Viva Voce	10
Total		**50**

Course outcomes (Course Skills Set)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3				2						
CO2			3	3	3						
CO3									3	3	

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Mathematical Foundation for Computer Science Stream-2		Semester	II
Course Code	25MA2BSMCS	CIE Marks	50
Credit Distribution (L-T-P)	3-1-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:28:0:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course successfully, students will be able to:

CO 1: Apply the concepts of Calculus, Linear Algebra and Numerical methods in solving problems

CO 2: Relate the importance of Calculus, Linear Algebra and Numerical methods in Computer science stream

CO 3: Demonstrate the understanding of Calculus, Linear Algebra and Numerical methods through programming skills using engineering tools

Module-1: Integral Calculus	**11 Hours**
Prerequisites: Definite and indefinite integrals of single-variable functions, basic conic sections and polar coordinates.	
Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. **Applications:** Area by double integral (polar curves), Volume by triple integral. **Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions. **Self-Study:** Moment of Inertia along a particular direction, Duplication formula.	
Module-2: Vector Space	**10 Hours**
Prerequisites: Binary operations, groups, matrices and system of equations.	
Definition and examples, subspace, linear combinations, linear span, linearly independent and dependent sets, row space, column space and null space of a matrix, basis and dimension. **Applications:** Coordinate vector. **Self-study:** Verification of vector spaces.	
Module-3: Linear Transformations	**10 Hours**
Prerequisites: Functions, matrix algebra, system of linear equations and their solutions	
Definition and examples, Matrix of a linear transformation. Rank and nullity of a linear operator, rank-nullity theorem and eigen spaces of a linear transformation. **Applications:** Singular, non-singular and onto linear transformations, invertible linear transformation **Self-study:** Geometric linear transformation in R^2 for image processing	
Module-4 : Numerical Methods -1	**09 Hours**
Prerequisites: Algebraic and transcendental functions, roots of an equation.	

Solution of algebraic and transcendental equations: Newton-Raphson method. Finite differences, Newton's forward and backward interpolation. Lagrange's interpolation and Lagrange's inverse Interpolation. **Numerical integration:** Simpson's $(1/3)^{rd}$ rule, Simpson's $(3/8)^{th}$ rule and Weddle's rule. **Applications:** Estimating the velocity, acceleration, area, volume. **Self-Study:** Regula-Falsi method and Newton's divided difference formula.
Module-5: Numerical Methods -2 **08 Hours**
Prerequisites: Basic differentiation and integration, analytical solutions for initial value problem.
Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Picard's method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector method. **Applications:** Finding approximate solution of ODEs related to engineering field. **Self-Study:** Adam-Bashforth method and Numerical solution of higher order ODEs

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna publishers, 45th Ed., 2024.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.
3. **D. C. Lay:** "Linear Algebra and its Applications", Pearson Publishers, 5th Ed., 2024

II. Reference books:

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **S. Pal & S. C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **N. P. Bali and M. Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
4. **James Stewart:** "Calculus" Cengage Publications, 7th Ed., 2019
5. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.
6. **D.G. Zill and W.S.Wright:** " Advanced Engineering Mathematics", Jones Bartlett Publishers Inc., 7th Ed., 2020

III. Web links and Video Lectures (e-Resources):

1. VTU e-shikshana Program
2. Integral Calculus: https://www.classcentral.com/course/youtube-integral-calculus-90616b and https://www.edx.org/course/mathtrackx-integral-calculus
3. Integral and Vector Calculus: https://onlinecourses.nptel.ac.in/noc22_ma03/preview
4. Vector Calculus: https://www.classcentral.com/course/mit-opencourseware-multivariable-calculus-fall-2007-40962/classroomand https://www.classcentral.com/course/vector-calculus-engineers-17387
5. Vector spaces and Linear Transformations: https://nptel.ac.in/courses/111104137, https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/ and https://www.classcentral.com/subject/linear-algebra

6. Numerical Methods: https://www.classcentral.com/course/numerical-methods-engineers-32822,
7. https://nptel.ac.in/courses/111107105 and https://ocw.mit.edu/courses/18-335j-introduction-to numerical-methods-spring-2019/

Teaching-Learning Process (Innovative Delivery Methods):

1. Chalk and talk method / Power Point Presentation

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Theory	Quiz	10	100	5	50
	AAT	10		5	
	Test 1	40		20	
	Test 2	40		20	
	Test 3	40		20	
SEE	End Exam	100		50	

1. CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.
2. The best two scores out of three tests will be considered for CIE.

Semester End Examination:

1. Two complete questions will be given from each unit.
2. One complete question from each unit to be answered.

Course outcomes (Course Skills Set)

After completing the course successfully, students will be able to:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3										
CO2	3										
CO3	3				3						

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Mathematical foundation for Civil, Electrical and Mechanical Streams -2		Semester	II
Course Code	25MA2BSCEM	CIE Marks	50
Credit Distribution (L-T-P)	3-1-0	SEE Marks	50
Pedagogical Hours (L:T:P:SL)	(42:28:0:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

After completing the course successfully, students will be able to:

CO 1: Apply the concepts of Calculus, Partial differential equations and Numerical methods in solving problems

CO 2: Relate the importance of Calculus, Partial differential equations and Numerical methods in Civil, Electrical and Mechanical streams

CO 3: Demonstrate the understanding of Calculus and Numerical methods through programming skills using engineering tools

Module-1: Integral Calculus **11 Hours**

Prerequisites: **Definite and indefinite integrals** of single-variable functions, basic conic sections and polar coordinates.

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates.
Applications: Area by double integral (polar curves), Volume by triple integral.
Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.
Self-Study: Moment of Inertia along a particular direction, Duplication formula.

Module-2: Vector Calculus **10 Hours**

Prerequisites: Scalars, vectors and its operations, multivariable calculus, basic integration

Scalar and vector fields. Gradient, divergence and curl - physical interpretation, solenoidal vector fields, irrotational vector fields and scalar potential.
Vector Integration: Line integrals, Green's theorem and Stokes' theorem (statement only): problems.
Applications: Directional derivative and work done by a force.

Self-study: Velocity, acceleration of a moving particle and Gauss divergence theorem

Module-3: Partial Differential Equations (PDEs) **10 Hours**

Prerequisites: Basics of differential equations

Formation of PDEs by elimination of arbitrary constants and functions. Solution of non- homogeneous PDE by direct integration, homogeneous PDE by the method of Separation of variables.
Applications: Mathematical modelling of one-dimensional heat and wave equations.

Self-study: Solution of one-dimensional heat and wave equations by the method of separation of variables.

Module-4 : Numerical Methods -1	**09 Hours**
Prerequisites: Algebraic and transcendental functions, roots of an equation.	
Solution of algebraic and transcendental equations: Newton-Raphson method. Finite differences, Newton's forward and backward interpolation. Lagrange's interpolation and Lagrange's inverse Interpolation. **Numerical integration:** Simpson's $(1/3)^{rd}$ rule, Simpson's $(3/8)^{th}$ rule and Weddle's rule. **Applications:** Estimating the velocity, acceleration, area, volume. **Self-Study:** Regula-Falsi method and Newton's divided difference formula	
Module-5: Numerical Methods -2	**08 Hours**
Prerequisites: Basic differentiation and integration, analytical solutions for initial value problem.	
Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Picard's method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector method. **Applications:** Finding approximate solution of ODEs related to engineering field. **Self-Study:** Adam-Bashforth method and Numerical solution of higher order ODEs.	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna publishers, 45th Ed., 2024.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

II. Reference books:

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **S. Pal & S. C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **N. P. Bali and M. Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
4. **C. R. Wylie, L. C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6th Ed., 2017
5. **James Stewart:** "Calculus" Cengage Publications, 7th Ed., 2019.
6. **D.G. Zill and W. S. Wright:** "Advanced Engineering Mathematics", Jones Bartlett Publishers Inc., 7th Ed., 2020

III. Web links and Video Lectures (e-Resources):

1. http://academicearth.org/
2. VTU e-Shikshana Program
3. VTU EDUSAT Program
4. https://nptel.ac.in/courses/111105160
5. https://nptel.ac.in/courses/127106019
6. https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/
7. https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2012/pages/syllabus

Teaching-Learning Process (Innovative Delivery Methods):

1. Chalk and talk method / Power Point Presentation

Course outcomes (Course Skills Set)

After completing the course successfully, students will be able to:

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Theory	Quiz	10	100	5	50
	AAT	10		5	
	Test 1	40		20	
	Test 2	40		20	
	Test 3	40		20	
SEE	End Exam	100		50	

1. CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.
2. The best two scores out of three tests will be considered for CIE.

Semester End Examination:

1. Two complete questions will be given from each unit.
2. One complete question from each unit to be answered.

Course outcomes (Course Skills Set)

After completing the course successfully, students will be able to:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3										
CO2	3										
CO3	3				3						

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Elements of Mechanical Engineering		Semester	II
Course Code	25ME2PSEME	CIE Marks	50
Credits Distribution (L-T-P)	3-0-1	SEE Marks	100
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)	Theory		

Course Outcomes (Course Skill Set)

CO1: Describe and discuss fundamental principles of Mechanical Engineering as applied in the domains of machining, thermal, automotive and futuristic technologies such as non-conventional energy technology

CO2: Differentiate and compare among various mechanical systems (such as energy, metal joining, IC engines etc.)

CO3: Derive and determine parameters related to different type of mechanical systems

CO4: Demonstrate skills in fabrication techniques and experimental analysis related to different domains in Mechanical Engineering

Module-1: **8 Hrs,10Hrs(SSA)**

Introduction to Mechanical Engineering (Overview only):
Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors and contribution to GDP (*Not for CIE/SEE*).

Energy Sources and Power Plants:
Classification of energy sources, Construction and working of Hydel power plant, Solar power plant (Helio-thermal process, flat and parabolic collectors), Wind power plant, Hydrogen as fuel and list of applications.

Hydraulic turbines
Classification of Hydraulic turbines, Principle and Operation of Pelton Wheel and Francis Turbine.

Module-2: **8 Hrs,10Hrs(SSA)**

Metal Joining Processes:
Soldering, Brazing and Welding: Classification, definitions and principles of operation, Procedure followed in soldering, brazing and welding, Brief description of arc welding.

Steam Formation and Application:
Formation of steam and thermodynamic properties of steam (no numerical problems), Applications of steam in industries.

Refrigeration: Principle of refrigeration, Refrigeration Effect, Ton of Refrigeration, COP, Refrigerants and their desirable properties, Principles and Operation of Vapor Compression and Vapor Absorption Refrigeration (with block diagrams), Applications of Refrigeration

Module-3: **8 Hrs,10Hrs(SSA)**

Fundamentals of IC Engines: Classification of Internal Combustion Engines, Working of 4-Stroke (petrol and diesel) engines, Applications of IC Engines, Numerical on Power and Mechanical efficiency calculations.

Insight into future mobility technology: Introduction to Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles (block diagram only). Advantages and disadvantages of EVs and Hybrid vehicles. Drones, UAV, Types of UAV, fixed wing and multi-rotors, Applications
Module-4 : **8 Hrs,10Hrs(SSA)**
Power Transmission – Belt Drives: Principle, working and application of flat and V-belt drives. Flat belt drives (Open and crossed), Simple numerical on flat belt drives involving velocity ratios (without the effect of belt thickness and slip). **Power Transmission – Gear Drives**: Types of gear, Gear Trains (simple and compound) and their application. **Introduction to Robotics:** Robot anatomy, Joints & links, common robot configurations, Applications of Robotics
Module-5: **8Hrs,10Hrs(SSA)**
Fundamentals of Machine Tools and Operations: (*Machine tool sketches are not included for CIE/SEE*) Working Principle of Lathe, Milling and Drilling machine tools, Lathe Operations: Turning, Facing, Taper Turning and Knurling. **Introduction to Modern Manufacturing Tools and Techniques:** CNC: Introduction, components of CNC, advantages and applications of CNC, Additive Manufacturing: Introduction, classification, steps involved. **Introduction to Mechatronics:** Concept of open-loop and closed-loop control systems, Examples of Mechatronic systems

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2019
2. Elements of Mechanical Engineering, V. K. Manglik, PHI Learning, 2019

II. Reference books:

1. Textbook of Elements of Mechanical Engineering, S. Trymbaka Murthy, Medtech, 2019
2. Elements of Mechanical Engineering, Kestoor Praveen, Suggi Publishing, 2019
3. Thermal Management in Electronic Equipment, HCL Technologies, 2010
4. Fundamentals of Robotics: Analysis and Control, Robert J. Schilling, Pearson Education (US).

III. Web links and Video Lectures (e-Resources):

1. https://www.tlv.com/global/TI/steam-theory/principal-applications-for-steam.html
2. https://www.forbesmarshall.com/Knowledge/SteamPedia/About-Steam/Fundamental-Applications-of-Steam
3. https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing-and-process-industry/

4. Videos | Makino (For Machine Tool Operation)
5. Mechanisms and mechanical devices 4e.pdf (e-book- Mechanical Linkages)

List of Lab activities: **[14*2 + 2=30 Hrs]**

1. One model preparation using arc welding
2. Preparation of a sheet metal model
3. One model preparation using soldering
4. One model preparation involving bench-drilling & tapping
5. One lathe model involving facing, turning and knurling
6. Hands on experience on CNC wood router and Laser cutting machine
7. Performance study of Pelton wheel turbine
8. Performance study of 4 stroke petrol engine

Teaching-Learning Process (Innovative Delivery Methods):

1. Power Point presentation,
2. Chalk and talk are used for problem solving (in-general).
3. Students are encouraged to practice only line diagrams for exams.
4. Video demonstration or simulations
5. Laboratory demonstrations and practical experiments

Assessment Structure:

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	--	--	25	25	10	50
	Test 1	40	80				
	Test 2	40					
	Test 3	40					
CIE – Lab	Record & Performance/ Lab Test	15	25		25	10	
	Experiential learning	10					
CIE							
SEE	End Exam	100		50			50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

Answer five full questions selecting one from each module. **Two questions will be set from each module.**

COs and POs Mapping

COs	POs										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3						2				
CO2	3						2				
CO3	3										
CO4	2			3							

B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU

Course Title: Elements of Chemical Engineering		Semester	II
Course Code	25CH2PSCHE	CIE Marks	50
Credits Distribution (L-T-P)	3:0:1	SEE Marks	100
Pedagogical Hours (L:T:P:SL)	(42:0:28:50)	Total Marks	100
Total Credits	04	Exam Hours	3
Examination type (SEE)			

Course Outcomes (Course Skill Set)

After completing the course, the students will be able to ….

CO1: Comprehend the relevance of chemicals engineering and role of a Chemical Engineer.
CO2: Identify the modern chemical engineering plants and importance of simulation.
CO3: Evaluate the dimensionless analysis and its applications.
CO4: Evaluate and asses the environmental & safety aspects in Chemical Engineering.
CO5: Present the experimental observations in the form of a lab report.

Module-1: Introduction to Chemical Engineering & Role of a Chemical Engineer	**8 Hours**
Introduction: Chemical Engineering in Everyday life, History of Chemical Engineering, Major Chemical Engineering Contributions to Society, Significance of chemical engineering in food, health, energy and environment. Sustainable development framework; United Nations SDGs, Emerging Technologies to implement sustainable development goals.	
Module-2: Modern chemical engineering plants	**8 Hours**
Batch processing and continuous processing, transition from batch to continuous processing, Basic principles of chemical processes; Unit processes and unit operations; Case studies: Manufacture of paint, Sulfuric acid and Soda ash. Measurement of temperature, pressure, flow and level in a process.	
Module-3: Role and importance of Natural Sciences in Chemical Engineering	**8 Hours**
Introduction, Ideal gas law, Infinitesimal Control Volume, Macroscopic Control Volume, Closed Systems and Open Systems, Conservation of Mass and energy and related numerical, Fundamentals of mass transfer, Fick's law of diffusion. Heat transfer, modes of heat transfer and related numerical.	
Module-4 : Fluid flow phenomena and Dimensional Analysis	**8 Hours**
Types of fluids - shear stress and velocity gradient relation, Types of fluid flow, Measurement of fluid flow: Rotameter, pitot tube. Dimensionless Numbers, Primary and derived quantities, Dimensional homogeneity, Methods of dimensional analysis (Rayleigh's) and its applications, related numerical.	

Module-5: Safety in Chemical Process Industries	**7 Hours**
Safety in Chemical Process Industries, Lessons for the Management, Importance of Quantitative Information, Case Study 1: Bhopal gas tragedy; Case Study 2: Environmental Hazards of a Green Project. Case study 3: Bottling plant of Coco-Cola. Basic safety and process management (Process design for safety, introduction to HAZOP and safety management processes).	

Suggested Learning Resources: (Textbook/Reference Book):

I. Textbooks:

1. Pushpavanam S, Introduction to Chemical Engineering, PHI Learning Private Limited, New Delhi, 2010.
2. Morton Denn, Chemical Engineering: An Introduction, Cambridge University Press, 2011.

II. Reference books:

1. W. L. McCabe, J. C. Smith and P. Harriot, Unit Operations of Chemical Engineering, 7th Edition, McGraw Hill, New York, 2021.
2. Walter L. Badger, Julius T. Banchero , Julius T. Bancheo, Introduction To Chemical Engineering, Tata McGraw-Hill, 1955.
3. Richard M. Felder and Ronald W. Rousseau, Elementary Principles of Chemical Processes, John Wiley & Sons, 3 rd Edition, 2005.
4. Himmelblau, D.M., Basic Principles and Calculations in Chemical Engineering, 6 th Edition, Prentice Hall of India, New Delhi, 1997.
5. Uche, N. Introduction to Chemical Engineering. Scrivener Publishing, Wiley, 2019
6. Ghoshal, S.K., Sanjal, S.K. and Datta, S. Introduction to Chemical Engineering. Tata McGraw-Hill Publication, 2017.
7. Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHILearning Pvt. Ltd., 2ndEdn, 2016

III. Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses/103108097
2. https://onlinecourses.nptel.ac.in/noc25_ch07/preview
3. https://www.youtube.com/watch?v=SdP3BbCt4Ak

List of Lab activities:

1. Introduction to Microsoft excel spreadsheet, tool bars and its functions
2. Spread sheet for Unit Conversion and dimensional analysis
3. Spread sheet for Material Balance for a Mixing Process
4. Spread sheet for Steady-State Material Balance on a Tank
5. Spread sheet for Steady-State Energy Balance in a heating tank
6. Introduction to MATLAB, solving matrices, tool bars and its functions.
7. MATLAB Program for determining the regression coefficient.

8. MATLAB Program for the calibration of a rotameter.
9. MATLAB Program for variation of height with respect to time in a tank (Solution of a differential equation).
10. MATLAB Program for the solving ordinary differential equation.

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes. The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

1. Flipped class
2. Chalk and talk
3. NPTEL and other videos for theory topics
4. Partial Delivery of course by Industry expert/ industrial visits
5. ICT-Enabled Teaching.
6. Activity based learning.
7. Keep fundamentals as the core teaching content.
8. Present recent trends as short "industry snapshot" segments at the end of each module (e.g., 15–20 minutes), not as examinable depth topics.
9. Use case studies, videos, or demonstrations for the advanced concepts so students see applications without getting bogged down in mechanisms.
10. Make the trends part of assessments via assignments, mini-seminars, or group presentations, so the main lecture hours focus on the basics.

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage

- To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.
- To pass the SEE, a student must score at least 35% of 50 marks, *i.e.*, 18 marks.
- Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

Continuous Internal Assessments		Marks 100% (Weightage 50%)	Assessment
Theory Component	Three Internals (Best of Two)	40%	Course Instructor
	Quiz (One Quiz or AAT)	10%	
Laboratory Component	Laboratory Component	50%	
Semester End Examination (Written Examination for Three Hours)		Marks 100 (Weightage 50%)	

Component	Theory (50%)			Practical (50%)		Total Marks
	Test 1	Test 2	Learning Activity-1	Records & Performances	Lab Test	
Max. Marks	20	20	10	30	20	100
Reduced CIE	10	10	5	15	10	50

Continuous Comprehensive Assessments (CCA):

CCA will be conducted for a total of 5 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

- Learning Activity 1: Case Studies Presentations related to implementation SDGs (5 Marks)

Rubrics for Learning Activity -1 (Based on the nature of learning activity, design the rubrics for each activity):
(10 Marks)

	Superior	Good	Fair	Needs Improvement	Unacceptable
Understanding of Case (10 Marks) (PO 1)	Demonstrates deep understanding (10)	Good understanding (8)	Adequate understanding. (6)	Limited understanding (4)	No clear understanding. (0-2)

Course outcomes (Course Skills Set)

After completing the course successfully, students will be able to:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1	3										
2	1										
3		2									
4						2					
5									3		

Suggested Learning Activities may include (but are not limited to):

1. Course Project
2. Case Study
3. Presentation Programming
4. Assignment Tool/Software Exploration

5. Literature Review
6. Open Book Test (preferably at RBL4 and RBL5 levels)
7. GATE-based Aptitude Test Assignment (at RBL3, RBL4, or RBL5 levels)
8. Any other relevant and innovative academic activity
9. Use of MOOCs and Online Platforms

Suggested Innovative Delivery Methods may include (but are not limited to):

1. Flipped Classroom
2. Problem-Based Learning (PBL)
3. Case-Based Teaching Simulation and
4. Virtual Labs Partial Delivery of course by Industry expert/ industrial visits
5. ICT-Enabled Teaching
6. Role Play

ANNEXURE – V

Approved Policy Document for Registration and Credit transfer of MOOC Courses

BMS COLLEGE OF ENGINEERING, BENGALURU 560 019
Autonomous Institute, Affiliated to VTU

POLICY DOCUMENT FOR REGISTRATION AND CREDIT TRANSFER OF MOOC COURSES

Objectives:

This policy aims to provide a structured framework for registration, approval, evaluation, and credit transfer of Massive Open Online Courses (MOOCs) undertaken by Engineering students of the College, in accordance with university guidelines for Autonomous Colleges. This policy is applicable to all Undergraduate and Postgraduate students admitted under the autonomous scheme for the batch of students admitted from the academic year 2023 onwards.

General Procedures:

1. Students shall be permitted to register only for MOOCs offered by platforms recognized by UGC / AICTE / VTU:
    - SWAYAM
    - NPTEL
    - VTU offered MOOC courses
2. All the courses offered on MOOC platform shall be vetted through the respective BOS before publishing to the students.
3. Students must register for one, two credit courses identified under Basic Sciences, Ability Enhancement courses, Humanity and Social Science and Management Courses. Further, the students must also register for open elective courses offered in 6^{th}, 7^{th} and 8^{th} semesters. In PG courses, wherever it is applicable as per the guidelines of the University.
4. The HODs and the concerned MOOC coordinator shall guide the students while selecting approved MOOC courses by the DAC/DAB and BOS.
5. The credit equivalence and course mapping shall be finalized by the BOS and approved by the Academic Council.
6. In any given semester, a student must register for a minimum of 16 credits and a maximum of 28 credits.
7. The duration of the MOOC shall be as follows:
    - One Credit MOOC course with a minimum of 4 weeks coursework.
    - Two Credit MOOC course with a minimum of 6 weeks coursework.
    - Three Credit MOOC course with a minimum of 12 weeks coursework.
8. The student must complete the MOOC and obtain a pass grade as prescribed by the MOOC platform. Further, the college-level assessment pattern for evaluation of the MOOC course shall be as follows:

    CIE – 50% weightage SEE – 50% weightage

The marks earned by the students through MOOC platform will be moderated as per the guidelines of the VTU before transferring the marks and credits to the Grade Card.

9. If student fails in a MOOC course, the student need to re-register for the same course on a same MOOC platform. In case, if student fails in an MOOC open elective course, the student may register for an alternate MOOC course.

10. The MOOC must include Proctored final examination.

11. Only MOOCs with verifiable certificates shall be considered for credit transfer.

12. Credits shall not be awarded for incomplete or failed MOOCs.

13. The student shall ensure timely registration and completion of the course.

Guidelines for students to register for MOOC:

a) The list of MOOC course (open electives) identified by the departments consists of Course Title, Name of the Course Instructor, Name of the University/College and link for the MOOC course; the list will be made available on College website.

b) Students shall register (only the courses identified by various departments with prior approval from DAC/DAB and BOS) as courses exclusively through the NPTEL/SWAYAM/VTU MOOC platform.

c) The students shall seek guidance from the Proctor before selecting the MOOC course.

d) It is the responsibility of the student to ensure that he/she does not select a MOOC course, if he/she has already studied a course with similar content with similar/different course code/title in the lower semesters or in the upcoming semesters.

The above said policies shall be reviewed periodically and may be amended based on VTU statutes and circulars, UGC / AICTE guidelines and recommendations of BOS and Academic Council.

BMS COLLEGE OF ENGINEERING, BENGALURU 560 019
Autonomous Institute, Affiliated to VTU

POLICY ON PRINTING OF GRADE CARDS INCLUDING MOOC COURSES

This policy outlines the procedure for inclusion of grades obtained through MOOCs in the Grade Cards of students pursuing B.E. program.

Students are permitted to pursue MOOC courses from the 3rd to 8th semester of the B.E. program, subject to the regulations prescribed by the University/Institution.

Procedure for Inclusion of MOOC Grades in Grade Cards:

1. **MOOC Course Pursued in Advance:**

   A student studying in the lower semester may be permitted to pursue the higher semester MOOC course.

   - Upon successful completion, the grade earned shall be reflected only in the respective semester Grade Card.
   - In case a student fails in the MOOC course, he/she shall re-register for the same course on the same MOOC platform until a pass grade (40% and above) is obtained.

2. **Student fail to clear MOOC Courses till 7th semester:**
   Student who has completed 7th semester and still has backlog in MOOC courses then the student shall re-appear for the summer semester SEE conducted by the Controller of Examinations (COE).

This policy shall be implemented with immediate effect and shall be applicable to all eligible students pursuing MOOC courses for the batch of students admitted from the academic year 2023 onwards.

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ANNEXURE – VI

Approved Modalities for Conduction of one-year Internship for students admitted from AY 2022 Onwards

B.M.S. COLLEGE OF ENGINEERING, BENGALURU

Autonomous institute, affiliated to VTU

POLICY DOCUMENT

MODALITIES FOR IMPLEMENTATION OF ONE-YEAR INTERNSHIP

1. Preamble:

1.1 In order to enhance industry readiness, Research culture and practical exposure of students, the Institution proposes structured implementation of a One-Year Internship during the final year (7^{th} and 8^{th} semesters) of the undergraduate programs.

1.2 The policy aims to integrate academic learning with industry experience/Research activity while ensuring compliance with statutory and regulatory requirements.

1.3 The policy further aims to promote Research culture in the student community by deputing the students to the premier institutions (IIT/NITs/IISc/IIIT) in India and abroad (Universities within 1000 QS World University Ranking as per AICTE / UGC guidelines).

2. Scope:

2.1 This policy shall be applicable to all undergraduate programs offering a one-year internship during the final year.

2.2 The provisions herein shall be implemented in accordance with the approved Scheme and Syllabus of the respective program.

3. Course Delivery during Internship/student exchange program (India and abroad):

3.1 The courses offered in the 7^{th} and 8^{th} semesters may be delivered in Online mode, or Blended mode.

3.2 Elective courses may be completed through approved MOOC platforms.

3.3 Credit transfer for MOOC courses shall be governed by the institutional credit transfer norms in force. Further, the college-level assessment pattern for evaluation of the MOOC course shall be as follows:

CIE – 50% weightage SEE – 50% weightage

4. Integration of Internship with Major Project:

4.1 The internship may be integrated with the Major Project under a Project-cum-Internship model.

4.2 Students shall be encouraged to undertake industry-oriented problem statements aligned with organizational requirements.

4.3 The Project-cum-Internship shall be evaluated jointly by an Industry Representative, and an Academic Evaluation Panel constituted by the Department.

4.4 The scheme of evaluation shall be defined in the approved Scheme and Syllabus.

5. Proctor to monitor project-cum-internship work:

5.1 The Proctor shall:
a) Monitor the progress periodically
b) Review performance reports and submit the same to the University
c) Provide academic guidance and support to students

5.2 Online monitoring mechanisms may be adopted for students undertaking internships outside the station.

5.3 Students shall submit periodic progress reports to the Proctors.

6. Equivalent Courses for the students:

6.1 The DAB/BOS shall suggest the courses in a MOOC platform for the courses offered at 7th and 8th semesters

6.2 Such restructuring shall ensure:

a) Compliance with AICTE Internship Policy Guidelines

b) Adherence to University Statutes governing Autonomous Colleges

c) Conformity with the approved Scheme and Syllabus of the Program.

6.3 The credits earned through MOOC platform will be transferred to the Grade Cards of 7th and 8th semesters.

7. Amendments:

7.1 Any matter not covered under this policy shall be ratified in the subsequent Academic Council meeting.

Note: The guidelines defined for credit transfer of MOOC courses will also applicable for students pursuing one year internship.

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