



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

BACHELOR OF ENGINEERING

SCHEME & SYLLABUS

I & II SEMESTERS

2023-2024



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

VISION

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

MISSION

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

FIRST YEAR SYLLABUS BOOK
With effect from the A.Y.2023-2024

CONTENTS

S No	Particulars	Page
01	Scheme of Instructions I Semester B.E 2023-2024(Physics Cycle)	3
02	Scheme of Instructions I Semester B.E 2023-2024(Chemistry Cycle)	3
03	Scheme of Instructions II Semester B.E 2023-2024(Physics Cycle)	4
04	Scheme of Instructions II Semester B.E 2023-2024(Chemistry Cycle)	4
05	Curriculum for -	
5.1	23MA1BSCM – Mathematical Foundation for Civil, Electrical and Mechanical Engineering stream– 1	
5.2	23MA1BSMCS - Mathematical foundation for Computer Engineering Stream– 1	
5.3	22PH1BSPCV / 22PH2BSPCV - Applied Physics for Civil Cluster	
5.4	22PH1BSPEE / 22PH2BSPEE - Applied Physics for Electrical Cluster	
5.5	22PH1BSPCS / 22PH2BSPCS - Applied Physics for Computer Science Cluster	
5.6	22PH1BSPME / 22PH2BSPME - Applied Physics for Mechanical Cluster	
5.7	22EC1ESBEC / 22EC2ESBEC - Basic Electronics	
5.8	22EE1ESEEE / 22EE2ESEEE - Elements of Electrical Engineering	
5.9	22CV1EENM/ 22CV2EENM - Engineering Mechanics	
5.10	22CS1ESPOP/22CS2ESPOP - Principles of programming in C	
5.11	22ME1ESEME/22ME2ESEME - Elements of Mechanical Engineering	
5.12	22CV1ESICV/22CV2ESICV - Introduction to Civil Engineering	
5.13	22ME1ESIME/22ME2ESIME - Introduction to Mechanical Engineering	
5.14	22EC1ESIEL/22EC2ESIEL - Introduction to Electronics Engineering	
5.15	22EE1ESIEE/22EE2ESIEE - Introduction to Electrical Engineering	
5.16	22CS1ESPYP/22CS2ESPYP - Introduction to PYTHON Programing	
5.17	22CY1BSCCV/22CY2BSCCV - Applied Chemistry for Civil Engineering	
5.18	22CY1BSCME/22CY2BSCME - Applied Chemistry for Mechanical Cluster	
5.19	22CY1BSCEE/22CY2BSCEE - Applied Chemistry for Electrical Cluster	
5.20	22CY1BSCCS/22CY2BSCCS - Applied Chemistry for CSE Cluster	
5.21	22ME1ESCED/22ME2ESCED - Computer Aided Engineering Drawing	

5.22	22CV1ESGBT/22CV2ESGBT - Green Buildings	
5.23	22ME1ETISE/22ME2ETISE - Introduction to Sustainable Engineering	
5.24	22EE1ESRES/22EE2ESRES - Renewable Energy Sources	
5.25	22CV1ESWMT/22CV2ESWMT - Waste Management	
5.26	23CY1ETNST/23CY2ETNST - Nanoscience And Technology	
5.27	22ME1AEIDT/22MEAEIDT - Innovation and Design Thinking	
5.28	22BT1AESFH/22BT2AESFH - Scientific Foundations for Health	
5.29	22MA1AECEN - Communicative English	
5.30	23MA2BSMCM - Mathematical foundation for Civil and Mechanical Engineering Stream – 2	
5.31	23MA2BSMES - Mathematical foundation for Electrical Stream – 2	
5.32	23MA2BSMCS - Mathematical foundation for Computer Science Stream-2	
5.33	22MA2AEPWE - Professional Writing Skills in English	
5.34	22MA1HSBAK/22MA2HSBAK - Balake Kannada	
5.35	22MA1HSSAK/22MA2HSSAK - Samskrutika Kannada	
5.36	22MA1HSCIP/22MA2HSCIP - Constitution of India & Professional Ethics	



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

Scheme & Syllabus for UG Programme – 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-S	Lecture-Tutorial- Practical-Self study
NFTE	Not Fit for Technical Education
SEE	Semester End Examination
SGPA	Semester Grade Point Average
BS	Basic Science
ESC	Engineering Science
PLC	Programming Language
ETC	Emerging Technology
SDC	Skill Development Course
AEC	Ability Enhancement
NC	No Credit



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

Scheme of Instruction for First Semester B.E.

2023-2024 (PHYSICS CYCLE)

	Sl. No.	Course Type	COURSE CODE	Course Title	L	T	P	Total credits	
1	1	ASC1	23MA1BSCM	Mathematical Foundation for Civil, Electrical and Mechanical Engineering stream- 1	2	1	1	4	
2			23MA1BSMCS	Mathematical foundation for Computer Science Stream- 1					
3	2	ASC2	22PH1BSPCV	Applied Physics for Civil Cluster.	3	0	2	4	
4				22PH1BSPEE					Applied Physics for Electrical Cluster
5				22PH2BSPCS					Applied Physics for Computer Science Cluster
6	3	ESC	22EC1ESBEC	Basic Electronics	3	0	0	3	
7				22EE1ESEEE					Elements of Electrical Engg.
8				22CV1ESENM					Engineering Mechanics
9				22CS1ESPOP					Principles of programming in C
10	4	ESC1	22CV1ESICV	Introduction to Civil Engineering	3	0	0	3	
11				22ME1ESIME					Introduction to Mechanical Engineering
12				22EC1ESIEL					Introduction to Electronics Engineering
13				22EE1ESIEE					Introduction to Electrical Engineering
14	5	PLC	22CS1ESPYP	Introduction to PYTHON Programing	2	0	2	3	
15	6	AEC2	22ME1AEIDT	Innovation and Design Thinking	1	0	0	1	
16	7	HSMC	22MA1HSBAK	Balake Kannada	1	0	0	1	
17				22MA1HSSAK					Sanskrutika Kannada
18	8	AEC1	22MA1AECEN	Communicative English	1	0	0	1	
Total					20				

L-Lecture (1 credit=1 contact hr.);	T-Tutorial (1 credit=2 contact hrs.);
P-Practical (1 credit=2 contact hrs.);	
ASC1 - Applied Science Course	PLC - Programming Language Course
ASC2 - Applied Science Course	HSMC--> Humanities
ESC - Engineering Science Course	SDC- Skill Development Course
ESC1 - Engineering Science Course-1	AEC- Ability Enhancement



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

Scheme of Instruction for First Semester B.E.
2023-2024 (CHEMISTRY CYCLE)

	Sl. No.	Course Type	COURSE CODE	Course Title	L	T	P	Total credits	
1	1	ASC1	23MA1BSCSEM	Mathematical Foundation for Civil, Electrical and Mechanical Engineering stream- 1	2	1	1	4	
2			22MA1BSMCS	Mathematical foundation for Computer Science Stream- 1					
3	2	ASC2	22CY1BSCCS	Applied Chemistry for CSE Cluster	3	0	2	4	
4				22CY1BSCME					Applied Chemistry for Mechanical Cluster
5				22CY1BSCEE					Applied Chemistry for Electrical Cluster
6	3	ESC	22ME1ESCED	Computer Aided Engineering Drawing	1	0	4	3	
7	4	ESC1	22CV1ESICV	Introduction to Civil Engineering	3	0	0	3	
8				22ME1ESIME					Introduction to Mechanical Engineering
9				22EC1ESIEL					Introduction to Electronics Engineering
10				22EE1ESIEE					Introduction to Electrical Engineering
11	5	ETC	22CV1ESGBT	Green Buildings	3	0	0	3	
12				22ME1ETISE					Introduction to Sustainable Engineering
13				22EE1ESRES					Renewable Energy Sources
14				22CV1ESWMT					Waste Management
15				23CY1ETNST					Nanoscience And Technology
16	6	HSMC	22MA1HSCIP	Constitution of India & Professional Ethics	1	0	0	1	
17	7	SDC	22BT1AESFH	Scientific Foundations for Health	1	0	0	1	
18	8	AEC1	22MA1AECEN	Communicative English	1	0	0	1	
Total					20				

L-Lecture (1 credit=1 contact hr.);	T-Tutorial (1 credit=2 contact hrs.);
P-Practical (1 credit=2 contact hrs.);	
ASC1 - Applied Science Course	ETC - Emerging Technology Course
ASC2 - Applied Science Course	HSMC--> Humanities
ESC - Engineering Science Course	SDC- Skill Development Course
ESC1 - Engineering Science Course-1	AEC- Ability Enhancement



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

Scheme of Instruction for Second Semester B.E.

2023-2024 (PHYSICS CYCLE)

	Sl. No.	Course Type	COURSE CODE	Course Title	L	T	P	Total credits
1	1	ASC1	23MA2BSMCM	Mathematical foundation for Civil and Mechanical Engineering stream – 2	2	1	1	4
2			23MA2BSMES	Mathematical foundation for Electrical Stream– 2				
3			23MA2BSMCS	Mathematical foundation for Computer Science Stream– 2				
4	2	ASC2	22PH2BSPME	Applied Physics for Mechanical Cluster	3	0	2	4
5			22PH2BSPEE	Applied Physics for Electrical Cluster				
6			22PH2BSPCS	Applied Physics for Computer Science Cluster				
7		ESC-2	22EC2ESBEC	Basic Electronics	3	0	3	3
8			22ME2ESEME	Elements of Mechanical Engineering				
9			22CS2ESPOP	Principles of programming in C				
10	4	ESC2-II	22EE2ESIEE	Introduction to Electrical Engg.	3	0	0	3
11			22CV2ESICV	Introduction to Civil Engineering				
12			22EC2ESIEL	Introduction to Electronics Engg				
13			22ME2ESIME	Introduction to Mechanical Engg.				
14	5	PLC	22CS2ESPYP	Introduction to PYTHON Programing	2	0	2	3
15	6	AEC2	22ME2AEIDT	Innovation and Design Thinking	1	0	0	1
16	7	HSMC	22MA2HSBAK	Balake Kannada	1	0	0	1
17			22MA2HSSAK	Samskrutika Kannada	1	0	0	1
18	8	AEC2	22MA2AEPWE	Professional Writing Skills in English	1	0	0	1
Total					20			

L-Lecture (1 credit=1 contact hr.); T-Tutorial (1 credit=2 contact hrs.);
P-Practical (1 credit=2 contact hrs.);

ASC1 - Applied Science Course	PLC - Programming Language Course
ASC2 - Applied Science Course	HSMC--> Humanities
ESC2 - Engineering Science Course	SDC- Skill Development Course
ESC2-II - Engineering Science Course-2	AEC- Ability Enhancement



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

Scheme of Instruction for Second Semester B.E.

2023-2024(CHEMISTRY CYCLE)

	Sl. No.	Course Type	COURSE CODE	Course Title	L	T	P	Total credits
1	1	ASC1	22MA2BSMCS	Mathematical foundation for Computer Science Stream- 2	2	1	1	4
2			22MA2BSMCV	Mathematical foundation for Civil Engineering - 2				
3			22MA2BSMES	Mathematical foundation for Electrical Stream- 2				
4	2	ASC2	22CY2BSCCS	Applied Chemistry for CSE Cluster	3	0	2	4
5			22CY2BSCCV	Applied Chemistry for Civil Cluster				
6			22CY2BSCEE	Applied Chemistry for Electrical Cluster				
7	3	ESC2	22ME2ESCED	Computer Aided Engineering Drawing	1	0	4	3
8	4	ESC2-II	22CV2ESICV	Introduction to Civil Engineering	3	0	0	3
9			22ME2ESIME	Introduction to Mechanical Engineering				
10			22EC2ESIEL	Introduction to Electronics Engineering				
11			22EE2ESIEE	Introduction to Electrical Engineering				
12	5	ETC	22CV2ESGBT	Green Buildings	3	0	0	3
13			22ME2ETISE	Introduction to Sustainable Engineering				
14			22EE2ESRES	Renewable Energy Sources				
15			22CV2ESWMT	Waste Management				
16			23CY1ETNST	Nanoscience And Technology				
17	6	HSMC	22MA2HSCIP	Constitution of India & Professional Ethics	1	0	0	1
18	7	SDC	22BT2AESFH	Scientific Foundations for Health	1	0	0	1
19	8	AEC2	22MA2AEPWE	Professional Writing Skills in English	1	0	0	1
Total					20			

L-Lecture (1 credit=1 contact hr.);		T-Tutorial (1 credit=2 contact hrs.);	
P-Practical (1 credit=2 contact hrs.);			
ASC1 - Applied Science Course		ETC - Emerging Technology Course	
ASC2 - Applied Science Course		HSMC--> Humanities	
ESC2 - Engineering Science Course		SDC- Skill Development Course	
ESC2-II - Engineering Science Course-1		AEC- Ability Enhancement	



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

Course Code :	23MA1BSCEM	Course Title:	Mathematical Foundation for Civil, Electrical and Mechanical Engineering stream– 1 (CV, EEE, ETE, ECE, MD, EIE , ME, IEM, AS,CH)
Credits:	4	L – T – P	3-1-0

Course objectives:

The objectives of the course are to facilitate the learners to

- **Appreciate** the importance of Calculus and Matrix theory in Engineering.
- **Gain the knowledge** of Calculus and Matrix theory concepts to implement them in their core domain.

Improve their **mathematical thinking** and **acquire skills** required for sustained lifelong learning.

Teaching-Learning Process (General Instructions)

These are sample strategies which teachers can use to accelerate the attainment of the various course outcomes.

- Lecture method(L) does not mean only traditional method, but different type of teaching methods may be adopted to develop the outcomes.
- Show Video/animation films to explain functioning of various concepts.
- Encourage collaborative (Group Learning) learning in the class.
- Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
- Topics will be introduced in a multiple representation and encourage the students to come up with their own creative ways to solve them.

Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the students' understanding.

UNIT-1

[09 hours]

Calculus of One Variable:

Introduction to polar coordinates, polar curves, angle between the radius vector and tangent, angle between two curves. Pedal equations.

Curvature and Radius of curvature – Cartesian, Parametric, Polar forms.

Self-study: Center and circle of curvature, evolutes and involutes.



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

UNIT-2	[10 hours]
Multivariable Calculus Partial differentiation, total derivative - differentiation of composite functions, Jacobian, Taylor's and Maclaurin's series expansion for two variables (statement only) – problems. Applications: Errors and approximations, Maxima and minima for a function of two variables. Self-study: Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint. (RBT Levels: L1, L2 and L3)	
UNIT-3	[09 hours]
Ordinary Differential Equations of First Order Introduction to first order ordinary differential equations. 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: Mixing problem, Orthogonal trajectories. Self-Study: Nonlinear differential equations - Introduction to general and singular solutions, solvable for p, for x and y. Clairaut's equations. (RBT Levels: L1, L2 and L3)	
UNIT-4	[10 hours]
Ordinary Differential Equations of Higher Order Higher-order linear ordinary differential equations with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations. Applications: L-R-C series circuits Self-Study: Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients. (RBT Levels: L1, L2 and L3)	
UNIT-5	[10 hours]
Matrices and System of equations Elementary row transformation of a matrix, 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. (RBT Levels: L1, L2 and L3)	



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

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
23MA1BSCHEM	CO 1	Apply the concepts of Calculus and Matrix theory in solving problems.	1	3
	CO 2	Relate the importance of Calculus and Matrix theory concepts to Engineering.	1	1
	CO 3	Demonstrate the understanding of Calculus and Matrix theory concepts through programming skills using modern tool.	1,5	2

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2	1											
CO3	2				2							

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	20	20	10	50	20	50
	Test 1	40	80	40			
	Test 2	40					
CIE				50		20	
SEE	End Exam			100		30	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 1, 3, 5 and two questions each from Unit 2 and Unit 4.



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

Suggested Learning Resources:

Text Books

1	B. S. Grewal: “Higher Engineering Mathematics”, Khanna publishers, 44 th Ed., 2021.
2	E. Kreyszig: “Advanced Engineering Mathematics”, John Wiley & Sons, 10 th Ed., 2018.
3	D. C. Lay: “Linear Algebra and its Applications”, Pearson Publishers, 4 th Ed., 2018.

Reference Books

1	V. Ramana: “Higher Engineering Mathematics”, McGraw-Hill Education, 11 th Ed., 2017
2	S. Pal and S. C. Bhunia: “Engineering Mathematics”, Oxford University Press, 3 rd Ed., 2016.
3	N. P. Bali and M. Goyal: “A textbook of Engineering Mathematics”, Laxmi Publications, 10 th Ed., 2022.
4	C. R. Wylie, L. C. Barrett: “Advanced Engineering Mathematics”, McGraw – Hill Book Co., New York, 6 th Ed., 2017.
5	C. B. Gupta, S. R. Sing and M. Kumar: “Engineering Mathematic for Semester I and II”, Mc-Graw Hill Education (India) Pvt. Ltd, 2015.
6	H. K. Dass and Er. R. Verma: “Higher Engineering Mathematics”, S. Chand Publication, 3 rd Ed., 2014.
7	J. Stewart: “Calculus”, Cengage Publications, 7 th Ed., 2019.
8	G. Williams: “Linear Algebra with applications”, Jones Bartlett Publishers Inc., 6 th Ed., 2017.

Web links and Video Lectures (e-Resources):

1	Calculus of one and multivariable: https://nptel.ac.in/courses/111104092
2	Differential Equations: https://www.classcentral.com/course/differential-equations-engineers-13258 and https://nptel.ac.in/courses/111106100
3	Matrices and System of Equations: https://www.classcentral.com/course/matrix-algebra-engineers-11986 and https://nptel.ac.in/courses/111106051
4	Python: https://spokentutorial.org/tutorialsearch/?search_foss=Python%203.4.3&search_language=English&page=1



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

Course Code :	23MA1BSMCS	Course Title:	Mathematical foundation for Computer Science stream -1 (CS, IS, ML, DS, IOT, CSB, Computer and Management, BT)
Credits:	4	L – T – P	3-1-0

Course objectives:

- **Appreciate** the importance of Calculus, Congruences and Matrix theory in computer and allied engineering science.
- **Gain the knowledge** of Calculus, Congruences and Matrix theory concepts to implement them in their core domain.

Improve their **mathematical thinking** and **acquire skills** required for sustained lifelong learning.

Teaching-Learning Process (General Instructions)

These are sample strategies which teachers can use to accelerate the attainment of the various course outcomes.

- Lecture method (L) does not mean only traditional method, but different type of teaching methods may be adopted to develop the outcomes.
- Show Video/animation films to explain functioning of various concepts.
- Encourage collaborative (Group Learning) Learning in the class.
- Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
- Topics will be introduced in a multiple representation and encourage the students to come up with their own creative ways to solve them.

Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the students' understanding.

UNIT-1

[09 hours]

Calculus of One Variable:

Introduction to polar coordinates, polar curves, angle between the radius vector and tangent, angle between two curves. Pedal equations.

Curvature and Radius of curvature - Cartesian, Parametric, Polar forms.

Self-study: Center and circle of curvature, evolutes and involutes.

(RBT Levels: L1, L2 and L3)



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

UNIT-2	[10 hours]
Multivariable Calculus Partial differentiation, total derivative - 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, Gradient descent method. Self-study: Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint. (RBT Levels: L1, L2 and L3)	
UNIT-3	[09 hours]
Ordinary Differential Equations (ODEs) of First Order Introduction to first order ordinary differential equations. 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: Growth and decay, Orthogonal trajectories. Self-Study: Nonlinear differential equations - Introduction to general and singular solutions, solvable for p, for x and y. Clairaut's equations. (RBT Levels: L1, L2 and L3)	
UNIT-4	[10 hours]
Congruences and its applications Introduction to Congruences, Linear Congruences, The Chinese Remainder theorem, Solving Polynomials, Linear Diophantine Equation, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Application: RSA algorithm. Self-Study: Divisibility, GCD, Properties of Prime Numbers, Fundamental theorem of Arithmetic. (RBT Levels: L1, L2 and L3)	
UNIT-5	[10 hours]
Matrices and System of equations Elementary row transformation of a matrix, 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. (RBT Levels: L1, L2 and L3).	



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

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
23MA1BSMCS	CO 1	Apply the concepts of Calculus, Congruences and Matrix theory in solving problems.	1	3
	CO 2	Relate the importance of Calculus, Congruences and Matrix theory in computer science stream.	1	1
	CO 3	Demonstrate the understanding of Calculus, Congruences and Matrix theory through programming skills using modern tool.	1,5	2

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2	1											
CO3	2				2							

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	20	20	10 40	50	20	50
	Test 1	40	80				
	Test 2	40					
CIE				50		20	
SEE	End Exam			100		30	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 1, 3, 5 and two questions each from Unit 2 and Unit 4.



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

Suggested Learning Resources:

Text Books

1	B. S. Grewal: “Higher Engineering Mathematics”, Khanna publishers, 44th Ed., 2021.
2	E. Kreyszig: “Advanced Engineering Mathematics”, John Wiley & Sons, 10th Ed., 2018.
3	D. C. Lay: “Linear Algebra and its Applications”, Pearson Publishers, 4th Ed., 2018.
4	T. Koshy: “Elementary number theory with applications”, Elsevier Science, 2 nd Ed., 2007.

Reference Books

1	B. V. Ramana: “Higher Engineering Mathematics” McGraw-Hill Education, 11 th Ed., 2017
2	S. Pal and S. C. Bhunia: “Engineering Mathematics” Oxford University Press, 3 rd Ed., 2016.
3	N. P. Bali and M. Goyal: “A textbook of Engineering Mathematics” Laxmi Publications, 10 th Ed., 2022.
4	C. R. Wylie, L. C. Barrett: “Advanced Engineering Mathematics” McGraw – Hill Book Co., Newyork, 6 th Ed., 2017.
5	C. B. Gupta, S. R. Sing S. R. and M. Kumar: “Engineering Mathematic for Semester I and II”, Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6	H. K. Dass and Er. Rajnish Verma: “Higher Engineering Mathematics” S. Chand Publication, 3 rd Ed., 2014.
7	J. Stewart: “Calculus” Cengage Publications, 7 th Ed., 2019.
8	G. Williams: “Linear Algebra with applications”, Jones Bartlett Publishers Inc., 6 th Ed., 2017.
9	W. Stallings: “Cryptography and Network Security” Pearson Prentice Hall, 6 th Ed., 2013

Web links and Video Lectures (e-Resources):

1	Calculus of one and multivariable: https://nptel.ac.in/courses/111104092
2	Differential Equations: https://www.classcentral.com/course/differential-equations-engineers-13258
3	Congruences and its applications: https://www.classcentral.com/course/youtube-math-455-number-theory-90833/classroom and https://nptel.ac.in/courses/111101137
4	Matrices and System of Equations: https://www.classcentral.com/course/matrix-algebra-engineers-11986 and https://nptel.ac.in/courses/111106051
5	Python: https://spokentutorial.org/tutorialsearch/?search_foss=Python%203.4.3&search_language=English&page=1



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

Course Code	22PH1BSPCV/22PH2BSPCV	Course Title:	Applied Physics for Civil Cluster
Credits:	4	L – T – P	3-0-2

Course objectives:

- To understand the essentials of LASERs and optical fibers for engineering applications
- To understand the types of oscillation and applications
- To understand the material characterization techniques
- To understand the elastic properties of materials
- To understand the natural hazards and its safety measures

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

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

UNIT-1
LASERS AND OPTICAL FIBERS

[8 hours]

LASERs: Introduction, characteristics of LASERs, interaction of radiation with matter, expression for energy density of a system under thermal equilibrium in terms of Einstein's coefficients, conditions for LASER action using Einstein's coefficients, basic requisites of a LASER system, construction and working of semiconductor diode LASER. Applications of LASERs: LASER Range Finder, LIDAR – Detection of pollutants in the atmosphere. Problems.

Optical Fibers: Introduction, principle of propagation in optical fibers. Angle of acceptance, expression for numerical aperture and condition for propagation. Number of modes: V-number. Classification of optical fibers. Attenuation - causes of attenuation, Applications of optical fibers: fiber optic displacement sensor and fiber optic temperature sensor. Problems.



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

Practical Topics:

1. Wavelength of LASER source
2. Divergence of LASER beam
3. Numerical aperture of an optical fiber

Self-study: Basics of LASERs and optical fibers

UNIT-2
OSCILLATIONS AND RESONANCE

[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.

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

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

Practical Topics:

1. LCR circuits
2. Spring constant

Self-study: Basics of Simple Harmonic Motion

UNIT-3
MATERIAL CHARACTERIZATION AND INSTRUMENTATION TECHNIQUES

[8 hours]

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. Problems.

Bragg's law, X-ray diffractometer, powder diffraction methods of structure determination, crystallite size determination by Scherrer equation. Principle, construction, working and applications of X-ray photoelectron spectroscopy (XPS). Problems.

Practical Topics: X-ray film analysis

Self-study: Basics of crystal systems



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

UNIT-4 ELASTICITY	[8 hours]
<p>Stress, strain and their types. Hooke's law. Stress-strain diagram. Young's Modulus(Y), bulk modulus (K) and rigidity modulus (n). Poisson's ratio (σ). Equivalence of shear to compression and extension. Equivalence of shearing stress to a compressive stress and a tensile stress. Work done per unit volume in a strain. Relation between Y, K, n and σ. Torsion of a cylinder - expression for twisting couple per unit twist.</p> <p>Beams: Bending moment – expression for bending moment.</p> <p>Cantilever- Cantilever loaded at free end. Problems.</p> <p>Practical Topics:</p> <ol style="list-style-type: none">1. Young's modulus by single cantilever2. Rigidity modulus of a given wire by Torsional pendulum <p>Self-study: Basics of elasticity</p>	

UNIT-5 NATURAL HAZARDS AND SAFETY	[8 hours]
<p>Introduction, Earthquake - general characteristics, Physics of earthquake, Richter scale of measurement and earthquake resistant measures. Tsunami - causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami. Landslide - causes such as excess rainfall, geological structure change, human excavation etc. Types of landslide, adverse effects, and engineering solution for landslides. Forest Fires and detection using remote sensing. Fire hazards and fire protection, fire-proofing materials, fire safety regulations and firefighting equipment - Prevention and safety measures. Problems.</p> <p>Self-study: Richter scale</p>	



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

Laboratory component: Any ten experiments have to be completed from the following list of experiments

No.	Name of the experiment
1	Wavelength of LASER by diffraction
2	Divergence angle of a LASER
3	Numerical aperture of an optical fiber
4	Series LCR circuits
5	Parallel LCR circuits
6	X-ray film analysis
7	Spring constant
8	Young's modulus by single cantilever
9	Rigidity modulus by Torsional pendulum
10	Resistivity by Four Probe method
11	GNU step interactive simulations
12	Study of motion using spread sheet
13	PHET Interactive Simulations (https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

Course outcomes: On completion of the course, the student will have the ability to:

CO1	Understand and Apply the principle of laser and optical fiber, concept of vibrations, crystal structure, various material characterization techniques, elastic properties of materials, natural hazards and its safety measures to obtain the desired parameter.
CO2	Use appropriate Tools to develop the concept of physics, perform as a member of team to build a model and make an oral presentation
CO3	Conduct, analyze and interpret the data and results from applied physics experiments.



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2										
CO2					1				1	1		
CO3				3								

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max. Marks	Reduced to	Total	Total Marks
CIE – Theory	AAT	10	5	50	50
	Test 1	40	10		
	Test 2	40	10		
CIE-Lab		50	25		
SEE	End Exam	100	50		50
Grand Total Marks					100

Semester End Examination: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one full question each from Unit 3, 4, 5 and two questions each from Unit 1 and Unit 2.
- Unit 1 and Unit 2 consists of either-or questions (choice).



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

Reference Books:

1. A Text book of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
2. An Introduction to Lasers theory and applications by M.N.Avadhanulu and P.S.Hemne revised Edition 2012 . S. Chand and company Ltd -New Delhi.
3. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
4. Vibrations and Waves (MIT introductory Physics Series), A P French, CBS, 2003 Edition
5. Timoshenko, S. and Goodier J.N. “Theory of Elasticity”, 2nd Edition, McGraw Hill Book Co, 2001.
6. Sadhu Singh, “Theory of Elasticity”, Khanna Publishers, 1997.
7. Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
8. Lasers and Non-Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011.
9. LASERS Principles, Types and Applications by K.R. Nambiar-New Age International Publishers.
10. Solid State Physics - S O Pillai, 8th Ed- New Age International Publishers-2018.
11. Characterization of Materials- Mitra P. K. Prentice Hall India Learning Private Limited.
12. An Introduction to Disaster Management, Natural Disaster & Man-Made Hazards, S. Vaidyanathan, IKON Books.
13. Natural Hazards, Edward Bryant, Cambridge University Press, 2nd Edition.
14. Natural hazards, Earthquakes, Volcanoes, and landslides by Ramesh P Singh, and Darius Bartlett, CRC Press, Taylor and Francis group.
15. Principles of Fire Safety Engineering Understanding Fire & Fire Protection, Akhil Kumar Das, PHI Learning, II Edition.
16. Disaster Management, R. Subramanian, S. Chand Publishing, 2018.

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. **Laser:** <https://www.britannica.com/technology/laser>
5. **Laser:** <https://nptel.ac.in/courses/115/102/115102124/>
6. **Numerical aperture of fiber:** <https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement>
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.mypysicslab.com>



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

Course Code	22PH1BSPEE/22PH2BSPEE	Course Title:	Applied Physics for Electrical Cluster
Credits:	4	L – T – P	3-0-2

Course objectives:

- To understand the principles of quantum mechanics
- To understand the essentials of LASERs and optical fibers for engineering applications
- To understand the electrical and dielectric properties of materials
- To understand the concepts of semiconductors and devices
- To understand the magnetic and superconducting properties of materials

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

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

UNIT-1
QUANTUM MECHANICS

[8 hours]

Introduction, 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. Problems.

Heisenberg's uncertainty principle- statement and physical significance. Application of uncertainty principle - non-existence of electron in the nucleus. Wave function-properties and physical significance. Probability density and normalization of wave function. Setting up of one-dimensional time independent Schrödinger's wave equation. Application of Schrodinger'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.

Practical Topics: Wavelength of different transparent LEDs/Planck's constant

Self-study: de-Broglie hypothesis



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

UNIT-2 LASERS AND OPTICAL FIBERS	[8 hours]
<p>LASERS: Introduction, characteristics of LASERs, interaction of radiation with matter, expression for energy density of a system under thermal equilibrium in terms of Einstein's coefficients, conditions for LASER action using Einstein's coefficients, basic requisites of a LASER system, construction and working of He-Ne LASER. Applications of LASERs: bar code scanner and LASER printer. Problems.</p> <p>Optical Fibers: Introduction, principle of propagation in optical fibers. Angle of acceptance, expression for numerical aperture and condition for propagation. Number of modes: V-number. Classification of optical fibers. Attenuation - causes of attenuation. Application of optical fibers: Block diagram and discussion of point-point optical communication, advantages and disadvantages. Problems.</p>	
<p>Practical Topics:</p> <ol style="list-style-type: none">1. Wavelength of LASER source2. Divergence of LASER beam3. Numerical aperture of an optical fiber <p>Self-study: Basics of LASERs and optical fibers</p>	

UNIT-3 ELECTRICAL PROPERTIES OF MATERIALS	[8 hours]
<p>Electrical Properties: Review of classical free electron theory, limitations of classical free electron theory. Postulates of quantum free electron theory, Fermi energy, Fermi velocity, Fermi temperature. Fermi factor and its dependence on energy and temperature. Electrical conductivity (qualitative expression using effective mass and Fermi velocity). Merits of quantum free electron theory. Problems.</p> <p>Dielectric Materials: Introduction, polarization, expression for 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 dielectric materials. Problems.</p>	
<p>Practical Topics:</p> <ol style="list-style-type: none">1. Fermi energy of copper2. Dielectric constant <p>Self-study: Classical free electron theory and basics of dielectrics</p>	



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

UNIT-4 SEMICONDUCTORS AND DEVICES	[8 hours]
<p>Semiconductors: Introduction, expression for concentration of electrons in conduction band, expression for hole-concentration in valance band (qualitative). Expression for intrinsic carrier concentration, expression for Fermi level in intrinsic semiconductors, Fermi level in semiconductors, expression for conductivity of semiconductors. Hall effect, expressions for Hall voltage and Hall coefficient. Problems.</p> <p>Devices: Photodiode and power responsivity, construction and working of semiconducting diode LASER, four probe method to determine resistivity. Problems.</p>	
<p>Practical Topics:</p> <ol style="list-style-type: none">1. Energy band gap of a semiconductor by four probes method2. V-I characteristics of a photodiode <p>Self-study: Basics of Semiconductors</p>	

UNIT-5 MAGNETIC AND SUPERCONDUCTING PROPERTIES OF MATERIALS	[8 hours]
<p>Magnetic Properties of Materials: Classification of magnetic materials. Ferromagnetic materials – Weiss’s domain theory. Hysteresis in ferromagnetic materials. Explanation of hysteresis using domain theory. Soft and hard magnetic materials – characteristic features and applications. Ferrites – features and applications. Problems.</p> <p>Superconductivity: Introduction to Superconductors, Temperature dependence of resistivity, Meissner effect, critical current, types of superconductors, temperature dependence of critical field, BCS theory (Qualitative), high temperature superconductivity. Application of superconductors: MAGLEV vehicle. Problems.</p>	
<p>Practical Topics: B-H curve</p> <p>Self-study: Basics of magnetism and superconductivity</p>	



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

Laboratory component: **Any ten experiments have to be completed from the following list of experiments**

No.	Name of the experiment
1	Wavelength of LEDs/Planck's constant
2	Wavelength of LASER by diffraction
3	Divergence angle of a LASER
4	Numerical aperture of an optical fiber
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	B-H curve
11	Black box
12	Attenuation coefficient of OFC
13	GNU step interactive simulations
14	Study of motion using spread sheet
15	PHET Interactive Simulations (https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

Course outcomes: On completion of the course, the student will have the ability to:

CO1	Understand and Apply the principles of quantum mechanics, transport phenomena in metals, dielectrics and semiconductor materials, superconducting and magnetic properties of solids, construction and working principle of laser and optical fiber to obtain desired parameter.
CO2	Use appropriate Tools to develop the concept of physics, perform as a member of team to build a model and make an oral presentation.
CO3	Conduct, analyze and interpret the data and results from applied physics experiments.



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2										
CO2					1				1	1		
CO3				3								

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Component	Type of assessment	Max. Marks	Reduced to	Total	Total Marks
CIE – Theory	AAT	10	5	50	50
	Test 1	40	10		
	Test 2	40	10		
CIE-Lab		50	25		
SEE	End Exam	100	50		50
Grand Total Marks					100

Scheme of Evaluation:

Semester End Examination: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one full question each from Unit 3, 4, 5 and two questions each from Unit 1 and Unit 2.
- Unit 1 and Unit 2 consists of either-or questions (choice).



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

Reference Books:

1. A Text book of Engineering Physics - M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
2. An Introduction to Lasers theory and applications by M.N. Avadhanulu and P.S. Hemne revised Edition 2012. S. Chand and company Ltd - New Delhi.
3. Engineering Physics - Gaur and Gupta - Dhanpat Rai Publications-2017.
4. Concepts of Modern Physics - Arthur Beiser: 6th Ed; Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006.
5. Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
6. Lasers and Non Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011.
7. LASERS Principles, Types and Applications by K.R. Nambiar - New Age International Publishers.
8. Solid State Physics - S O Pillai, 8th Ed - New Age International Publishers-2018.

Web links and Video Lectures (e-Resources):

1. **Laser:** <https://www.britannica.com/technology/laser>
2. **Laser:** <https://nptel.ac.in/courses/115/102/115102124/>
3. **Quantum mechanics:** <https://nptel.ac.in/courses/115/104/115104096/>
4. **Physics:** <http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>
5. **Numerical aperture of fiber:** <https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement>
6. **Superconductivity:** <https://archive.nptel.ac.in/courses/115/103/115103108/>

Activity-Based Learning /Practical-Based Learning:

1. <http://nptel.ac.in>
2. <https://swayam.gov.in>
3. <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>
4. <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
5. https://virtuallabs.merlot.org/vl_physics.html
6. <https://phet.colorado.edu>
7. <https://www.myphysicslab.com>



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

Course Code	22PH1BSPCS/22PH2BSPCS	Course Title:	Applied Physics for Computer Science Cluster
Credits:	4	L – T – P	3-0-2

Course objectives:

- To understand the essentials of LASERs and optical fibers for engineering applications
- To understand the principles of quantum mechanics
- To understand the electrical and dielectric properties of materials
- To understand the concepts of semiconductor and superconductivity
- To understand the principles of quantum computing

Teaching-Learning Process (General Instructions)

Suggested strategies that teachers may use to effectively achieve the course outcomes:

8. Chalk and Talk
9. Blended Mode of Learning
10. Simulations, Interactive Simulations and Animations
11. NPTEL and Other Videos for theory topics
12. Smart Class Room
13. Flipped Class
14. Lab Experiment Videos

UNIT-1
LASERS AND OPTICAL FIBERS

[8 hours]

LASERs: Introduction, characteristics of LASERs, interaction of radiation with matter, expression for energy density of a system under thermal equilibrium in terms of Einstein's coefficients, conditions for LASER action using Einstein's coefficients, basic requisites of a LASER system, construction and working of semiconductor diode LASER. Applications of LASERs: Bar Code Scanner and LASER Printer. Problems.

Optical Fibers: Introduction, principle of propagation in optical fibers. Angle of acceptance, expression for numerical aperture and condition for propagation. Number of modes: V-number. Classification of optical fibers. Attenuation-causes of attenuation. Applications of optical fibers: Block diagram and discussion of point-point optical communication, advantages and disadvantages. Problems.

Practical Topics:

1. Wavelength of LASER source
2. Divergence of LASER beam
3. Numerical aperture of an optical fiber

Self-study: Basics of LASERs and optical fibers



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

UNIT-2 QUANTUM MECHANICS	[8 hours]
<p>Introduction, 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. Problems.</p> <p>Heisenberg’s uncertainty principle- statement and physical significance. Application of uncertainty principle – non-existence of electron in the nucleus. Wave function-properties and physical significance. Probability density and normalization of wave function. Setting up of one-dimensional time independent Schrödinger’s wave equation. Application of Schrodinger’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.</p>	
<p>Practical Topics: Wavelength of different transparent LEDs/Planck’s constant</p> <p>Self-study: de-Broglie hypothesis</p>	

UNIT-3 ELECTRICAL PROPERTIES OF MATERIALS	[8 hours]
<p>Electrical Properties: Review of classical free electron theory, limitations of classical free electron theory. Postulates of quantum free electron theory, Fermi energy, Fermi velocity, Fermi temperature. Fermi factor and its dependence on energy and temperature. Electrical conductivity (qualitative expression using effective mass and Fermi velocity). Merits of quantum free electron theory. Problems.</p> <p>Dielectric Materials: Introduction, polarization, expression for 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 dielectric materials. Problems.</p>	
<p>Practical Topics:</p> <ol style="list-style-type: none">3. Fermi energy of copper4. Dielectric constant <p>Self-study: Classical free electron theory and basics of dielectrics</p>	



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

UNIT-4 SEMICONDUCTORS AND SUPERCONDUCTIVITY	[8 hours]
<p>Semiconductors: Introduction, expression for concentration of electrons in conduction band, expression for hole-concentration in valance band (qualitative). Expression for intrinsic carrier concentration, expression for Fermi level in intrinsic semiconductors, Fermi level in semiconductors, expression for conductivity of semiconductors. Hall effect, expressions for Hall voltage and Hall coefficient. Problems.</p> <p>Superconductivity: Introduction to superconductors, temperature dependence of resistivity, Meissner effect, critical current, types of superconductors, temperature dependence of critical field, BCS theory (Qualitative), high temperature superconductivity. Application of superconductors: MAGLEV vehicle. Problems.</p>	
<p>Practical Topics: Energy band gap of a semiconductor by four probe method</p> <p>Self-study: Basics of semiconductors and superconductivity</p>	

UNIT-5 QUANTUM COMPUTING	[8 hours]
<p>Principles of Quantum Information & Quantum Computing: Introduction to quantum computing, Moore's law & its end. Single particle quantum interference, classical and quantum information comparison. Differences between classical and quantum computing, quantum superposition.</p> <p>Concept of Qubit and its properties.</p> <p>Wave Function in Ket Notation: Matrix form of wave function, Identity operator, Determination of $0\rangle$ and $1\rangle$, Pauli Matrices and its operations on 0 and 1 states, Mention of Conjugate and Transpose, Unitary Matrix U, Examples: 2x2 Matrices and their multiplication (Inner Product), Probability, Orthogonality.</p> <p>Quantum Gates: Single Qubit Gates: Quantum Not Gate, Pauli Z Gate, Hadamard Gate, Phase Gate (or S Gate), T Gate.</p> <p>Multiple Qubit Gates: Controlled gate - CNOT Gate, (Discussion for 4 different input states). Representation of Swap gate, Controlled - Z gate, Toffoli gate. Problems.</p>	
<p>Self-Study: Moore's law</p>	



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

Laboratory component: **Any ten experiments have to be completed from the following list of experiments**

No.	Name of the experiment
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)

Course outcomes: On completion of the course, the student will have the ability to:

CO1	Understand and Apply the principles of quantum mechanics, quantum computing, transport phenomena in metals, properties of dielectric, semiconducting and superconducting materials, construction and working principle of laser and optical fibers to obtain the desired parameter.
CO2	Use appropriate Tools to develop the concept of physics, perform as a member of team to build a model and make an oral presentation.
CO3	Conduct, analyze and interpret the data and results from applied physics experiments.



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2										
CO2					1				1	1		
CO3				3								

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Component	Type of assessment	Max. Marks	Reduced to	Total	Total Marks
CIE – Theory	AAT	10	5	50	50
	Test 1	40	10		
	Test 2	40	10		
CIE-Lab		50	25		
SEE	End Exam	100	50		50
Grand Total Marks					100

Scheme of Evaluation:

Semester End Examination: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one full question each from Unit 3, 4, 5 and two questions each from Unit 1 and Unit 2.
- Unit 1 and Unit 2 consists of either-or questions (choice).



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

Reference Books:

1. Solid State Physics, S O Pillai, New Age International Private Limited, 8th Edition, 2018.
2. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
3. Concepts of Modern Physics, Arthur Beiser, McGraw-Hill, 6th Edition, 2009.
4. Lasers and Non-Linear Optics, B B Loud, New age international, 2011 edition.
5. A textbook of Engineering Physics by M. N. Avadhanulu, P. G. Kshirsagar and T. V. S. Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
6. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition.
7. Quantum Computing, Vishal Sahani, McGraw Hill Education, 2007 Edition.
8. Quantum Computation and Logic: How Quantum Computers Have Inspired Logical Investigations, Maria Luisa Dalla Chiara, Roberto Giuntini, Roberto Leporini, Giuseppe Sergioli, Trends in Logic, Volume 48, Springer.
9. Introduction to Superconductivity, Michael Tinkham, McGraw Hill, INC, II Edition.

Web links and Video Lectures (e-Resources):

1. **LASER:** <https://www.youtube.com/watch?v=WgzynecPiyc>
2. **Superconductivity:** <https://www.youtube.com/watch?v=MT5Xl5ppn48>
3. **Optical Fiber:** https://www.youtube.com/watch?v=N_kA8EpCUQo
4. **Quantum Mechanics:** <https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s>
5. **Quantum Computing:** <https://www.youtube.com/watch?v=jHoEjvuPoB8>
6. **NPTEL Superconductivity:** <https://archive.nptel.ac.in/courses/115/103/115103108/>
7. **NPTEL Quantum Computing:** <https://archive.nptel.ac.in/courses/115/101/115101092>
8. **Virtual LAB:** <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>
9. **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>



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

Course Code	22PH1BSPME/22PH2BSPME	Course Title:	Applied Physics for Mechanical Cluster
Credits:	4	L – T – P	3-0-2

Course objectives:

- To understand the essentials of LASERs and optical fibers for engineering applications
- To understand the types of oscillation and applications
- To understand the electrical and thermal properties of materials
- To understand the elastic properties of materials
- To understand the material characterization techniques

Teaching-Learning Process:

Suggested strategies that teachers may use to effectively achieve the course outcomes:

15. Chalk and Talk
16. Blended Mode of Learning
17. Simulations, Interactive Simulations and Animations
18. NPTEL and Other Videos for theory topics
19. Smart Class Room
20. Flipped Class
21. Lab Experiment Videos

UNIT-1
LASERS AND OPTICAL FIBERS

[8 hours]

LASERs: Introduction, characteristics of LASERs, interaction of radiation with matter, expression for energy density of a system under thermal equilibrium in terms of Einstein's coefficients, conditions for LASER action using Einstein's coefficients, basic requisites of a LASER system, construction and working of semiconductor diode LASER. Applications of LASERs in industry: LASER cutting, welding and drilling. Problems.

Optical Fibers: Introduction, principle of propagation in optical fibers. Angle of acceptance, expression for numerical aperture and condition for propagation. Number of modes: V-number. Classification of optical fibers. Attenuation - causes of attenuation. Applications of optical fibers: fiber optic displacement sensor and fiber optic temperature sensor. Problems.

Practical Topics:

1. Wavelength of LASER source
2. Divergence of LASER beam
3. Numerical aperture of an optical fiber

Self-study: Basics of LASERs and optical fibers



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

UNIT-2 OSCILLATIONS AND RESONANCE	[8 hours]
<p>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.</p> <p>Theory of damped vibrations: Resistive forces, equation of motion-expression for decaying amplitude, three cases of damping. Logarithmic decrement, relaxation time and quality factor.</p> <p>Theory of forced vibrations: Equation of motion-expression for amplitude, three cases of forcing, expression for maximum amplitude.</p> <p>Resonance: Phenomenon of resonance. Example of resonance: LCR circuit. Problems.</p>	
<p>Practical Topics:</p> <ol style="list-style-type: none">1. LCR circuits2. Spring constant <p>Self-study: Basics of Simple Harmonic Motion</p>	

UNIT-3 ELECTRICAL AND THERMAL PROPERTIES OF MATERIALS	[8 hours]
<p>Electrical Properties: Review of classical free electron theory, limitations of classical free electron theory. Postulates of quantum free electron theory, Fermi energy, Fermi velocity, Fermi temperature. Fermi factor and its dependence on energy and temperature. Electrical conductivity (qualitative expression using effective mass and Fermi velocity). Merits of quantum free electron theory. Problems.</p> <p>Thermal Properties: 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.</p>	
<p>Practical Topics:</p> <ol style="list-style-type: none">1. Fermi energy of Copper2. Thermal conductivity of a poor conductor by Lee–Charlton’s method3. Thermal conductivity of a good conductor by Forbe’s method <p>Self-study: Classical free electron theory and basics of thermodynamics</p>	



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

UNIT-4 ELASTICITY	[8 hours]
<p>Elasticity – Stress, strain and their types. Hooke’s law. Stress-strain diagram. Young’s Modulus (Y), bulk modulus (K) and rigidity modulus (n). Poisson’s ratio (σ). Equivalence of shear to compression and extension. Equivalence of shearing stress to a compressive stress and a tensile stress. Work done per unit volume in a strain. Relation between Y, K, n and σ. Torsion of a cylinder - Expression for twisting couple per unit twist. Torsional pendulum.</p> <p>Beams: Bending moment – expression for bending moment.</p> <p>Cantilever- Cantilever loaded at free end. Problems</p>	
<p>Practical Topics:</p> <ol style="list-style-type: none">1. Young’s modulus by single cantilever2. Rigidity modulus of a given wire by Torsional pendulum <p>Self-study: Basics of elasticity</p>	

UNIT-5 MATERIAL CHARACTERIZATION AND INSTRUMENTATION TECHNIQUES	[8 hours]
<p>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. Problems.</p> <p>Bragg’s law, Bragg’s diffractometer, powder diffraction methods of structure determination, crystallite size determination by Scherrer equation. Principle, construction, working and applications of X-ray Photoelectron Spectroscopy (XPS). Problems.</p>	
<p>Practical Topics: X-ray film analysis</p> <p>Self-study: Basics of crystal systems</p>	



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

Laboratory component: **Any ten experiments have to be completed from the following list of experiments**

No.	Name of the experiment
1	Wavelength of LASER by diffraction
2	Divergence angle of a LASER
3	Numerical aperture of an optical fiber
4	Series LCR circuits
5	Parallel LCR circuits
6	Fermi energy of copper
7	Thermal conductivity of a good conductor by Forbe's method
8	Thermal conductivity of a poor conductor by Lee Charlton's method
9	Spring constant
10	Young's modulus by single cantilever
11	Rigidity modulus by Torsional pendulum
12	X-ray film analysis
13	GNU step interactive simulations
14	Study of motion using spread sheet
15	PHET Interactive Simulations (https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

Course outcomes: On completion of the course, the student will have the ability to:

CO1	Understand and Apply the principle of laser and optical fiber, concept of vibrations, electrical and thermal transport phenomena in metals, crystal structure, various material characterization techniques and elastic properties of materials to obtain the desired parameter.
CO2	Use appropriate Tools to develop the concept of physics, perform as a member of team to build a model and make an oral presentation.
CO3	Conduct, analyze and interpret the data and results from applied physics experiments.



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2										
CO2					1				1	1		
CO3				3								

Level 3- Highly Mapped, Level 2- Moderately Mapped, Level 1- Low Mapped, Level 0- Not Mapped

Scheme of Evaluation:

Component	Type of assessment	Max. Marks	Reduced to	Total	Total Marks
CIE – Theory	AAT	10	5	50	50
	Test 1	40	10		
	Test 2	40	10		
CIE-Lab		50	25		
SEE	End Exam	100	50		50
Grand Total Marks					100

Semester End Examination: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one full question each from Unit 3, 4, 5 and two questions each from Unit 1 and Unit 2.
- Unit 1 and Unit 2 consists of either-or questions (choice).



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

Reference Books:

1. Vibrations and Waves (MIT introductory Physics Series), A P French, CBS, 2003 Edition.
2. Timoshenko, S. and Goodier J.N. "Theory of Elasticity", 2nd Edition, McGraw Hill Book Co, 2001.
3. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, 1997.
4. Mechanical Properties of Engineered Materials by Wole Soboyejo, CRC Press; 1st edition, 2002.
5. Heat and Thermodynamics (I-Edition) – D. S. Mathur - S. Chand & Company Ltd., New-Delhi, 1991.
6. Characterization of Materials - Mitra P. K. Prentice Hall India Learning Private Limited.
7. A Text book of Engineering Physics - M. N. Avadhanulu and P. G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
8. Engineering Physics - Gaur and Gupta - Dhanpat Rai Publications - 2017.
9. Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
10. Lasers and Non Linear Optics – B. B. Laud, 3rd Ed, New Age International Publishers 2011.
11. Solid State Physics - S O Pillai, 8th Ed- New Age International Publishers - 2018.

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. **Laser:** <https://www.britannica.com/technology/laser>
5. **Laser:** <https://nptel.ac.in/courses/115/102/115102124/>
6. **Numerical aperture of fiber:** <https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement>
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>



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

Course Code :	23EC1ESBEC	Course Title:	Basic Electronics (For ECE and Allied Branches)
Credits:	3	L – T – P	3-0-0

Course objectives:

The objectives of the course are to facilitate the learners to

- **Gain fundamental knowledge** in the field of Electronics and Communication Engineering.
- **Equip** students with a basic foundation in electronic engineering fundamentals required for comprehending the operation and application of electronic circuits, logic design and communication systems.
- **Simulate** the electronic circuits using modern Engineering tools

Teaching-Learning Process (General Instructions):Chalk and talk method / PowerPoint Presentation

UNIT-1

[08 hours]

Semiconductor Diode & Applications:

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 as a Voltage Regulator, Regulated Power Supply.

(RBT Levels: L1, L2, L3 and L4)

UNIT-2

[08 hours]

Bipolar Junction Transistors:

Introduction, BJT Voltages & Currents, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics, BJT Biasing: Introduction, DC Load line and Bias point, Transistor as a Switch,
Feedback: Feedback Principle, Types of feedback: Positive and Negative Feedback, Advantages of negative feedback.

(RBT Levels: L1, L2, L3 and L4)

UNIT-3

[08 hours]

Operational Amplifiers:

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 configurations, Differential Amplifier, Inverting & Non Inverting Amplifier

Op-Amp Applications: Inverting configuration: Summing, scaling, Averaging circuit, Subtractor, Voltage Follower, Integrator and Differentiator

Oscillators: Principle of Oscillations, RC Phase Shift Oscillator, Hartley and Colpitts Oscillator, Crystal Oscillator.

(RBT Levels: L1, L2, L3 and L4)



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

UNIT-4	[08 hours]
<p>Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & Hexadecimal 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</p> <p>Applications: Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder</p> <p>Sequential logic: Introduction, flip-flops- SR, D, T and JK flip-flops</p> <p>(RBT Levels: L1, L2, L3 and L4)</p>	

UNIT-5	[08 hours]
<p>Communication: 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-AM, FM</p> <p>Applications: Introduction to Cellular Communication, Computer Communication Networks.</p> <p>(RBT Levels: L1, L2 and L3)</p>	

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	P O	Strength
22EC1ESBE C	CO 1	Apply the basic principles of Electronics to solve Analog and Digital circuits.	1	3
	CO 2	Analyse the characteristics/performance parameters of Electronic Circuits.	2	1
	CO 3	Design basic Electronic Circuits for given Specifications.	3	1
	CO 4	Simulate the performance of electronic circuits using modern Engineering tools	5	1

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		1										
CO3			1									
CO4					1							



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

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	AAT (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: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from **Units 2, 3, 5** and two questions each from **Unit 1 and Unit 4**.

Suggested Learning Resources:

Text Books

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.

Reference Books

1	Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016
2	Communication Systems, S L Kakani and Priyanka Punglia, New Age International Publisher, 2017. https://elib4u.ipublishcentral.com/pdfreader/communication-systems



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

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
5	https://www.mooc-list.com/course/introduction-electronics-coursera



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

Course Title	Elements of Electrical Engineering	Course Code	22EE1ESEEE
Credits	03	L – T – P (Credits)	2-0-1

Course Objectives:

The objectives of the course are to facilitate the learners to

- To explain the laws used in the analysis of DC circuits
- To explain the construction and operation of transformers, and DC motors.
- To explain the behaviour of circuit elements in single-phase circuits.
- To explain the generation of three-phase power and operation of three-phase circuits.
- To explain the construction and operation of transformers, DC generators and motors, Induction motors, and synchronous generators.
- To explain electricity billing, equipment and personal safety measures.

UNIT - 1

[08 hours]

DC Circuits: Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits, Power and energy, Numerical problems (Numerical problems on KCL and KVL can be solved using Branch current method).

DC motors: Construction and principle of operation, back emf, torque equation, types of dc motors, characteristics of DC motors (shunt and series motors only) and applications, Simple Numerical.

Teaching-Learning Process

Chalk and talk method / Power Point Presentation

DC Motors: Cut -out demo/actual machine models, video for working of machine, Chalk and talk.

UNIT - 2

[08 hours]

AC Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor.

AC Circuits: Analysis of R, L, C, R-L, R-C and R-L-C circuits with phasor diagrams, Real power, reactive power, apparent power, and Power factor, Simple Numerical.

Teaching-Learning Process

Chalk and talk method / Power Point Presentation



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

<u>UNIT - 3</u>		[08 hours]
<p>Three-phase AC circuits: Necessity and advantage of 3-phase system. Generation of 3-phase power. Definition of phase sequence. Relationship between line and phase values of balanced star and delta connections. Power in balanced 3-phase circuits. Simple Numerical.</p>		
Teaching-Learning Process	<p>Three-phase circuits: (i) For a generation of 3-phase voltages, video/animation are used. (ii) Numerical problems can be solved with the chalk and talk method. (iii) Practical Topics: Relation between the line and phase parameter in 3-phase connection both star and delta connections.</p>	
<u>UNIT - 4</u>		[08 hours]
<p>Single Phase Transformers: Construction and principle of operation, emf equation, losses, variation in losses with respect to load, efficiency, condition for maximum efficiency, illustrative examples.</p> <p>Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, constructional features of motor, types - squirrel cage and wound rotor, slip and problems on the slip, significance of slip, applications.</p>		
Teaching-Learning Process	Transformer topic: Cut-out demo /actual machine models and chalk and talk method of teaching, YouTube videos.	
	DC Motors: Cut -out demo/actual machine models, video for working of machine, Chalk and talk.	
<u>UNIT - 5</u>		[08 hours]
<p>Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of “unit” used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.</p> <p>Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.</p> <p>Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB).</p> <p>Introduction to Electric Vehicles: Overview and block diagram approach to Electric Vehicles.</p>		
Teaching-Learning Process	Chalk and talk, Demonstration of functioning of MCB and Fuse.	
	Self-study topic: Safety precautions to avoid shock.	



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

LIST OF EXPERIMENTS	
S. No.	Aim of the Experiment
1	Verification of KCL and KVL for DC circuits.
2	Measurement of Current, Power, and Power Factor of Lighting Loads.
3	Measurement of Current, Power, and Power Factor of Heater Load.
4	Measurement of Resistance and Inductance of a Choke coil using three voltmeter method.
5	Measurement of Resistance and Inductance of a Choke coil using A-V-W method.
6	Determination of Phase and Line quantities in three-phase star connected load.
7	Determination of Phase and Line quantities in three-phase delta connected load.
8	Determination of efficiency of a single-phase transformer by direct load test.
9	Speed Vs Torque characteristics of shunt Motor
10	Speed Vs Torque characteristics of series Motor

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22EE1ESEEE	CO1	Understand the fundamental concepts of DC, AC circuits, electrical machines and electric vehicles	1	1
	CO2	Apply the basic electrical laws to solve circuits.	1	2
	CO3	Analyse the behaviour of electric circuits, electrical machines and.	2	3
	CO4	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.	6	2
	CO5	Conduct the experiments and study the performance of electrical machines, AC and DC circuits	9	1
	CO6	Ability to engage in individual/team work to make effective technical presentation on electrical concepts and communicate effectively to the audience	10	1



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

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks	
CIE – Theory	Quiz/AAT	20	20	25	25	10	50	
	Test 1	40	80					
	Test 2	40	(Best 2 of 3 tests)					
	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:

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 2, 3, 5 and two questions each from Unit 1 and Unit 4.

Suggested Learning Resources:

Text Books

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.
3. Basic Electrical Engineering by B Venkatesh, Madhura S, Divya. S and Chaitanya L, InSc Publishers, 2021

Reference Books

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014.

Web links and Video Lectures (e-Resources):

1. www.nptel.ac.in
2. <http://nptel.ac.in/courses/108105053/>
3. <http://nptel.ac.in/courses/108108076/>



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

Course Code :	23CV1ESEN/23CV2ESEN	Course Title:	Engineering Mechanics
Credits:	03	L – T – P	2-1-0

Course objectives:

- To develop students' ability to analyse the problems involving forces, moments with their applications.
- To analyse the member forces in trusses.
- To make students to learn the effect of friction on different planes
- To develop the student's ability to find out the centre of gravity and moment of inertia and their applications.
- To make the students learn about kinematics and kinetics and their applications.

Teaching-Learning Process (General Instructions)

Lecture method (L) shall not only be limited to traditional methods but with different types of teaching methods such as PowerPoint presentation, Video/animation film presentations to effectively explain on different concepts.

Encourage interactive and collaborative (Group Learning) learning in the class.

Topics shall be introduced in multiple representations and discuss how the concepts can be related to and applied to the real world to improve students' understanding.

Asking and solving for HOT (Higher order Thinking) questions frequently in the class, which promotes critical thinking.

Discussion on different ways to solve the same problem/question (if applicable) and encourage the students to adopt and develop their own creative ways to solve the same in correct manner.

UNIT-1

[8 hours]

System of forces: Resultant of coplanar concurrent and non-concurrent forces

Resultant of coplanar force system: Basic dimensions and units, Idealisations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system- Numerical examples



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

UNIT-2	[10 hours]
System of forces: Equilibrium concepts, Support reactions and Truss analysis Equilibrium of coplanar force system: Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples. Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections- Numerical examples.	
UNIT-3	[8 hours]
Friction Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction - Numerical examples.	
UNIT-4	[10 hours]
Centroid and Moment of Inertia Centroid of Plane areas: Introduction, Locating the centroid of 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. Moment of inertia of plane areas: Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections- Numerical examples.	
UNIT-5	[8 hours]
Kinematics Kinematics: Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion Projectiles: Introduction, numerical examples on projectiles. Kinetics: Introduction, D 'Alembert's principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys- Numerical examples.	

Course outcomes (Course Skills Set)



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

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
23CV1ESEN/23CV2ESEN	CO 1	Apply the concepts of statics for the analysis of coplanar force systems.	PO1, PO2	3
	CO 2	Apply the principles of static equilibrium for solving problems involving friction.	PO1, PO2	2
	CO 3	Locate centroid and evaluate second moment of area of plane composite and built-up areas.	PO1, PO2	3
	CO 4	Apply the concepts of dynamics to solve problems related to kinematics and kinetics of particles.	PO1, PO2	2

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3										
CO2	2	2										
CO3	3	3										
CO4	2	2										

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	20	20	10	50	20	50
	Test 1	40	80	20			
	Test 2	40		20			
	Test 3						
CIE – Lab	Record & Performance						50
	Lab Test						
CIE				50		20	
SEE	End Exam			100		35	50
Grand Total Marks							100

Semester End Examination: (OP PATTERN)

* Answer five full questions selecting one from each unit.



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

* To set one question each from Unit 1, 3 and 5 and two questions each from Unit 2 & 4

Suggested Learning Resources:

Text Books

1	Bhavikatti S S, Engineering Mechanics, 2019, New Age International
2	Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2018, EBPB
3	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.

Reference Books

1	Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2	Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3	Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication
4	Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
5	Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.

Web links and Video Lectures (e-Resources):

1	NPTEL: Engineering Mechanics https://archive.nptel.ac.in/courses/112/106/112106286/
2	https://www.iitg.ac.in/rkbc/me101/Presentation/L16-18.pdf



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

Course Code :	22CS1ESPOP/22CS2ESPOP	Course Title:	PRINCIPLES OF PROGRAMMING IN C
Credits:	03	L – T – P	2-0-1

<u>Course Objectives</u>	
The objectives of the course are to facilitate the learners to:	
<ul style="list-style-type: none"> • Gain the knowledge of the basic principles of Problem solving. • Learn how to use C programming language to specify data and operations on data. • Understand and explore systematic techniques and approaches for constructing C programs. 	
<u>UNIT - 1</u>	[05 hours]
Introduction to C	
Basic Organization of a Computer, Types of Programming Languages, Program Design Tools, 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.	
(RBT Levels: L1, L2 and L3)	
Teaching-Learning Process	Chalk and talk method / Power Point Presentation
<u>UNIT - 2</u>	[05 hours]
Decision Control and Looping Statements	
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.	
(RBT Levels: L1, L2 and L3)	
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation
<u>UNIT - 3</u>	[05 hours]
Functions: Introduction, Using Functions, Components of Functions (Function Declaration, Function Definition, Function Call), Passing Parameters to Functions, Example Programs.	
Arrays: Introduction, Declaration of Arrays, Accessing the elements of an Array, Storing values in Arrays, Operations on Arrays (Insertion, Deletion, Searching), Two-Dimensional Arrays, Transpose of a Matrix, Example Programs.	
(RBT Levels: L1, L2 and L3)	
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation
<u>UNIT - 4</u>	[05 hours]
Strings: Introduction, Operations on Strings (Length of a String, Converting Lowercase to Uppercase and Vice Versa, String Concatenation, String Comparison), Example Programs.	
Structures: Introduction, Arrays of Structures, Nested Structures, Example Programs.	
(RBT Levels: L1, L2 and L3)	
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation
<u>UNIT - 5</u>	[05 hours]



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

Pointers: Introduction to Pointers, Declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Passing Arguments to Functions using Pointers, Example Programs.

Files: Introduction to Files, Using Files in C, Read Data from Files, Writing Data to Files, Example Programs.

(RBT Levels: L1, L2 and L3)

Teaching-Learning Process

Chalk and talk method / PowerPoint Presentation

List of Lab Programs

Weekly: 1 Session (2 hours)

Batch Strength: 15 Students

Number of Labs: 12 (11 Sessions + 1 Lab Assessment)

Suggested Software: Code Blocks (Open Source)

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 find all possible roots of a quadratic equation.
4. Develop a C program to print the sum of even numbers from M to N.
5. Develop a C program to sum the series $1+1/2+1/3+ \dots 1/N$.
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 find the Transpose of a Matrix.
3. Write functions to implement String operations such as concatenation and String length without using built-in functions.
4. Parameter Passing techniques: Call by Value and Call by reference (**Virtual Lab link:** <https://cse02-iiith.vlabs.ac.in/exp/pointers/>)
5. Structures (**Virtual Lab link:** <https://cse02-iiith.vlabs.ac.in/exp/structures/>)
6. Demonstrate how to read data from the keyboard, write it to a file called BMSCE, again read the same data from the BMSCE file, and display it on the screen/console.

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.



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

121
12321
1234321

4. Develop a C program to find the factorial of a number using functions.
5. Develop a C Program to read a matrix and print the diagonal elements.
6. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
7. Develop a C Program to Count the Number of Vowels, Consonants, digits, and special characters in a string.
8. 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. (Consider Employee DOB as a nested structure).

Course Outcomes

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

Course Code		COURSE OUTCOMES (COs)	POs	Strength
22CS1ESPOP	CO1	Understand the basic concepts of computer programming, including variables, data types, and dynamics of memory.	-	-
	CO2	Write, compile and debug programs in the C programming language using proper syntax and conventions.	1,2	2
	CO3	Design simple programs involving decision structures, loops, functions, arrays, structures, pointers and files.	1,2,3	2

Assessment Details

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Online Course Certification + Quiz	20	20	5	25	10	50
	Test 1	40	80	20			
	Test 2	40					
CIE – Lab	Lab Test	20	20	20	25	10	
	Record & Performance	5	5	5			
CIE				50	20		
SEE		100		50	35		50
Grand Total Marks						40	100



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

Two 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

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 1, 4, 5 and two questions each from Unit 2 and Unit 3.

Suggested Learning Resources

Text Book

1. **Reema Thareja**, "Computer Fundamentals and Programming in C", 2nd Edition, Oxford Higher Education, 2016.

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.

Web links and Video Lectures (e-Resources)

4. **Introduction to Programming in C** [https://onlinecourses.nptel.ac.in/noc23_cs02/preview]
5. **C for Everyone: Programming Fundamentals** [<https://www.coursera.org/learn/c-for-everyone>]
6. **Computer Programming Virtual Lab** [<https://cse02-iiith.vlabs.ac.in/exp/pointers/>]
7. **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>]
8. **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>]



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

Course Code :	22ME1ESEME/22ME2ESEME	Course Title:	ELEMENTS OF MECHANICAL ENGINEERING
Credits:	3	L – T – P	2-0-1

Course objectives:

CLO 1: To impart the knowledge of fundamental principles of Mechanical Engineering as applied in the domains of machining, thermal, automotive and futuristic technologies.

CLO 2: To provide the knowledge on various mechanical systems and processes (energy, metal joining, IC engines etc.)

CLO 3: To explain the mathematical concepts and relationships concerning different mechanical systems.

CLO 4: To teach skills with regards to fabrication techniques and experimental analysis in various domains of Mechanical Engineering.

Teaching-Learning Process (General Instructions)

- 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

UNIT-1

[5 hours]

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*).

Steam Formation and Application:

Formation of steam and thermodynamic properties of steam (no numerical problems), Applications of steam in industries.

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.

UNIT-2

[5 hours]

Hydraulic turbines and pumps:

Classification of Hydraulic turbines, Principle and Operation of Pelton Wheel and Francis Turbine, Introduction to working of single stage Centrifugal Pump.

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.

Heat Transfer Applications:

Modes of Heat Transfer: Definition, Governing laws, Principle of heat transfer in Automobile Radiators, Cooling of Electrical and Electronic Devices (Active, Passive and Hybrid Cooling.)



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

UNIT-3	[5 hours]
<p>Fundamentals of IC Engines: Classification of Internal Combustion Engines, Working of 4-Stroke (petrol and diesel) engines, Applications of IC Engines, Numericals on Power and Mechanical efficiency calculations.</p> <p>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.</p> <p>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.</p>	

UNIT-4	[5 hours]
<p>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 (with the effect of belt thickness and slip).</p> <p>Power Transmission – Gear Drives: Classification of gear drives, Gear Trains and their application: simple and compound Gear Trains, Simple numerical on Gear trains involving velocity ratios.</p> <p>Introduction to Robotics: Robot anatomy, Joints & links, common robot configurations. Applications of Robotics.</p>	

UNIT-5	[5 hours]
<p>Fundamentals of Machine Tools and Operations: (<i>Machine tool sketches are not included for CIE/SEE</i>) Working Principle of Lathe, Milling and Drilling machine tools. Lathe Operations: Turning, Facing, Taper Turning and Knurling.</p> <p>Introduction to Modern Manufacturing Tools and Techniques: CNC: Introduction, components of CNC, advantages and applications of CNC. Additive Manufacturing: Introduction, classification, steps involved.</p> <p>Introduction to Mechatronics: Concept of open-loop and closed-loop control systems, Examples of Mechatronic systems.</p>	

LIST OF LAB PROGRAMS	
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	Performance study of Pelton wheel turbine.
7	Performance study of 4 stroke petrol engine.
8	Determination of thermal conductivity of a copper rod

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
-------------	----	---------------------	----	----------



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

22ME1ESEME/ 22ME2ESEME	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.	1,7	3,2
	CO2	Differentiate and compare among various mechanical systems (such as energy, metal joining, IC engines etc.)	1,7	3,2
	CO3	Derive and determine parameters related to different type of mechanical systems.	1	3
	CO4	Demonstrate skills in fabrication techniques and experimental analysis related to different domains in Mechanical Engineering.	3,4	3,2

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3						2					
CO2	3						2					
CO3	3											
CO4	2			3								

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	--	--	25	25	12	50
	Test 1	40	80				
	Test 2	40					
	Test 3	40					
CIE – Lab	Record & Performance/ Lab Test	15	25		25	12	
	Experiential learning	10					
CIE							
SEE	End Exam	100		50			
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

Answer five full questions selecting one from each module.



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

To set one question each from module 1, 4, 5 and two questions each from module 2 & 3

Suggested Learning Resources:

Text Books

1	Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2019.
2	Elements of Mechanical Engineering, V. K. Manglik, PHI Learning, 2019

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).

Web links and Video Lectures (e-Resources):

1	https://www.tlv.com/global/TT/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)



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

Course Code :	23CV1ESICV/23CV2ESICV	Course Title:	Introduction to Civil Engineering
Credits:	03	L – T – P	3-0-0

Course objectives:

The objectives of the course are to facilitate the learners to

- Define the scope and relevance of civil engineering professionals in societal development.
- Define Sustainable Development Goals (SDGs), list the ways by which civil engineering profession can contribute to reaching the targets and contribute to infrastructure development
- Analyse the problems involving forces, moments, centroid and moment of inertia with their applications.

Teaching-Learning Process (General Instructions)

Lecture method (L) shall not only be limited to traditional method but with different types of teaching methods such as PowerPoint presentation, Video/animation film presentations to effectively explain on different concepts.

Encourage interactive and collaborative (Group Learning) learning in the class.

Topics shall be introduced in multiple representations and discuss how the concepts can be related to and applied to the real world to improve students' understanding.

Asking and solving for HOT (Higher order Thinking) questions frequently in the class, which promotes critical thinking.

Discussion on different ways to solve the same problem/question (if applicable) and encourage the students to adopt and develop their own creative ways to solve the same in correct manner.

UNIT-1

[6 hours]

Civil Engineering Disciplines and Building Science

Introduction to Civil Engineering: Roles and Responsibilities of Civil Engineering profession,

Disciplines in Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management.

Basic Materials of Construction: Cement: mortar and concrete, Burnt clay bricks and concrete blocks, Reinforced concrete, Pre- stressed Concrete, Structural steel, Construction Chemicals.

Structural elements of a building: Foundation, Plinth, Column, Beam, Slab, Masonry wall, Lintel, Chejja and staircase.



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

UNIT-2	[6 hours]
Societal and Global Impact of Infrastructure Infrastructure development: Introduction to sustainable development goals Smart City Concept: Smart Buildings, Building Automation System – Temperature and sound control in building, recycling; water supply and sanitary systems, urban air pollution management, solid waste management, urban flood control system, Intelligent Transportation Systems (ITS).	
UNIT-3	[10 hours]
Analysis of force systems Concept of idealization, force as a vector and characteristics of force vector, principles of superposition and transmissibility, Resolution and composition of forces, Parallelogram law of forces, system of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, free body diagram, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force systems, Numerical examples.	
UNIT-4	[8 hours]
Centroid Definition and relevance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane lamina from first principles, centroid of built-up sections- Numerical examples.	
UNIT-5	[10 hours]
Moment of inertia Definition and application of Moment of Inertia in structural engineering, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-up sections, Numerical Examples.	



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

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
23CV1ESICV/23CV2ESICV	CO 1	Define the scope and responsibilities of various specializations of civil engineering profession in societal development.	PO6	2
	CO 2	Define Sustainable Development Goals (SDGs), list the ways by which civil engineering profession can contribute to reaching the targets, define the concept and parameters of smart cities	PO7	2
	CO 3	Apply the concepts of force and moments to solve problems related to resultant and equilibrium of coplanar force system.	PO1, PO2	3
	CO 4	Apply the concepts of centroid and moment of inertia to locate centroid and evaluate second moment of area of composite shapes.	PO1, PO2	3

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1						2						
CO2							2					
CO3	3	3										
CO4	3	3										

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	20	20	10	50	20	50
	Test 1	40	80	20			
	Test 2	40		20			
	Test 3						
CIE – Lab	Record & Performance						
	Lab Test						
CIE				50		20	
SEE	End Exam			100		35	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)



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

* Answer five full questions selecting one from each unit.

* To set one question each from Unit 1, 2 and 4 and two questions each from Unit 3 & 5

Suggested Learning Resources:

Text Books

1	Bhavikatti S S, Engineering Mechanics, 2019, New Age International
2	Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2018, EBPB
3	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.

Reference Books

1	Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2	Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3	Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication
4	Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.

Web links and Video Lectures (e-Resources):

1	NPTEL: Introduction to Civil Engineering Profession https://archive.nptel.ac.in/courses/105/106/105106201/
2	NPTEL: Engineering Mechanics https://archive.nptel.ac.in/courses/112/106/112106286/
3	https://www.iitg.ac.in/rkbc/me101/Presentation/L16-18.pdf
4.	https://www.undp.org/sustainable-development-goals



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

Course Code :	22ME1ESIME/22ME2ESIME	Course Title:	INTRODUCTION TO MECHANICAL ENGINEERING
Credits:	3	L – T – P	3-0-0

Course objectives:

CO 1: To impart the knowledge of fundamental principles of Mechanical Engineering as applied in the domains of machining, thermal, automotive and futuristic technologies.

CO 2: To provide the knowledge on various mechanical systems and processes (energy, metal joining, IC engines etc.)

CO 3: To explain the mathematical concepts and relationships concerning different mechanical systems.

Teaching-Learning Process (General Instructions)

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 students' Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

UNIT-1

[8 hours]

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

UNIT-2

[8 hours]

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



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

UNIT-3	[8 hours]
<p>Introduction to IC Engines: Classification, Working of 4-Stroke (petrol and diesel) engines, numericals on Power and Mechanical efficiency calculations, applications.</p> <p>--- 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.</p>	

UNIT-4	[8 hours]
<p>Materials and its Industrial Applications: (<i>Definitions, types and list of applications only</i>) Metals- Ferrous: Tool steels and stainless steels, Non-ferrous: Aluminum alloys. Ceramics- Glass, optical fiber glass, cermets. Composites- Fiber reinforced composites, Metal matrix composites, Smart materials: Piezoelectric materials, shape memory alloys, semiconductors, and super-insulators.</p> <p>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.</p>	

UNIT-5	[8 hours]
<p>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.</p> <p>Automation in Industry: Definition, types - fixed, programmable and flexible automation, basic elements with block diagrams and advantages</p> <p>Introduction to IoT: Definition and characteristics, physical design, protocols, logical design of IoT, functional blocks, and communication models</p>	

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
	CO 1	Describe & discuss fundamental principles of Mechanical Engineering as applied in the domains of machining, thermal, automotive and futuristic technologies.	1,7	3
	CO 2	Differentiate and compare among various mechanical systems (such as energy, metal joining, IC engines etc.)	1,7	3
	CO 3	Determine performance-related parameters for IC engines.	1	2



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3						2					
CO2	3						2					
CO3	2											

Assessment Details (both CIE and SEE)

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				
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.
- To set one question each from module 1, 4, 5 and two questions each from module 2 & 3

Suggested Learning Resources:

Text Books

1	Elements of Mechanical Engineering, K R GopalaKrishna, Subhash Publications, 2019.
2	Elements of Mechanical Engineering, V. K. Manglik, PHI Learning, 2019

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).



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

Web links and Video Lectures (e-Resources):

1	https://www.tlv.com/global/TL/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)



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

Course Code:	22EC1ESIEL/ 22EC2ESIEL	Course Title:	Introduction to Electronics Engineering
Credits:	3	L – T – P	3-0-0

Course objectives:

The objectives of the course are to facilitate the learners to

- **Gain** fundamental knowledge in the field of Electronics and Communication Engineering
- **Equip** students with a basic foundation in electronic engineering fundamentals required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.

Teaching-Learning Process (General Instructions)

Chalk and talk method / Power Point Presentation

UNIT-1

[08 hours]

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.

Amplifiers – Definition, Types of amplifier, gain, Input-Output Resistance, Multi-stage amplifier; BJT as a switch: Cut-off and saturation modes.

(RBT Levels: L1, L2 and L3)

UNIT-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, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Crystal oscillator (Only Concepts, working, and waveforms. No mathematical derivations)

(RBT Levels: L1, L2, L3 and L4)

UNIT-3

[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

(RBT Levels: L1, L2 and L3)



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

UNIT-4	[08 hours]
<p>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</p> <p>Sensors and Interfacing – Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display</p> <p>(RBT Levels: L1, L2, L3 and L4)</p>	

UNIT-5	[08 hours]
<p>Communication: 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-AM, FM</p> <p>Introduction to Cellular Communication, Computer Communication Networks.</p> <p>(RBT Levels: L1, L2 and L3)</p>	

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22EC1ESIEL/ 22EC2ESIEL	CO 1	Apply the basic principles of electronics to solve analog and digital circuits.	1	3
	CO 2	Analyse and Identify a suitable electronic system for a given application.	2	1
	CO 3	Design the basic electronic circuits for a given specification to address engineering applications.	3	1
	CO 4	Involve in independent/team learning on recent trends in applied electronics and communicate with effective presentations and report.	9, 10	1

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		1										
CO3			1									
CO4									1	1		



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

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE	Quiz 1	05	10	50	50	20	50
	AAT	05					
	Test 1	40	80				
	Test 2	40					
	Test 3	40					
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: (OP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 2, 4, 5 and two questions each from Unit 1 and Unit 3.

Suggested Learning Resources:

Text Books

1	Santiram Kal , "Basic Electronics- Devices, circuits and IT fundamentals", PHI, 2012
2	M. Morris Mano , "Digital Logic and Computer Design", PHI Learning, 2008 ISBN-978-81-203-0417-84.
3	K V Shibu , "Introduction to Embedded Systems", 2nd Edition, McGraw Hill Education (India), Private Limited, 2016.

Reference Books

1	Mike Tooley , "Electronic Circuits, Fundamentals & Applications", 4 th Edition, Elsevier, 2015. DOI: https://doi.org/10.4324/9781315737980 . eBook ISBN9781315737980
2	S L Kakani and Priyanka Punglia , "Communication Systems", New Age International Publisher, 2017. https://elib4u.ipublishcentral.com/pdfreader/communication-systems

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



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

Course Title	Introduction to Electrical Engineering	Course Code	22EE1ESIEE
Credits	03	L – T – P (Credits)	3-0-0

Course Objectives:

The objectives of the course are to facilitate the learners to

- To understand structure of electrical power systems, energy sources and their utilization.
- To explain the laws used in the analysis of DC circuits and electromagnetism.
- To explain the behaviour of circuit elements in single-phase circuits.
- To explain the construction and operation of transformers, and DC motors.
- To introduce concepts of circuit protecting devices and earthing.
- To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.

UNIT - 1

[08 hours]

Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.

Power Generation: Hydrel, Nuclear, Solar & wind power generation (Block Diagram approach).

DC Circuits: Ohm's Law and its limitations. KCL & KVL, Simple Numerical.

Teaching-Learning Process

Chalk and talk method / Power Point Presentation

UNIT - 2

[08 hours]

Circuit Theorems: Thevenin's Theorem, Superposition Theorem (Only for DC circuits), Simple Numerical (Only for Independent Voltage Sources).

Electromagnetism: Faraday's Laws of Electromagnetic Induction, Lenz's Law, Flemings rules, statically and dynamically induced EMF; concepts of self and mutual inductance. Coefficient of Coupling. Energy stored in magnetic field. Simple Numerical.

Teaching-Learning Process

Chalk and talk method / Power Point Presentation

UNIT - 3

[08 hours]

AC Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor (only definitions).

AC Circuits: Voltage and current relationship with phasor diagrams in R, L, and C circuits. Analysis of R-L, R-C, R-L-C Series circuits.

Teaching-Learning Process

Chalk and talk method / Power Point Presentation



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

<u>UNIT - 4</u>		[08 hours]
<p>Single Phase Transformers: Construction and principle of operation, emf equation, losses, variation in losses with respect to load, efficiency, condition for maximum efficiency, illustrative examples.</p> <p>DC Motors: Construction, Principle of operation, back emf and its significance, Torque equation, types of motors (series & shunt only), applications of DC motors. Simple numerical.</p>		
Teaching-Learning Process	Transformer topic: Cut-out demo /actual machine models and chalk and talk method of teaching, YouTube videos.	
	DC Motors: Cut -out demo/actual machine models, video for working of machine, Chalk and talk.	
<u>UNIT - 5</u>		[08 hours]
<p>Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of “unit” used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.</p> <p>Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.</p> <p>Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.</p> <p>Introduction to Electric Vehicles: Overview and block diagram approach to Electric Vehicles.</p>		
Teaching-Learning Process	Chalk and talk, Demonstration of functioning of MCB and Fuse.	
	Self-study topic: Safety precautions to avoid shock.	

CHOICE UNITS: II & IV

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22EE1ESIEE	CO1	Understand the concepts of various energy sources, electric circuits and electromagnetism		
	CO2	Apply knowledge of mathematics to solve problems related to electrical circuits.	1	2
	CO3	Analyse the behaviour of electric circuits, transformers, DC motors and electric vehicles.	2	3
	CO4	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.	6	3
	CO5	Ability to engage in individual/team work to make effective technical presentation on electrical concepts and communicate effectively to the audience	9, 10	1, 1



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

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	10	10	50	20	50
	Test 1	40	90			
	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:

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 1, 3, 5 and two questions each from Unit 2 and Unit 4.

Suggested Learning Resources:

Text Books

4. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
5. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.
6. Basic Electrical Engineering by B Venkatesh, Madhura S, Divya. S and Chaitanya L, InSc Publishers, 2021

Reference Books

4. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
5. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
6. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014.

Web links and Video Lectures (e-Resources):

9. www.nptel.ac.in



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

Course Code:	22CS1ESPYP	Course Title:	Introduction to Python Programming
Credits:	3	L – T – P	2-0-1

Course objectives:

The objectives of the course are to facilitate the learners to

- Master the fundamentals of writing Python scripts, learn core Python scripting elements such as variables and flow control structures, discover how to work with lists and sequence data.
- Write Python functions to facilitate code reuse, make their code robust by handling errors and exceptions properly, Explore Python's object-oriented features, Search text using regular expressions, Use Python to read and write files

Teaching-Learning Process (General Instructions)

Given below are sample strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture 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/animation films to explain the programming concepts such as iteration, slicing and recursion.
3. Demonstration of program execution and debugging of errors.
4. Encourage collaborative (Group) Learning in the class.

UNIT-1

[5 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

UNIT-2

[5 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



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

UNIT-3	[5 hours]
<p>Dictionaries: Dictionary as a set of counters, Dictionaries and files, Looping and dictionaries, Advanced text parsing</p> <p>Tuples: Immutable, comparing tuples, Tuple Assignment, Dictionaries and Tuples, Multiple Assignments with Dictionaries, Using Tuples as keys in Dictionary</p> <p>Functions: Function calls, Built-in functions, Type conversion functions, Random numbers, Math functions, Adding new functions, Definitions and uses, Flow of execution, Parameters and arguments, Fruitful functions and void functions, Why functions</p>	
UNIT-4	[5 hours]
<p>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</p> <p>Exceptions: Exception Class Hierarchy, User-Defined Exceptions</p>	
UNIT-5	[hours]
<p>Regular expressions: Character matching in regular expressions, Extracting data using regular expressions, combining searching and extracting, Escape character</p> <p>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</p>	



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

LIST OF LAB PROGRAMS

Q.No	Lab Programs
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. 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. 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 combine_lists that combines these lists into a dictionary. 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. b) Write a program to compute the number of characters, words and lines in a file

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)
	CO 1	Apply knowledge of Python programming for various applications
	CO 2	Analyse the given Python program to identify bugs
	CO 3	Design Python programs/ applications for a given requirement.
	CO 4	Ability to conduct practical experiments for given requirements using python.



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2											
CO2		3										
CO3			3									
CO4				3								

Assessment Details (both CIE and SEE)

Assessment Plan (for 50 marks of CIE)		
Tool	Remarks	Marks
Internals	Two	20
AAT	Mini-project	5
Lab Component	Lab CIE + Lab Test	25
Self-Study Component	NA	--
Total		50

Semester End Examination: (QP PATTERN)

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-5	Mandatory	One Question to be asked for 20 Marks



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

Suggested Learning Resources:

Prescribed Text Book					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Python for Everybody: Exploring Data Using Python 3	Charles R. Severance	Fourth	University of Michigan	2016
2	Learning to Program using Python	Cody Jackson	Second	Packt Publishing	2018

Reference Text Book					
Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Programming Python	Mark Lutz	First	O'Reilly Media	2010
2	Python Essential Reference	David M. Beazley	Fourth	Pearson	2009
3	Core Python Applications Programming	Wesley J Chun	Third	Pearson	2015

E-Book						
Sl. No	Book Title	Authors	Edition	Publisher	Year	URL
1	Think Python	Allen B. Downe	Second	Green Tea Press, Needham, Massachusetts	2014	https://greenteapress.com/thinkpython2/thinkpython2.pdf
2	A Hands-On, Project-Based Introduction to Programming	Eric Matthes	First	No Starch Press	2016	https://t.ly/fEOq (URL Shortened)

MOOCS Courses					
Sl. No	Course name	Course Offered by	Year	URL	
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	



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

Course Code:	22CY1BSCCV/22CY2BSCCV	Course Title:	APPLIED CHEMISTRY FOR CIVIL ENGINEERING AND ALLIED BRANCHES
Credits:	04	L – T – P	3:0:1

Course objectives:

To impart the knowledge of Chemistry involved in Electrochemical cells, Corrosion and its control; Conventional, electrochemical and renewable sources of energy; Polymers; memory and display systems; Water treatment; sensors; e-waste management; Nanomaterials and Instrumental methods of analysis.

Teaching-Learning Process

Suggested strategies that teachers may use to effectively achieve the course outcome:

Chalk and Talk

Blended mode of learning

Videos – NPTEL and other popular lectures

UNIT-1

[8 hours]

Electrochemistry: Electrode Systems and Corrosion

Electrodes and Cells – Introduction- Classification of cells - primary, secondary and concentration cells; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode.

Determination of pH using glass electrode, numerical on concentration cells.

Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion Penetration Rate (CPR) , numerical. Corrosion control: Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroless plating: Introduction, Electroless plating of copper (PCB). Inorganic coatings – anodizing and phosphating.

UNIT-2

[8 hours]

Energy: Sources, Conversion and Storage

Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Octane number- Reformulation of petrol.

Sustainable energy sources: Hydrogen as a fuel - advantages, production and storage. Biofuels - Production of Biodiesel. Solar cells - Construction and working of Si based PV cell, advantages. Quantum Dot Sensitized Solar Cells (QDSSC's) - Principle, Properties and Applications.

Electrochemical Energy Systems: Introduction to batteries, Classification of batteries - primary and secondary batteries; Battery characteristics; construction, working and applications of Lithium ion batteries.



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

UNIT-3	[8 hours]
Polymers for Engineering Applications Polymers - Introduction, Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (T _g); Structure and property relationship in polymers; Plastics - Definition of resins and plastics; Synthesis, properties and applications of PMMA and UF resin; Elastomers - Synthesis, properties and application of butyl rubber and nitrile rubber; Adhesives : Synthesis, properties and applications of epoxy resin. Polymer composites - Composites as structural material; Synthesis and applications of Kevlar and Carbon fibers; Wood polymer composites: Synthesis, properties and applications, Biodegradable polymers - Introduction, Polyglycolic acid - synthesis, degradation and uses.	
UNIT-4	[8 hours]
Structural Materials Metals and Alloys : Introduction, Properties and application of Iron and its alloys (any two), Aluminium (any two) and its alloys. Cement : Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement. Geo polymer concrete: Introduction, synthesis, constituents, properties and applications. Refractories : Introduction, classification based on chemical composition, properties and application of refractory materials. Glass : Introduction, Composition, Types, Preparation of Soda-lime glass, properties and applications of glass.	
UNIT-5	[8 hours]
Water treatment, Nanomaterials and Analytical Techniques Water treatment : Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD, treatment of waste water - aerobic and anaerobic oxidation, primary, secondary (trickling filter method) and tertiary treatment methods. Nano materials : Introduction, synthesis, properties and applications of nanomaterials for water treatment, Analytical techniques : Principle, Instrumentation and applications of Colorimetry (Copper), Flame Photometry (Sodium), Conductometry (Acid Mixtures).	



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

LIST OF LAB PROGRAMS	
A – Compulsory Experiments:	
1	Potentiometric estimation of Iron using std. $K_2Cr_2O_7$ (Electrochemical sensor).
2	Determination of pKa of a weak acid using glass electrode (pH sensor).
3	Conductometric estimation of mixture of strong and weak acid (conductometric sensors).
4	Estimation of copper in electroplating effluent by colorimetry (optical sensor).
5	Estimation of sodium in effluent using flame photometry.
6	Estimation of total hardness of water by EDTA method.
7	Determination of COD of an industrial wastewater.
8	Estimation of percentage of copper in brass (analysis of alloy).
9	Estimation of iron on rusted TMT bar by external indicator method.
B – Demonstration (offline/virtual):	
1	Determination of calorific value of a solid fuel using bomb calorimeter.
2	Determination of rate of corrosion of mild steel by weight loss method.
3	Determination of viscosity coefficient of lubricant (Ostwald's viscometer).
4	Synthesis of oxide nanoparticles.
5	Synthesis of polyaniline and its conductivity measurement.
C – Open Ended Experiments:	
1	Electroless plating of Nickel on Copper
2	Determination of glucose by electrochemical sensors.
3	Electroplating of desired metal on substrate
4	Design an experiment to Identify the presence of proteins in given sample.

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22CY1BSCCS/ 22CY2BSCCS	CO 1	Understand and apply the principles of chemistry involved in water treatment, corrosion, energy sources, polymers, nanomaterials, phase equilibria, alloys, ceramics and instrumental methods of analysis.	1	3
	CO 2	Analyse the Engineering problems and draw meaningful inferences through applied chemistry.	2	2
	CO 3	Implement sustainable solutions through concepts of Applied Chemistry in the field of Materials, Energy and Environment.	7	2
	CO 4	Engage in self-study and make an effective oral presentation on contribution of Chemistry to society.	6, 10, 12	1
	CO 5	Apply the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods and analyze, interpret the data to assess and address the issues of Environmental Pollution	1, 2, 12	1

COs and POs Mapping



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

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		2										
CO3							2					
CO4						1				1		1
CO5	1	1										1

Assessment Details (both CIE and SEE)

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	40				
	Test 2	40					
	Test 3	40					
CIE – Lab	Record & Performance	20		10	25	10	
	Lab Test	50		15			
CIE						20	
SEE	End Exam	100					50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

* Question paper consists of seven questions from five Units.

Units –II, IV & V shall have one question each (Mandatory).

Unit - I & Unit - III shall have two questions each (internal choice).

The choice questions are to be set in Unit I and Unit III

Each full question shall be of 20 marks and cover the entire syllabus of that unit.

There can be two to three subdivisions to each question.



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

Suggested Learning Resources:

Text Books

1	A Text Book of Engineering Chemistry, 4th edition, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd. 2016.
2	Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022

Reference Books

1	Wiley's Engineering Chemistry (Wiley India), Dr. Shubha Ramesh et al., 2 nd Edition, 2013.
2	Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi, 1 st edition, 2012.
3	A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.

Web links and Video Lectures (e-Resources):

1	Electrochemistry basics by LibreTexts of UCDavis: https://chem.libretexts.org/LibreTexts/University_of_California_Davis/UCD_Chem_002C/UCD_Chem_2C%3A_Larsen/Chapters/Unit_1%3A_Electrochemistry
2	Introduction to Chemistry - Tracy Poulsen; 250 pages; ISBN-13: 9781478298601; ISBN-10: 147829860X.
3	NPTEL/SWAYAM/MOOCs http://nptel.ac.in/ https://swayam.gov.in/



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

Course Code :	22CY1BSCEE/22CY2BSCEE	Course Title:	APPLIED CHEMISTRY FOR EE & ALLIED BRANCHES
Credits:	04	L – T – P	3:0:1

Course objectives:

To impart the knowledge of Chemistry involved in Electrochemical cells, Corrosion and its control; Conventional, electrochemical and renewable sources of energy; Polymers; memory and display systems; Water treatment; sensors; e-waste management; Nanomaterials and Instrumental methods of analysis.

Teaching-Learning Process

Suggested strategies that teachers may use to effectively achieve the course outcome
Chalk and Talk
Blended mode of learning
Videos – NPTEL and other popular lectures

UNIT-1

[8 hours]

Electrochemistry: Electrode Systems and Corrosion

Electrodes and Cells: Introduction- Classification of cells - primary, secondary and concentration cells; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode, numerical on concentration cells.

Corrosion: Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion Penetration Rate (CPR), numerical. Corrosion control: Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroless plating: Introduction, Electroless plating of copper (PCB). Inorganic coatings – anodizing and phosphating.

UNIT-2

[8 hours]

Energy: Sources, Conversion and Storage

Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Octane number- Reformation of petrol.

Sustainable energy sources: Hydrogen as a fuel - advantages, production and storage. Biofuels Production of Biodiesel. Solar cells - Construction and working of Si based PV cell, advantages. Quantum Dot Sensitized Solar Cells (QDSSC's)- Principle, Properties and Applications.

Electrochemical Energy Systems: Introduction to batteries, Classification of batteries – primary and secondary batteries; Battery characteristics; construction, working and applications of Lithium ion batteries.



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

UNIT-3	[8 hours]
<p>Polymers for Engineering Applications Polymers - Introduction, Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (T_g); Structure and property relationship in polymers; Plastics - Definition of resins and plastics; Synthesis, properties and applications of PMMA and UF resin; Elastomers - Synthesis, properties and application of butyl rubber and nitrile rubber; Polymer composites - Composites as structural material; Synthesis and applications of Kevlar and Carbon fibers; Conducting polymers - Introduction, synthesis and conducting mechanism of polyacetylene and applications. Biodegradable polymers - Introduction, Polyglycolic acid - synthesis, degradation and uses.</p>	
UNIT-4	[8 hours]
<p>Chemistry of Electronic Materials Conductors, Semiconductors and Insulators: Introduction, Band theory and examples. Semiconductors: production of electronic grade silicon, Refining- Float Zone method and Czochralski process. Memory Devices: Introduction, concepts of electronic memory. Classification of electronic memory materials -organic/polymer electronic memory devices (organic molecules, polymeric materials, organic-inorganic hybrid materials). Display Systems: Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Jablonski Diagram. Photoactive and electroactive materials, Light emitting electrochemical cells. Nanomaterials (QLED's) and organic materials (OLED's) used in optoelectronic devices.</p>	
UNIT-5	[8 hours]
<p>Water treatment, Sensors and E - Waste Management Water treatment: Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD, treatment of waste water - aerobic and anaerobic oxidation, primary, secondary (trickling filter method) and tertiary treatment methods. Sensors: Introduction, Construction, working and applications of Conductometric sensors (Estimation of Acid Mixtures), Electrochemical sensors (Potentiometric estimation of FAS), Optical sensors (Colorimetric estimation of copper), Gas sensors. E-waste Management: Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling. Extraction of copper from e-waste.</p>	



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

LIST OF LAB PROGRAMS	
A – Compulsory Experiments:	
1	Potentiometric estimation of Iron using std. $K_2Cr_2O_7$ (Electrochemical sensor).
2	Determination of pK_a of a weak acid using glass electrode (pH sensor).
3	Conductometric estimation of mixture of strong and weak acid (conductometric sensors).
4	Estimation of copper in electroplating effluent by colorimetry (optical sensor).
5	Estimation of sodium in effluent using flame photometry.
6	Estimation of total hardness of water by EDTA method.
7	Determination of COD of an industrial wastewater.
8	Estimation of percentage of copper in brass (analysis of alloy).
9	Estimation of iron on rusted TMT bar by external indicator method.
B – Demonstration (offline/virtual):	
1	Determination of calorific value of a solid fuel using bomb calorimeter.
2	Determination of rate of corrosion of mild steel by weight loss method.
3	Determination of viscosity coefficient of lubricant (Ostwald's viscometer).
4	Synthesis of oxide nanoparticles.
5	Synthesis of polyaniline and its conductivity measurement.
C – Open Ended Experiments:	
1	Electroless plating of Nickel on Copper
2	Determination of glucose by electrochemical sensors.
3	Electroplating of desired metal on substrate
4	Design an experiment to Identify the presence of proteins in given sample.

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22CY1BSCCS/ 22CY2BSCCS	CO 1	Understand and apply the principles of chemistry involved in water treatment, corrosion, energy sources, polymers, nanomaterials, phase equilibria, alloys, ceramics and instrumental methods of analysis.	1	3
	CO 2	Analyse the Engineering problems and draw meaningful inferences through applied chemistry.	2	2
	CO 3	Implement sustainable solutions through concepts of Applied Chemistry in the field of Materials, Energy and Environment.	7	2
	CO 4	Engage in self-study and make an effective oral presentation on contribution of Chemistry to society.	6, 10, 12	1
	CO 5	Apply the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods and analyze, interpret the data to assess and address the issues of Environmental Pollution	1, 2, 12	1



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		2										
CO3							2					
CO4						1				1		1
CO5	1	1										1

Assessment Details (both CIE and SEE)

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	40				
	Test 2	40					
	Compensatory test	40		20			
CIE – Lab	Record & Performance	20		10	25	10	
	Lab Test	50		15			
CIE						20	
SEE	End Exam	100					
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

* Question paper consists of seven questions from five Units.

Units –II, IV & V shall have one question each (Mandatory).

Unit - I & Unit - III shall have two questions each (internal choice).

The choice questions are to be set in Unit I and Unit III

Each full question shall be of 20 marks and cover the entire syllabus of that unit.

There can be two to three subdivisions to each question.



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

Suggested Learning Resources:

Text Books

1	A Text Book of Engineering Chemistry, 4th edition, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd. 2016.
2	Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022

Reference Books

1	Wiley's Engineering Chemistry (Wiley India), Dr. Shubha Ramesh et al., 2 nd Edition, 2013.
2	Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi, 1 st edition, 2012.
3	A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.

Web links and Video Lectures (e-Resources):

1	Electrochemistry basics by LibreTexts of UCDavis: https://chem.libretexts.org/LibreTexts/University_of_California_Davis/UCD_Chem_002C/UCD_Chem_2C%3A_Larsen/Chapters/Unit_1%3A_Electrochemistry
2	Introduction to Chemistry - Tracy Poulsen; 250 pages; ISBN-13: 9781478298601; ISBN-10: 147829860X.
3	NPTEL/SWAYAM/MOOCs http://nptel.ac.in/ https://swayam.gov.in/



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

Course Code	22CY1BSCCS/22CY2BSCCS	Course Title:	APPLIED CHEMISTRY FOR CSS & ALLIED BRANCHES
Credits:	04	L – T – P	3:0:1

Course objectives:

To impart the knowledge of Chemistry involved in Electrochemical cells, Corrosion and its control; Conventional, electrochemical and renewable sources of energy; Polymers; memory and display systems; Water treatment; sensors; e-waste management; Nanomaterials and Instrumental methods of analysis.

Teaching-Learning Process

Suggested strategies that teachers may use to effectively achieve the course outcome:

Chalk and Talk

Blended mode of learning

Videos – NPTEL and other popular lectures

UNIT-1

[8 hours]

Electrochemistry: Electrode Systems and Corrosion

Electrodes and Cells – Introduction- Classification of cells - primary, secondary and concentration cells; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode, numerical on concentration cells.

Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion penetration Rate (CPR), numerical. Corrosion control: Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroless plating: Introduction, Electroless plating of copper (PCB). Inorganic coatings – anodizing and phosphating.

UNIT-2

[8 hours]

Energy: Sources, Conversion and Storage

Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Octane number- Reformulation of petrol.

Sustainable energy sources: Hydrogen as a fuel - advantages, production and storage. Biofuels - Production of Biodiesel. Solar cells - Construction and working of Si based PV cell, advantages.

Electrochemical Energy Systems: Introduction to batteries, Classification of batteries – primary and secondary batteries; Battery characteristics; construction, working and applications of Lithium-ion batteries.



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

UNIT-3	[8 hours]
<p>Polymers for Engineering Applications Polymers - Introduction, Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (T_g); Structure and property relationship in polymers; Plastics - Definition of resins and plastics; Synthesis, properties and applications of PMMA and UF resin; Elastomers - Synthesis, properties and application of butyl rubber and nitrile rubber; Polymer composites - Composites as structural material; Synthesis and applications of Kevlar and Carbon fibers; Conducting polymers - Introduction, synthesis and conducting mechanism of polyacetylene and applications. Biodegradable polymers - Introduction, Polyglycolic acid - synthesis, degradation and uses.</p>	
UNIT-4	[8 hours]
<p>Chemistry of Materials for Memory and Display Systems Memory Devices: Introduction, concepts of electronic memory. Classification of electronic memory materials (organic molecules, polymeric materials, organic-inorganic hybrid materials). Display Systems: Liquid crystals (LC's) - Introduction, classification, Liquid crystal behaviour and applications. Jablonski Diagram. Photoactive and electroactive materials, Light emitting electrochemical cells. Nanomaterials – Quantum Dot sensitized solar cells (QDSSC's)- Principle, Properties and applications, (QLED's) and organic materials (OLED's) used in optoelectronic devices.</p>	
UNIT-5	[8 hours]
<p>Chemistry of materials for sensors, water treatment and E-waste management Sensors: Introduction, Construction, working and applications of conductometric sensors, Electrochemical sensors, Optical sensors, Gas sensors. Water treatment: Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD. E-Waste: Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. Toxic materials used in manufacturing electronic and electrical products; Recycling and Recovery: Different approaches of recycling (separation, thermal treatments, hydrometallurgical extraction, pyrometallurgical methods, direct recycling). Recycling of Li-Ion batteries. Extraction of copper from E-waste.</p>	



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

LIST OF LAB PROGRAMS	
A – Compulsory Experiments:	
1	Potentiometric estimation of Iron using std. $K_2Cr_2O_7$ (Electrochemical sensor).
2	Determination of pK_a of a weak acid using glass electrode (pH sensor).
3	Conductometric estimation of mixture of strong and weak acid (conductometric sensors).
4	Estimation of copper in electroplating effluent by colorimetry (optical sensor).
5	Estimation of sodium in effluent using flame photometry.
6	Estimation of total hardness of water by EDTA method.
7	Determination of COD of an industrial wastewater.
8	Estimation of percentage of copper in brass (analysis of alloy).
9	Estimation of iron on rusted TMT bar by external indicator method.
B – Demonstration (offline/virtual):	
1	Determination of calorific value of a solid fuel using bomb calorimeter.
2	Determination of rate of corrosion of mild steel by weight loss method.
3	Determination of viscosity coefficient of lubricant (Ostwald's viscometer).
4	Synthesis of oxide nanoparticles.
5	Synthesis of polyaniline and its conductivity measurement.
C – Open Ended Experiments:	
1	Electroless plating of Nickel on Copper
2	Determination of glucose by electrochemical sensors.
3	Electroplating of desired metal on substrate
4	Design an experiment to Identify the presence of proteins in given sample.

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22CY1BSCCS/ 22CY2BSCCS	CO 1	Understand and apply the principles of chemistry involved in water treatment, corrosion, energy sources, polymers, nanomaterials, phase equilibria, alloys, ceramics and instrumental methods of analysis.	1	3
	CO 2	Analyse the Engineering problems and draw meaningful inferences through applied chemistry.	2	2
	CO 3	Implement sustainable solutions through concepts of Applied Chemistry in the field of Materials, Energy and Environment.	7	2
	CO 4	Engage in self-study and make an effective oral presentation on contribution of Chemistry to society.	6, 10, 12	1
	CO 5	Apply the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods and analyze, interpret the data to assess and address the issues of Environmental Pollution	1, 2, 12	1



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		2										
CO3							2					
CO4						1				1		1
CO5	1	1										1

Assessment Details (both CIE and SEE)

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	40				
	Test 2	40					
	Compensatory test	40		20			
CIE – Lab	Record & Performance	20		10	25	10	
	Lab Test	50		15			
CIE						20	
SEE	End Exam	100					50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

* Question paper consists of seven questions from five Units.

Units –II, IV & V shall have one question each (Mandatory).

Unit - I & Unit - III shall have two questions each (internal choice).

The choice questions are to be set in Unit I and Unit III

Each full question shall be of 20 marks and cover the entire syllabus of that unit.

There can be two to three subdivisions to each question.



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

Suggested Learning Resources:

Text Books

1	A Text Book of Engineering Chemistry, 4th edition, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd. 2016.
2	Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022

Reference Books

1	Wiley's Engineering Chemistry (Wiley India), Dr. Shubha Ramesh et al., 2 nd Edition, 2013.
2	Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi, 1 st edition, 2012.
3	A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.

Web links and Video Lectures (e-Resources):

1	Electrochemistry basics by LibreTexts of UCDavis: https://chem.libretexts.org/LibreTexts/University_of_California_Davis/UCD_Chem_002C/UCD_Chem_2C%3A_Larsen/Chapters/Unit_1%3A_Electrochemistry
2	Introduction to Chemistry - Tracy Poulsen; 250 pages; ISBN-13: 9781478298601; ISBN-10: 147829860X.
3	NPTEL/SWAYAM/MOOCs http://nptel.ac.in/ https://swayam.gov.in/



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

Course Code:	22CY1BSCME/22CY2BSCME	Course Title:	APPLIED CHEMISTRY FOR MECHANICAL ENGINEERING & ALLIED BRANCHES
Credits:	04	L – T – P	3:0:1

Course objectives:

To impart the knowledge of Chemistry involved in Electrochemical cells, Corrosion and its control; Conventional, electrochemical and renewable sources of energy; Polymers; memory and display systems; Water treatment; sensors; e-waste management; Nanomaterials and Instrumental methods of analysis.

Teaching-Learning Process

Suggested strategies that teachers may use to effectively achieve the course outcome
Chalk and Talk
Blended mode of learning
Videos – NPTEL and other popular lectures

UNIT-1

[8 hours]

Electrochemistry: Electrode Systems and Corrosion

Electrodes and Cells – Introduction- Classification of cells - primary, secondary and concentration cells; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode, numerical on concentration cells.

Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion penetration Rate (CPR), numerical. Corrosion control: Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroless plating: Introduction, Electroless plating of copper (PCB). Inorganic coatings – anodizing and phosphating.

UNIT-2

[8 hours]

Energy: Sources, Conversion and Storage

Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Knocking: Mechanism of knocking in IC engine, Octane number- Reformation of petrol.

Sustainable energy sources: Hydrogen as a fuel - advantages, production and storage. Biofuels - Production of Biodiesel. Solar cells - Construction and working of Si based PV cell, advantages.

Electrochemical Energy Systems: Introduction to batteries, Classification of batteries – primary and secondary batteries; Battery characteristics; construction, working and applications of Lithium-ion batteries.

UNIT-3

[8 hours]



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

Polymers for Engineering Applications

Polymers - Introduction, Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (T_g); Structure and property relationship in polymers; **Plastics** - Definition of resins and plastics; Synthesis, properties and applications of PMMA and UF resin; **Elastomers** - Synthesis, properties and application of butyl rubber and nitrile rubber; **Polymer composites** - Composites as structural material; Synthesis and applications of Kevlar and Carbon fibres; **Biodegradable polymers** - Introduction, Polyglycolic acid - synthesis, degradation and uses. **Polycarbonates** – Synthesis, properties and applications.

UNIT-4

[8 hours]

Materials for Engineering Applications

Alloys: Introduction, classification, composition, properties and applications of stainless steel, solders, brass, alnico and shape memory alloys.

Ceramics: Introduction, classification based on chemical composition, properties and applications of perovskites.

Lubricants: Introduction, classification, properties and applications of lubricants.

Nanomaterials: Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: top-down and bottom-up approaches; Synthesis by sol-gel (ZrO_2), chemical vapor deposition methods (CNTs). Graphene by Hummer's method – properties and applications.

UNIT-5

[8 hours]

Phase equilibria, Water Treatment and Analytical Techniques

Phase equilibria – Gibbs phase rule; Concept of Phase component, degrees of freedom with examples; Numericals. Application of Phase rule to (i) one component system - water system; (ii) two component system - Pb-Ag system,

Water treatment - Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD.

Analytical Techniques - Principle, Instrumentation and applications of Colorimetry (Copper), Flame Photometry (Sodium), Conductometry (Acid Mixtures).



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

LIST OF LAB PROGRAMS	
A – Compulsory Experiments:	
1	Potentiometric estimation of Iron using std. $K_2Cr_2O_7$ (Electrochemical sensor).
2	Determination of pKa of a weak acid using glass electrode (pH sensor).
3	Conductometric estimation of mixture of strong and weak acid (conductometric sensors).
4	Estimation of copper in electroplating effluent by colorimetry (optical sensor).
5	Estimation of sodium in effluent using flame photometry.
6	Estimation of total hardness of water by EDTA method.
7	Determination of COD of an industrial wastewater.
8	Estimation of percentage of copper in brass (analysis of alloy).
9	Estimation of iron on rusted TMT bar by external indicator method.
B – Demonstration (offline/virtual):	
1	Determination of calorific value of a solid fuel using bomb calorimeter.
2	Determination of rate of corrosion of mild steel by weight loss method.
3	Determination of viscosity coefficient of lubricant (Ostwald's viscometer).
4	Synthesis of oxide nanoparticles.
5	Synthesis of polyaniline and its conductivity measurement.
C – Open Ended Experiments:	
1	Electroless plating of Nickel on Copper
2	Determination of glucose by electrochemical sensors.
3	Electroplating of desired metal on substrate
4	Design an experiment to Identify the presence of proteins in given sample.

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22CY1BSCCS/ 22CY2BSCCS	CO 1	Understand and apply the principles of chemistry involved in water treatment, corrosion, energy sources, polymers, nanomaterials, phase equilibria, alloys, ceramics and instrumental methods of analysis.	1	3
	CO 2	Analyse the Engineering problems and draw meaningful inferences through applied chemistry.	2	2
	CO 3	Implement sustainable solutions through concepts of Applied Chemistry in the field of Materials, Energy and Environment.	7	2
	CO 4	Engage in self-study and make an effective oral presentation on contribution of Chemistry to society.	6, 10, 12	1
	CO 5	Apply the knowledge of chemistry to investigate engineering materials by volumetric and instrumental methods and analyze, interpret the data to assess and address the issues of Environmental Pollution	1, 2, 12	1



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		2										
CO3							2					
CO4						1				1		1
CO5	1	1										1

Assessment Details (both CIE and SEE)

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	40				
	Test 2	40					
	Compensatory test	40					
CIE – Lab	Record & Performance	20		10	25	10	
	Lab Test	50		15			
CIE						20	
SEE	End Exam	100					50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

* Question paper consists of seven questions from five Units.

Units –II, IV & V shall have one question each (Mandatory).

Unit - I & Unit - III shall have two questions each (internal choice).

The choice questions are to be set in Unit I and Unit III

Each full question shall be of 20 marks and cover the entire syllabus of that unit.

There can be two to three subdivisions to each question.



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

Suggested Learning Resources:

Text Books

1	A Text Book of Engineering Chemistry, 4th edition, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd. 2016.
2	Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022

Reference Books

1	Wiley's Engineering Chemistry (Wiley India), Dr. Shubha Ramesh et al., 2 nd Edition, 2013.
2	Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi, 1 st edition, 2012.
3	A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.

Web links and Video Lectures (e-Resources):

1	Electrochemistry basics by LibreTexts of UCDavis: https://chem.libretexts.org/LibreTexts/University_of_California_Davis/UCD_Chem_002C/UCD_Chem_2C%3A_Larsen/Chapters/Unit_1%3A_Electrochemistry
2	Introduction to Chemistry - Tracy Poulsen; 250 pages; ISBN-13: 9781478298601; ISBN-10: 147829860X.
3	NPTEL/SWAYAM/MOOCs http://nptel.ac.in/ https://swayam.gov.in/



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

Course Code :	22ME1ESCED/ 22ME2ESCED	Course Title:	COMPUTER-AIDED ENGINEERING DRAWING
Credits:	3	L – T – P	1-0-2

Course objectives:

To create the concept of systems of projection, standards and conventions.

To develop the views of basic geometrical entities i.e. points, lines, planes and solids.

To impart skills of manual sketching and modern engineering tools necessary for engineering practice.

To acquire the skill of expressing three -dimensional and two-dimensional objects into Engineering / professional language and vice versa.

To enable strong spatial visualization skills which are important to an engineer's ability to create and interpret technical drawings

Teaching-Learning Process (General Instructions)

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 various pedagogical approaches for teaching learning process

Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

UNIT-1

[11 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.

B: Orthographic Projections

Introduction, quadrant system, Planes of projection, reference line and conventions employed, Projections of points in I and III 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.

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.



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

UNIT-2	[8 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.	
UNIT-3	[7 hours]
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 (Maximum of 3 solids. The axes of the first and second solids may be considered in vertical and horizontal positions).	
UNIT-4	[8 hours]
Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones & their frustums and truncations (resting with base on HP only). Problems on applications of development of lateral surfaces viz. Funnels, Trays, Transition pieces connecting two ducts.	
UNIT-5	[6 hours]
Using CAD software (for CIE only) 5A: Use of solid-modelling software for creating engineering components and assemblies and extracting orthographic views, sectional and Isometric views 5B: Multidisciplinary Applications i. Basic Building Drawings; Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using suitable software, ii. Electric Wiring and lighting diagrams; Like UPS system, EV battery, Automatic fire alarm, Call bell system, and Basic power distribution system using suitable software iii. Electronics Engineering Drawings- Simple Electronics Circuit Drawings iv. Drawing for process simulation.	

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22ME1ESCED/ 22ME2ESCED	CO1	Draw orthographic and Isometric projections of geometrical entities in various positions.	PO1	
	CO2	Develop 2D, 3D models and lateral surfaces of solids.	PO1,PO5	
	CO3	Use modern engineering tool (CAD software) necessary for engineering visualisation	PO1,PO5	
	CO4	Interpret and communicate with sketches and engineering drawings with enhanced spatial visualization skills.	PO2,	



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2	3				3							
CO3	3				3							
CO3		2										

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Test 1	40	20	20		50	
	Test 2	40					
	Test 3	40					
	Sketching and lab assignments	60	20	20			
	Project/Assignment/Experiential Learning	10	10	10			
CIE							
SEE	End Exam	100		50		50	
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

Sl.No	Unit	Number of questions	Weightage(To Answer one full question from each unit)		
			Sketching	ON 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



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

Suggested Learning Resources:

Text Books

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.Gopala Krishna, Sudhir Gopalakrishna, ISBN-135551234102489, 2017

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

Web links and Video Lectures (e-Resources):

1	Siemens Solid Edge Exercises 200 Practice Drawings for Solid Edge and Other Feature-Based Modelling Software By Sachidanand Jha · 2019, ISBN:9781096479147, 1096479141, Amazon Digital Services LLC - KDP Print US.
2	Solid Edge 2020 for Designers, 17th Edition books.google.co.in › books Prof. Sham Tickoo, CAD/CIM Technologies · 2020

Publications of Bureau of Indian Standards

<https://law.resource.org/pub/in/bis/S01/is.sp.46.2003.pdf>

- a) IS 10711 – 2001: Technical products documentation – Size and lay out of drawing sheets.
- b) IS 9609 (Parts 0 & 1) – 2001: Technical products documentation – Lettering.
- c) IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
- d) IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
- e) IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

NPTEL/SWAYAM/MOOC:

1. NPTEL course on ENGINEERING DRAWING AND COMPUTER GRAPHICS
<https://nptel.ac.in/courses/112/105/112105294/#>



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

Course Code :	23CV1ESGBT/23CV2ESGB T	Course Title:	Green Buildings
Credits:	03	L – T – P	3-0-0

Course objectives:

The objectives of the course are to facilitate the learners to

- Define Global Warming Potential (GWP) parameters; correlate the cause and effect of GWPs
- Identify and compare the cost factors of construction materials and technologies; suggest cost effective options
- List the factors that are used in green building rating systems and correlate that with green building design
- Identify different options for energy and water efficiency, waste management approaches in Buildings and Built Environment.

Teaching-Learning Process (General Instructions)

Lecture method (L) shall not only be limited to traditional method but with different types of teaching methods such as PowerPoint presentation, Video/animation film presentations to effectively explain on different concepts.

Encourage interactive and collaborative (Group Learning) learning in the class.

Live material demonstration whenever applicable; Laboratory and Building visits within campus.

Topics shall be introduced in multiple representations and discuss how the concepts can be related to and applied to the real world to improve students' understanding.

Assigning higher order thinking questions and activities to relate for building applications which promotes critical thinking.

UNIT-1

[08 hours]

Global Warming Potential and Buildings

Global warming: Definition - Causes and Effects, Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions- India specific GHG program.

Major Energy efficient areas for buildings – Green Buildings – Definition - Features- Necessity – Benefits of Green buildings, Embodied Energy in Materials- Green Materials - Comparison of Initial cost of Green v/s Conventional Building –Life cycle cost of Buildings.



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

UNIT-2	[08 hours]
<p>Introduction to cost-effective construction and related materials</p> <p>Introduction to the concept of cost-effective options, Uses and availability of different cost effective materials of construction: Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Porotherm blocks- Aerated concrete blocks- Lime Pozzolana Cement- Gypsum Boards - Lightweight Beams - Fiber Reinforced Cement Components - Fiber Reinforced Polymer Composite – Bamboo. Environmental issues related to quarrying of building materials, Recycling potential of building materials – Brick- Concrete- Steel- Plastics.</p>	

UNIT-3	[08 hours]
<p>Environment friendly cost-effective building technologies and practices</p> <p>Different substitute for wall construction: Flemish Bond - Rat Trap Bond – Cavity Wall- Wall Panels- Rammed Earth wall; Alternate roofing systems: Filler Slab - Composite beam concrete deck roof - Jack arch roof - Tiled roof.</p> <p>Concept and applications of: Pre-cast concrete in construction, Pre-engineered/ Pre-fabricated building elements, Ferro Cement/ Ferro Concrete construction, Arches in buildings.</p> <p>Day lighting: principles and practice, Concepts of thermal comfort in building envelope and estimation.</p> <p>Contributions of non-profitable and government agencies towards cost effective construction practices.</p>	

UNIT-4	[08 hours]
<p>Efficiency in Buildings and Built Environment: Energy, Water and Wastes</p> <p>Urban Environment and Green Buildings - Green Cover and Built Environment.</p> <p>Utility of Solar energy in buildings: Concepts of Solar Passive Cooling and Heating of Buildings - Low Energy Cooling- Case studies of Solar Passive Cooled and Heated Buildings.</p> <p>Water efficiency: Water Utilization in Buildings, Low Energy Approaches to Water Management, Rain water harvesting- concept and capacity calculation.</p> <p>Waste management: Management of Solid Wastes - Management of Sullage and Sewage Water</p>	



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

UNIT-5	[08 hours]
<p>Principles of Green Design and Building Rating systems</p> <p>Introduction to Sustainable development- Green Design – Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Lifecycle design of Materials and Structures (Concepts only)</p> <p>Rating systems: BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age.</p>	

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
23CV1ESGBT/23CV2ESGBT	CO 1	Define Global Warming Potential (GWP) and correlate the necessity of Green buildings to cause and effect of GWPs	PO7	3
	CO 2	Identify and compare the cost factors of construction materials and technologies; suggest cost effective sustainable options	PO6, PO7	2, 3
	CO 3	Identify different options for energy, water efficiency and waste management approaches in Buildings and Built Environment.	PO6, PO7	2, 3
	CO4	List the factors that are used in green building rating systems and correlate that with green building design	PO7	3

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1							3					
CO2						2	3					
CO3						2	3					
CO4							3					



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

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	20	20	10	50	20	50
	Test 1	40	80	20			
	Test 2	40		20			
	Test 3						
CIE – Lab	Record & Performance						
	Lab Test						
CIE				50		20	
SEE	End Exam			100		35	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

* Answer five full questions selecting one from each unit.

* To set one question each from Unit 1, 4 and 5 and two questions each from Unit 2 & 3

Suggested Learning Resources:

Text Books

1	Harharalyer G, Green Building Fundamentals, Notion Press, 2022.
2	Dr. Adv. HarshulSavla, Green Building: Principles & Practices, Notion Press, 2021.
3	K.S. Jagadish, Sustainable Building Technologies, BMTPC , IK International Publishing House Pvt. Ltd., 2019.

Reference Books

1	A.K. Jain, The Idea of Green Building, Khanna Publishers .
2	Energy, Environment and Green Building Materials, Taylor & Francis Ltd., CRC Press.

Web links and Video Lectures (e-Resources):

1	NPTEL: Sustainable Materials and Green Buildings https://archive.nptel.ac.in/courses/105/102/105102195/
2	NPTEL: Sustainable architecture , https://archive.nptel.ac.in/courses/124/107/124107011/
3	NPTEL: Ecology and Environment , https://archive.nptel.ac.in/courses/127/106/127106004/



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

Course Code :	22ME1ETISE / 22ME2ETISE	Course Title:	Introduction to Sustainable Engineering
Credits:	3	L – T – P	3-0-0

Course objectives:

To familiarize the students to the area of sustainability and concepts of sustainability engineering

To enable students with an understanding of principles and frame work of sustainable engineering

To provide students with an understanding of Life Cycle Assessment tool in sustainable engineering

To provide students with understanding of integration of sustainability with design.

Teaching-Learning Process (General Instructions)

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 various pedagogical approaches for teaching learning process

Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

UNIT-1

[8 hours]

Introduction to Sustainable engineering: Introduction to engineering of products/services
Sustainable Development and Role of Engineers: Introduction, Why and What is Sustainable Development, THE SDFs, Paris Agreement and Role of Engineering, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering
Sustainable Engineering Concepts: Key concepts – Factor 4 and Factor 10: Goals of sustainability, System Thinking, Life Cycle Thinking and Circular Economy

UNIT-2

[8 hours]

Sustainable Engineering and Concepts, Principles and Frame Work: Green Economy and Low Carbon Economy, Eco Efficiency, Triple bottom Line, Guiding principles of sustainable engineering, Frameworks for sustainable Engineering.

Tools for sustainability Assessment: procedural tools-Environmental Management System, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental Assessment, stakeholder engagement



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

UNIT-3	[8 hours]
<p>Fundamentals of Life Cycle Assessment: Why and What is LCA, LCA Goal and Scope, Life cycle inventory, Life Cycle Impact Assessment, Interpretation and presentation of Results, Iterative Nature of LCA, Methodological Choices, LCI Databases and LCA Softwares, Strength and Limitations of LCA. Environmental Life Cycle Costing, Social Life Cycle Assessment, Life Cycle Sustainability</p>	

UNIT-4	[8 hours]
<p>Life Cycle Assessment Applications in Engineering: Environmental Product Declarations and Product Category Rules, Carbon and Water Foot Printing, Energy systems, Buildings and the Built Environment, Chemical and Chemical Production Food and Agriculture</p> <p>Introduction to Environmental Economics: Introduction – What Is Environmental Economics? Valuing the Environment, Market-based Incentives (or Economic Instruments) for Sustainability, Command-and-Control versus Economic Instruments, A Simple Model of Pollution Control</p>	

UNIT-5	[8 hours]
<p>Integrating Sustainability in Engineering Design: Problems Solving in Engineering, conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on sustainable Engineering Design Process</p> <p>The contribution of engineers to sustainability: innovation, role of engineers and sustainable engineering in focus</p>	

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22ME1ETISE /22ME2ETISE	CO1	Understand the basics of sustainability and sustainable engineering	PO 1, PO7	
	CO2	Apply Sustainable Engineering Concepts to various situations	PO1, PO 7	
	CO3	Analyze the sustainability of a system through various tools	PO7,PO9, PO10	
	CO4	Develop the ideas for integration of sustainability in engineering	PO7,PO9, PO10	



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3						3		3			
CO2	3						3		3			
CO3							2		2	2		
CO3							2		2	2		

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks	
CIE – Theory	Quiz/AAT		10		50	20	50	
	Test 1	40	40					
	Test 2	40						
	Test 3	40						
CIE – Lab	Record & Performance							
	Lab Test							
CIE								
SEE	End Exam	100		50				50
Grand Total Marks								50

Semester End Examination: (QP PATTERN)

Answer five full questions selecting one from each unit.

Two questions each to be set from units 1 and 5 and one question from units 2, 3, and 4.

Suggested Learning Resources:

Text Books

1	Introduction to Sustainability for Engineers, Toolseeram Ramjeawon, CRC Press, 1 st Edition., 2020
2	Sustainability Engineering: Concepts, Design and Case studies, Prentice Hall, 1 st Edition, 2015



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

Reference Books

1	System Analysis for sustainable Engineering: Theory and applications, Ni bin Chang, McGraw Hill Publications, 1 st Edition., 2010
2	Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, 1 st Edition., 2021
3	Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHI Learning Pvt. Ltd., 2nd Edn, 2016

Web links and Video Lectures (e-Resources):

1	https://unesdoc.unesco.org/
2	https://unesdoc.unesco.org/ark:/48223/pf0000375644.locale=en
3	https://engineeringforoneplanet.org



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

Course Title	Renewable Energy Sources	Course Code	22EE1ESRES / 22EE2ESRES
Credits	03	L – T – P (Credits)	3-0-0

Course Objectives:

The objectives of the course are to facilitate the learners to

- To understand energy scenario, energy sources and their utilization.
- To explore society's present needs and future energy demands.
- To Study the principles of renewable energy conversion systems.
- To exposed to energy conservation methods.

UNIT - 1

[08 hours]

Introduction: Introduction to energy sources, conventional and non-conventional energy sources, Obstacle to the implementation of renewable energy, renewable energy availability (worldwide and India), brief descriptions on solar energy, wind energy, tidal energy, hydro energy, ocean thermal energy, biomass energy, and geothermal energy. (block diagram approach only).

Teaching-Learning Process

Chalk and talk method / Power Point Presentation

UNIT - 2

[08 hours]

Solar Energy: Solar Radiation, beam and diffuse radiation, solar radiation geometry– sketch and definitions only (latitude of location, declination, hour angle, solar Azimuth angle, Zenith angle, altitude angle, surface Azimuth angle), simple numerical on calculating declination, Solar radiation Measurements- Pyranometer, Pyrheliometers, Solar Thermal systems: Flat plate collector (water heating application), parabolic collector (dish and trough)

Solar electric power generation: Introduction to solar cells and its characteristics, Principle of Solar cell, Photovoltaic system for electric power generation, advantages, Disadvantages and applications of solar photovoltaic system (3 major applications).

Teaching-Learning Process

Chalk and talk method / Power Point Presentation



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

<u>UNIT - 3</u>		[08 hours]
Wind Energy: Introduction, basic principle of wind energy conversion, wind velocity and power from wind, site selection considerations, Basic components of wind energy conversion system (WECS); Classification of WECS- Horizontal axis- single, double and 3 blade system. Vertical axis- Savonius and darrieus types, advantages and disadvantages, safety systems, environmental aspects associated with wind power.		
Teaching-Learning Process	Chalk and talk method / Power Point Presentation	
<u>UNIT - 4</u>		[08 hours]
Tidal Power: Principle of tidal power generation, operation method of utilizing tidal energy, working of single basin tidal system storage, advantages and limitations. Ocean Thermal Energy Conversion: Principle of working, methods of power generation, working of closed OTEC cycle, prospects of OTEC power stations in India, problems associated with OTEC.		
Teaching-Learning Process	Chalk and talk method / Power Point Presentation	
<u>UNIT - 5</u>		[08 hours]
Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies-fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft). Fuel Cells: Introduction, classification of fuel cells, working of Phosphoric Acid Fuel Cell (PAFC), Alkaline Fuel Cell (AFC), Fuels for fuel cells, Fuel cell power plant, advantages and disadvantages, applications of fuel cells.		
Teaching-Learning Process	Chalk and talk method / Power Point Presentation	



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

CHOICE UNITS: II & III

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22EE1ESRES	CO1	Describe the environmental aspects of renewable energy resources in comparison with various conventional energy systems, their prospects and limitations.	7	3
	CO2	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation.	2	2
	CO3	Understand and acquire the conversion principles of wind, tidal energy, ocean thermal energy conversion, biomass energy resources	1	2
	CO4	Ability to engage in individual/team work to make effective technical presentation on Renewable Energy concepts and communicate effectively to the audience	9, 10	1, 1

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	10	10	50	20	50
	Test 1	40	90			
	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:

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 1, 4, 5 and two questions each from Unit 2 and Unit 3.



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

Suggested Learning Resources:

Text Books

1. Non-conventional Energy sources, G D Rai, Khanna Publishers, Fifth Edition,
2. Solar Energy – Principles of Thermal Collection and Storage, S.P. Sukhatme and J.K. Naik, Tata McGraw Hill Publishing Company, New Delhi, 3rd Edition, 2013.
3. Energy Technology, S. Rao and Dr. B.B. Parulekar, Khanna Publication.

Reference Books

1. Non-Conventional Energy Sources, B.H. Khan, Tata McGraw Hill Publishing Company, New Delhi, 2nd Edition, 2010.
2. Principles of Energy Conversion, A.W. Culp Jr., McGraw Hill, 1996
3. Non-Convention Energy Resources, Shobh Nath Singh, Pearson, 2018

Web links and Video Lectures (e-Resources):

- E-book URL: <https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html>
- E-book URL: <https://www.pdfdrive.com/non-conventional-energy-systems-nptel-d17376903.html>
- E-book URL: <https://www.pdfdrive.com/renewable-energy-sources-and-their-applications-e33423592.html>
- E-book URL: <https://www.pdfdrive.com/lecture-notes-on-renewable-energy-sources-e34339149.html>
- https://onlinecourses.nptel.ac.in/noc18_ge09/previe



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

Course Code :	23CV1ESWMT/23CV2ESWMT	Course Title:	Waste Management
Credits:	03	L – T – P	3-0-0

Course objectives:

- Broader understanding on various aspects of solid waste management practices.
- To learn on recovery of products from solid waste to compost and biogas, incineration and energy recovery, hazardous waste management and treatment, and integrated waste management

Teaching-Learning Process (General Instructions)

- Include traditional teaching learning process such as Chalk and Talk using writing boards.
- Construct graphical and pictorial representation of the subject in the form of Chart, hand-outs or PowerPoint presentations.
- Integrate real time case studies in various scientific tools used.
- Reflective approaches on analysing how and why the tools are used in self-reflected or published data.
- Incorporate Inquiry based approach using demonstration/ field study.

UNIT-1

[08 hours]

INTRODUCTION TO SOLID WASTE MANAGEMENT:

Classification of solid wastes (source and type based), solid waste management (SWM), elements of SWM, ESSWM (environmentally sound solid waste management) and EST (environmentally sound technologies), factors affecting SWM, Indian scenario, progress in MSW (municipal solid waste) management in India.

UNIT-2

[08 hours]

WASTE GENERATION ASPECTS:

Waste stream assessment (WSA), waste generation and composition, waste characteristics (physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city.

UNIT-3

[08 hours]

COLLECTION, STORAGE, TRANSPORT AND DISPOSAL OF WASTES:

Waste Collection, Storage and Transport: Collection components, storage-containers/collection vehicles, collection operation.

Waste Disposal: key issues in waste disposal, disposal options and selection criteria, sanitary landfill, landfill gas emission, leachate formation, environmental effects of landfill, landfill operation issues, case study.



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

UNIT-4	[08 hours]
<p>WASTE PROCESSING TECHNIQUES & SOURCE REDUCTION, PRODUCT RECOVERY & RECYCLING:</p> <p>Purpose of processing, mechanical volume and size reduction, component separation, drying and dewatering. Source Reduction, Product Recovery and Recycling: basics, purpose, implementation monitoring and evaluation of source reduction, significance of recycling, commonly recycled materials and processes.</p>	

UNIT-5	[08 hours]
<p>HAZARDOUS WASTE MANAGEMENT AND TREATMENT:</p> <p>Identification and classification of hazardous waste, basic concepts on hazardous waste treatment, pollution prevention and waste minimization, hazardous wastes management in India.</p>	

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
23CV1ESWMT/23CV2ESWMT	CO 1	Apply the basics of solid waste management towards sustainable development	PO6, PO7	2,3
	CO 2	Apply technologies to manage waste and dispose the same.	PO6, PO7	2,3
	CO 3	Define concepts and processes to recycle and convert waste to energy	PO6, PO7	2,3
	CO4	Identify and classify hazardous waste and manage the hazard	PO6, PO7	2,3

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1						2	3					
CO2						2	3					
CO3						2	3					
CO4						2	3					



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

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	20	20	10	50	20	50
	Test 1	40	80	20			
	Test 2	40		20			
	Test 3						
CIE – Lab	Record & Performance						
	Lab Test						
CIE				50		20	
SEE	End Exam			100		35	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

* Answer five full questions selecting one from each unit.

* To set one question each from Unit 1, 2 and 5 and two questions each from Unit 3 & 4

Suggested Learning Resources:

Text Books

1	Bilitewski B., Hard He G., Marek K., Weissbach A., and Boeddicker H., Waste Management, Springer, 1994
2	Tchobaanoglous, G., Theisen, H., and Samuel A Vigil, Integrated Solid Waste Management, McGraw-Hill Publishers, 1993

Reference Books

1	White, F. R., Franke P. R., & Hindle M., Integrated solid waste management: a life cycle inventory. McDougall, P. John Wiley & Sons. 2001
2	Nicholas, P., & Cheremisinoff, P. D., Handbook of solid waste management and waste minimization technologies, Imprint of Elsevier Science. 2005

Web links and Video Lectures (e-Resources):

1	NPTEL: https://nptel.ac.in/courses/105103205
2	NPTEL: https://nptel.ac.in/courses/103/107/103107125/



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

COURSE TITLE: NANOSCIENCE AND TECHNOLOGY	Course Code: 23CY1ETNST/23CY2ETNST	Credits: 03
L:T:P: 3:0:0	Contact Hours: 40	Hours/Week: 03

Course Objectives: To impart the knowledge of nanoscience and technology and its applications relevant to various disciplines of engineering.

Course Content

Unit-1

Introduction to Nanoscience and technology **8hrs**

History and interdisciplinary nature of nanoscience and engineering, Size dependent properties of nanomaterials -surface to volume ratio, catalytic properties, optical properties, magnetic properties, electrical properties, thermal properties and mechanical properties. Classifications of nanomaterials with examples. Nanoforms of carbon, nanoparticles of metals and metal oxides. Quantum dots.

Unit-2

Synthesis and characterization of Nanomaterials **8hrs**

Synthesis of nanomaterials: Bottom-up and Top-down Approach: Co-Precipitation, microwave synthesis, Self-assembly, hydrothermal, Chemical vapour deposition, Mechanical Milling and lithography.

Characterization of nanomaterials: Principle and applications of Powder X-ray diffraction, Fourier transform infrared spectroscopy, UV-Vis spectroscopy, Scanning electron microscopy, transmission electron microscopy, Energy dispersive spectroscopy and BET-analysis.

Unit-3

Engineering Applications of Nanomaterials **8hrs**

Applications of nanomaterials in (i) renewable energy- Solar cells, hydrogen generation, batteries and fuel cells (ii) medicine-drug delivery, cosmetics, tissue engineering (iii) information technology-memory, display and integrated circuits (iv) agriculture and food technology (v) Sensors-Electrochemical and Biosensors (vi) Military-textiles and aerospace.

Unit-4

Nanomaterials in water treatment **8hrs**

Applications of nanomaterials in Water Remediation-Photocatalytic degradation of toxic chemicals in water, defluorination of water, nanomaterial-based adsorbents for wastewater treatment – adsorption at metal oxide surfaces, carbon based and hybrid adsorbents; case studies. Nanofiltration.

Unit-5

Sustainable Nanotechnology **8hrs**

Application of industrial ecology to nanotechnology, Fate of nanomaterials in environment, environmental and health impacts of nano materials, toxicological threats, eco-toxicology, exposure to nano particles – biological damage, environmental surveillance. Corporate social responsibility for nanotechnology, Nano materials in future – implications.



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

Text Books

1. A Text Book of Engineering Chemistry, 4th edition, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd. 2016.
2. Wiley's Engineering Chemistry (Wiley India), Dr. Shubha Ramesh et al., 2nd Edition, 2013.
3. Materials Science and Engineering-A first course, V Raghavan, 6th edition, PHI learning private limited, 2018.

Reference Books

1. Nano: The essentials (Understanding Nanoscience and Nanotechnology), T Pradeep, Mc Graw Hill Education (India) Private Limited, 2007.
2. Fundamentals of Nanoscience, S L Kakani and Shubhra Kakani, New Age International Publishers, 1st edition, 2017

e-books

1. <https://bookboon.com/en/nano-technology-ebook>
2. <https://web.pdx.edu/~pmoeck/phy381/intro-nanotech.pdf>

NPTEL/SWAYAM/MOOCs

1. <http://nptel.ac.in/>
2. <https://swayam.gov.in/>

Course outcomes: On completion of the course, the student will have the ability to:	
CO1	Apply the principles of nanoscience in the field of science and technology.
CO2	Apply the knowledge of synthesis and characterization for the development of sustainable nanomaterials.
CO3	Implement sustainable solutions through nanoscience in the field of Materials, Energy and Environment.

CO-PO mapping with strength

	PO1	PO2	PO6	PO7
CO1	3			
CO2	2	1		
CO3			3	2



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

Scheme of Evaluation

Component	Type of assessment	Max. Marks		Weightage	Total	Total Marks
Theory	AAT# (Alternative Assessment Tool)	20		10	50	50 (CIE)*
	Test 1	40	Average of Two tests	40		
	Test 2	40				
SEE	Sem End Exam	100		50	50	50 (SEE)
Grand Total Marks						100
*Minimum CIE marks \geq 20 to gain eligibility to write the SEE						



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

Course Code :	22ME1AEIDT/22ME2AEIDT	Course Title:	INNOVATION AND DESIGN THINKING
Credits:	1	L – T – P	1-0-0

Course objectives:

1. To explain the concept of design thinking for product and service design and development
2. To explain the fundamental concept of innovation and design thinking
3. To discuss the methods of implementing design thinking in the real world.

Teaching-Learning Process (General Instructions)

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.

UNIT-1

[03 hours]

Introduction: Scope and importance, steps in design thinking- Empathize, Define, Ideate, Prototype and Test with examples

UNIT-2

[03 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

UNIT-3

[02 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



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

UNIT-4	[03hours]
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	

UNIT-5	[02 hours]
Application of Design Thinking in IT: Design Thinking to Business Process modeling – Agile in Virtual collaboration environment	

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22ME1AEIDT/ 22ME2AEIDT	CO 1	Identify the situations, which need application of concepts of design thinking.	PO1	3
	CO 2	Develop ideas to solve the identified societal and industrial problems through design thinking tools.	PO2	3
	CO 3	Demonstrate the qualities pertaining to design thinking process through group activities.	PO9, PO10, PO12	3

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2		3										
CO3									3	3		3

Assessment Details (both CIE and SEE)

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.



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

Suggested Learning Resources:

Text Books

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.

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).

Web links and Video Lectures (e-Resources):

1	www.tutor2u.net/business/presentations/. /productlifecycle/default.html
2	https://support.google.com/docs/answer/179740?hl=en
3	www.designthinkingformobility.org



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

Course Code :	22BT1AESFH/ 22BT2AESFH	Course Title:	SCIENTIFIC FOUNDATION OF HEALTH
Credits:	01	L – T – P	1-0-0

Course Objectives:

The course SFH will enable the students:

- To know about Health and wellness (and its Beliefs)
- To acquire Good Health & It's balance for positive mind-set
- To Build the healthy lifestyles for good health for their better future
- To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world
- To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
- To Prevent and fight against harmful diseases for good health through positive mindset

MODULE-1 Good Health and It's balance for positive mindset	[04 hours]
Health- Importance of Health, Influencing factors of Health, Health and Behaviour, Health beliefs, Advantages of good health, Health and Society, Health and family, Health and Personality - Profession. Health and behaviour, Psychological Disorders- Methods to improve good psychological health, Changing health habits for good health. Health and personality.	

MODULE-2 Building of healthy Lifestyles for better future	[03 hours]
Developing a healthy diet for good health, Food and health, Nutritional guidelines for good health and well beingness, obesity and overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function.	

MODULE-3 Creation of Healthy and caring relationships	[03 hours]
Building communication skills, Friends and friendship - education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviours through social engineering.	



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

MODULE -4 Avoiding risks and Harmful habits	[03 hours]
<p>Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, How addiction, develops and addictive behaviors, Types of addiction, influencing factors for addictions, Differences between addictive people and non-addictive people and their behavior with society, Effects and health hazards from addiction such as..., how to recovery from addictions.</p>	

MODULE -5 Preventing and fighting against diseases for good health	[03 hours]
<p>How to protect from different types of infections, How to reduce risks for good health, Reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life, Health and Wellness of youth: a challenge for the upcoming future. Measuring of health and wealth status.</p>	

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22BT1AESFH/2 2BT2AESFH	CO 1	To acquire Good Health and inculcate the healthy lifestyle habits with positive mindset.	6, 12	3
	CO 2	To Create a Healthy and caring relationships to meet the requirements of outer world	6, 12	3
	CO 3	To adopt the innovative & positive methods to avoid risks from harmful habits inside & outside the campus.	6, 12	3
	CO4	To positively fight against harmful diseases for good health and wellness.	6, 12	3
	CO5	Work as an individual, communicate effectively and prepare a report on health lifestyles to be inculcated in one's life	6, 12	3



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

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1						3						3
CO2						3						3
CO3						3						3
CO4						3						3
CO5						3						3

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	MCQs at CIE-1	20	50	NA	50	20	50
	1st activity (Poster)	10					
	2nd activity (PPT presentation)	10					
	3rd activity (Report writing)	10					
SEE	End Exam			50		20	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

SEE pattern for First Semester B.E (50 Marks, 1 Hour)

Part-A MCQs 25 X 1 Mark= 25 Marks.

Part-B Match the following 5X 2= 10 Marks.

Part-C Descriptive questions 3 questions for 5 marks (5 options) = 15 Marks.



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

References:

1. Think good, feel good: A cognitive-behavioral therapy workbook for children and young people by Stallard, P. (2019). John Wiley & Sons.
2. Human ecology and family sciences, Part-1, D 10T BS, National Council of Educational Research and Training
3. Health and wellness by Edlin, G., & Golanty, E. (2015). Jones & Bartlett Publishers.
4. Introduction to nutrition, exercise, and health. 4th ed. [1993] by Katch F.I.; McArdle W.D.
5. Foundations of wellness. By Reger-Nash, B., Smith, M., & Juckett, G. (2014). Human Kinetics.
6. Thriving Mind: How to cultivate a good life [Jenny Brockis](#) ISBN: 978-0-730-38367-3 July 2020
7. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY 10017.
8. Health Psychology - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press
9. HEALTH PSYCHOLOGY (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press.



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

Course Title	Communicative English	Course Code	22MA1AECEN
Credits	01	L – T – P	1:0:0

Course Objectives:

- To understand the nuances of phonetics, accent, intonation and improve the pronunciation and communication skills
- To learn the basic English grammar and understand all types of English vocabulary and acquire professional communication skills
- Perform as a member of a team and engage in group discussion and oral presentation.

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.

(i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation-based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) 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.

UNIT – 1

[03 hours]

Introduction to Communicative English: Communicative English, Fundamentals of Communicative English, Process of communication, Barriers to Effective Communication, Different styles and levels in Communication, Interpersonal and Intrapersonal Communication Skills.

Teaching-Learning Process

Chalk and talk method / Power Point Presentation

UNIT - 2

[03 hours]

Introduction to Phonetics: Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non-silent Letters, Syllables, Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation, Word Pairs (Minimal Pairs) – Exercises, Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence.

Teaching-Learning Process

Chalk and talk method / Power Point Presentation



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

<u>UNIT - 3</u>		[03 hours]
Basic English Communicative Grammar and Vocabulary PART - I: Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words		
Teaching-Learning Process	Chalk and talk method / Power Point Presentation	
<u>UNIT - 4</u>		[03 hours]
Basic English Communicative Grammar and Vocabulary PART - II: Words formation - Prefixes and Suffixes, Contractions and Abbreviations, Vocabulary – Exercises on synonyms, antonyms, homophones and homonyms.		
Teaching-Learning Process	Chalk and talk method / Power Point Presentation	
<u>UNIT - 5</u>		[03hours]
Communication Skills for Employment: Job application, Types of official/ employment/ business letters, Resume vs. Bio Data, profile, CV. Information Transfer: Oral Presentation and its Practice. Difference between Extempore/ Public Speaking, Communication Guidelines.		
Teaching-Learning Process	Chalk and talk method / Power Point Presentation	

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO
	CO 1	To understand the nuances of phonetics, accent, intonation and improve the pronunciation and communication skills	10
	CO 2	To learn the basic English grammar and understand all types of English vocabulary and acquire professional communication skills.	10
	CO 3	Perform as a member of a team and engage in group discussion and oral presentation.	9, 10

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total
CIE – Theory	AAT	10	50
	Test 1 (Descriptive + MCQ)	40	
SEE	End Exam		

Only one CIE shall be conducted.

CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.



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

Semester End Examination:

SEE paper will be set for 50 marks. The pattern of the question paper is **Descriptive and MCQ Mode**. The time allotted for SEE is 120 minutes.

Suggested Learning Resources:

Textbook:

1. **Communication Skills** by Sanjay Kumar & Pushp Lata, Oxford University Press India Pvt Ltd - 2019.
2. **A Textbook of English Language Communication Skills**, (ISBN-978-81-955465-2-7), Published by InfiniteLearning Solutions, Bengaluru - 2022.

Reference Books:

1. **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
2. **English for Engineers** by N. P. Sudharshana and C. Savitha, Cambridge University Press – 2018.
3. **English Language Communication Skills – Lab Manual cum Workbook**, Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
4. **A Course in Technical English – D Praveen Sam, KN Shoba**, Cambridge University Press – 2020.
5. **Practical English Usage** by Michael Swan, Oxford University Press – 2016.



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

Course Code :	23MA2BSMCM	Course Title:	Mathematical foundation for Civil and Mechanical Engineering stream – 2 (CV, ME, IEM, AS, CH)
Credits:	4	L – T – P	3-1-0

Course objectives:

- **Appreciate** the importance of calculus and numerical methods in the field of civil and mechanical engineering stream.
- **Gain the knowledge** of calculus and numerical methods in the field of civil and mechanical engineering stream.
- Improve their **mathematical thinking** and **acquire skills** required for sustained lifelong learning.

Teaching-Learning Process (General Instructions)

These are sample strategies which teachers can use to accelerate the attainment of the various course outcomes.

- Lecture method(L) does not mean only traditional method, but different type of teaching methods may be adopted to develop the outcomes.
- Show Video/animation films to explain functioning of various concepts.
- Encourage collaborative (Group Learning) Learning in the class.
- Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
- Topics will be introduced in a multiple representation and encourage the students to come up with their own creative ways to solve them.

Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the students' understanding.

UNIT-1

[11 hours]

INTEGRAL CALCULUS

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates.

Applications: Area(polar curves), Volume by triple integral, Mass of a plane laminar region.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.

Self-Study: Moment of Inertia along a particular direction.

(RBT Levels: L1, L2 and L3)



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

UNIT-2	[10 hours]
VECTOR CALCULUS Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector Integration: Line integrals, Green's theorem and Stokes' theorem. Application: Work done by a force. Self-Study: Velocity and acceleration of a moving particle. Gauss divergence theorem. (RBT Levels: L1, L2 and L3)	
UNIT-3	[10 hours]
PARTIAL DIFFERENTIAL EQUATIONS Formation of partial differential equations (PDE) by elimination of arbitrary constants and functions. Solution of nonhomogeneous PDE by direct integration. Solution of Lagrange's linear PDE. Solution of homogeneous PDE by separation of variables. Applications: Mathematical modelling in terms of one-dimensional heat equation and wave equation. Self-Study: Solution of one-dimensional heat equation and wave equation by the method of separation of variables. (RBT Levels: L1, L2 and L3)	
UNIT-4	[09 hours]
NUMERICAL METHODS -1 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: Bisection method, Newton's divided difference formula. (RBT Levels: L1, L2 and L3)	
UNIT-5	[08 hours]
NUMERICAL METHODS -2 Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula, Applications: Finding approximate solutions to ODE related to engineering field. Self-Study: Adam-Bashforth method. (RBT Levels: L1, L2 and L3)	



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

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
23MA1BSMCM	CO 1	Apply the concepts of Calculus, Congruences and Matrix theory in solving problems.	1	3
	CO 2	Relate the importance of Calculus, Congruences and Matrix theory in computer science stream.	1	1
	CO 3	Demonstrate the understanding of Calculus, Congruences and Matrix theory through programming skills using modern tool.	1,5	2

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2	1											
CO3	2				2							

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	20	20	10 40	50	20	50
	Test 1	40	80				
	Test 2	40					
CIE				50		20	
SEE	End Exam			100		30	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 2, 4, 5 and two questions each from Unit 1 and Unit 3.



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

Suggested Learning Resources:

Text Books

1	B. S. Grewal: “Higher Engineering Mathematics”, Khanna publishers, 44 th Ed., 2021.
2	E. Kreyszig: “Advanced Engineering Mathematics”, John Wiley & Sons, 10 th Ed., 2018.
3	D. C. Lay: “Linear Algebra and its Applications”, Pearson Publishers, 4 th Ed., 2018.

Reference Books

1	V. Ramana: “Higher Engineering Mathematics” McGraw-Hill Education, 11th Ed., 2017
2	Srimanta Pal & Subodh C. Bhunia: “Engineering Mathematics” Oxford University Press, 3rd Ed., 2016.
3	N. P. Bali and Manish Goyal: “A textbook of Engineering Mathematics” Laxmi Publications, 10th Ed., 2022.
4	C. Ray Wylie, Louis C. Barrett: “Advanced Engineering Mathematics” McGraw – Hill Book Co., New York, 6th Ed., 2017.
5	Gupta C. B, Sing S. R. and Mukesh Kumar: “Engineering Mathematic for Semester I and II”, Mc-Graw Hill Education (India) Pvt. Ltd 2015.
6	H. K. Dass and Er. Rajnish Verma: “Higher Engineering Mathematics” S. Chand Publication, 3rd Ed., 2014.
7	James Stewart: “Calculus” Cengage Publications, 7th Ed., 2019.
8	Gareth Williams: “Linear Algebra with applications”, Jones Bartlett Publishers Inc., 6 th Ed., 2017.

Web links and Video Lectures (e-Resources):

1	Integral Calculus: https://www.classcentral.com/course/youtube-integral-calculus-90616 and https://www.edx.org/course/mathtrackx-integral-calculus
2	Integral and Vector Calculus: https://onlinecourses.nptel.ac.in/noc22_ma03/preview
3	Vector Calculus: https://www.classcentral.com/course/mit-opencourseware-multivariable-calculus-fall-2007-40962/classroom and https://www.classcentral.com/course/vector-calculus-engineers-17387
4	Partial Differential Equations: https://ocw.mit.edu/courses/18-152-introduction-to-partial-differential-equations-fall-2011/ , https://archive.nptel.ac.in/courses/111/101/111101153/ and https://nptel.ac.in/courses/111103021 and https://www.classcentral.com/course/swayam-partial-differential-equations-17721
5	Numerical Methods: https://www.classcentral.com/course/numerical-methods-engineers-32822 , https://nptel.ac.in/courses/111107105 and https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/



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

Course Code :	23MA2BSMES	Course Title:	Mathematical foundation for Electrical stream – 2 (EEE, ETE, ECE, MD, EIE)
Credits:	4	L – T – P	3-1-0

Course objectives:

- **Appreciate** the importance of calculus and numerical methods in the field of civil and mechanical engineering stream.
- **Gain the knowledge** of calculus and numerical methods in the field of civil and mechanical engineering stream.
- Improve their **mathematical thinking** and **acquire skills** required for sustained lifelong learning.

Teaching-Learning Process (General Instructions)

These are sample strategies which teachers can use to accelerate the attainment of the various course outcomes.

- Lecture method(L) does not mean only traditional method, but different type of teaching methods may be adopted to develop the outcomes.
- Show Video/animation films to explain functioning of various concepts.
- Encourage collaborative (Group Learning) Learning in the class.
- Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
- Topics will be introduced in a multiple representation and encourage the students to come up with their own creative ways to solve them.

Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the students' understanding.

UNIT-1

[11 hours]

INTEGRAL CALCULUS

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates.

Applications: Area (polar curves), Volume by triple integral.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.

Self-Study: Duplication formula. Moment of Inertia along a particular direction.

(RBT Levels: L1, L2 and L3)



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

UNIT-2	[09 hours]
VECTOR CALCULUS Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector Integration: Line integrals, Green's theorem and Stokes' theorem. Application: Work done by a force. Self-Study: Volume integral and Gauss divergence theorem. (RBT Levels: L1, L2 and L3)	
UNIT-3	[11 hours]
VECTOR SPACE AND LINEAR TRANSFORMATIONS Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension. Linear transformations: Definition and examples, Matrix of a linear transformation. Rank and nullity of a linear operator, rank-nullity theorem. Applications: Geometric linear transformation in R^2 for image processing. Self-study: Eigen spaces of a linear transformation. Invertible linear operators. (RBT Levels: L1, L2 and L3)	
UNIT-4	[09 hours]
NUMERICAL METHODS -1 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: Bisection method, Newton's divided difference formula. (RBT Levels: L1, L2 and L3)	
UNIT-5	[08 hours]
Numerical methods - 2 Numerical Solution of Ordinary Differential Equations (ODE's) Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula, Applications: Finding approximate solutions to ODE related to Electrical engineering field. Self-Study: Adam-Bashforth method. (RBT Levels: L1, L2 and L3).	



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

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
23MA2BSMES	CO 1	Apply the concepts of Calculus, Linear Algebra and Numerical methods in solving problems.	1	3
	CO 2	Relate the importance of Calculus, Linear Algebra and Numerical methods in Electrical stream.	1	1
	CO 3	Demonstrate the understanding of Calculus, Linear Algebra and Numerical methods through programming skills using modern tool.	1, 5	2

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2	1											
CO3	2				2							

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	20	20	10 40	50	20	50
	Test 1	40	80				
	Test 2	40					
CIE				50		20	
SEE	End Exam			100		30	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 2, 4, 5 and two questions each from Unit 1 and Unit 3.



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

Suggested Learning Resources:

Text Books

1	B. S. Grewal: “Higher Engineering Mathematics”, Khanna publishers, 44th Ed., 2021.
2	E. Kreyszig: “Advanced Engineering Mathematics”, John Wiley & Sons, 10th Ed., 2018.
3	David C Lay: “Linear Algebra and its Applications”, Pearson Publishers, 4th Ed., 2018.

Reference Books

1	V. Ramana: “Higher Engineering Mathematics” McGraw-Hill Education, 11th Ed., 2017
2	Srimanta Pal & Subodh C. Bhunia: “Engineering Mathematics” Oxford University Press, 3rd Ed., 2016.
3	N. P. Bali and Manish Goyal: “A textbook of Engineering Mathematics” Laxmi Publications, 10th Ed., 2022.
4	C. Ray Wylie, Louis C. Barrett: “Advanced Engineering Mathematics” McGraw – Hill Book Co., Newyork, 6th Ed., 2017.
5	Gupta C.B., Sing S. R. and Mukesh Kumar: “Engineering Mathematic for Semester I and II”, Mc-Graw Hill Education (India) Pvt. Ltd 2015.
6	H. K. Dass and Er. Rajnish Verma: “Higher Engineering Mathematics” S. Chand Publication, 3rd Ed., 2014.
7	James Stewart: “Calculus” Cengage Publications, 7th Ed., 2019.
8	Gareth Williams: “Linear Algebra with applications”, Jones Bartlett Publishers Inc., 6 th Ed., 2017.

Web links and Video Lectures (e-Resources):

1	Integral Calculus: https://www.classcentral.com/course/youtube-integral-calculus-90616 and https://www.edx.org/course/mathtrackx-integral-calculus
2	Integral and Vector Calculus: https://onlinecourses.nptel.ac.in/noc22_ma03/preview
3	Vector Calculus: https://www.classcentral.com/course/mit-opencourseware-multivariable-calculus-fall-2007-40962/classroom and https://www.classcentral.com/course/vector-calculus-engineers-17387
4	Partial Differential Equations: https://ocw.mit.edu/courses/18-152-introduction-to-partial-differential-equations-fall-2011/ , https://archive.nptel.ac.in/courses/111/101/111101153/ and https://nptel.ac.in/courses/111103021 and https://www.classcentral.com/course/swayam-partial-differential-equations-17721
5	Numerical Methods: https://www.classcentral.com/course/numerical-methods-engineers-32822 ,



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

Course Code :	23MA2BSMCS	Course Title:	Mathematical foundation for Computer Science Stream-2 (CS, IS, ML, DS, IOT, CSB, Computer and Management, BT)
Credits:	4	L – T – P	3-1-0

Course objectives:

- **Appreciate** the importance of calculus and numerical methods in the field of civil and mechanical engineering stream.
- **Gain the knowledge** of calculus and numerical methods in the field of civil and mechanical engineering stream.
- Improve their **mathematical thinking** and **acquire skills** required for sustained lifelong learning.

Teaching-Learning Process (General Instructions)

These are sample strategies which teachers can use to accelerate the attainment of the various course outcomes.

- Lecture method(L) does not mean only traditional method, but different type of teaching methods may be adopted to develop the outcomes.
- Show Video/animation films to explain functioning of various concepts.
- Encourage collaborative (Group Learning) Learning in the class.
- Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
- Topics will be introduced in a multiple representation and encourage the students to come up with their own creative ways to solve them.

Discuss how every concept can be applied to the real world and when that's possible, it helps to improve the students' understanding.

UNIT-1	[11 hours]
INTEGRAL CALCULUS Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications: Area(polar curves), Volume by triple integral. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Self-Study: Duplication formula. Moment of Inertia along a particular direction. (RBT Levels: L1, L2 and L3)	



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

UNIT-2	[09 hours]
VECTOR CALCULUS Scalar and vector fields. Gradient, curl and divergence – physical interpretation, solenoidal and irrotational vector fields. Orthogonal Curvilinear coordinates: Scale factors, base vectors, transformation between cartesian and curvilinear systems, Cylindrical polar coordinates, Spherical polar coordinates. Applications: Directional derivative. Self-Study: Area element, volume element in orthogonal curvilinear coordinates. (RBT Levels: L1, L2 and L3)	
UNIT-3	[11 hours]
VECTOR SPACE AND LINEAR TRANSFORMATIONS Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension. Linear transformations: Definition and examples, Matrix of a linear transformation. Rank and nullity of a linear operator, rank-nullity theorem. Applications: Geometric linear transformation in R^2 for image processing. Self-study: Eigen spaces of a linear transformation. Invertible linear operators. (RBT Levels: L1, L2 and L3)	
UNIT-4	[09 hours]
NUMERICAL METHODS -1 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: Bisection method, Newton's divided difference formula. (RBT Levels: L1, L2 and L3)	
UNIT-5	[08 hours]
NUMERICAL METHODS -2 Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula, Applications: Finding approximate solutions to ODE related to engineering field. Self-Study: Adam-Bashforth method. (RBT Levels: L1, L2 and L3).	



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

Course outcomes (Course Skills Set)

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
23MA2BSMCS	CO 1	Apply the concepts of Calculus, Linear Algebra and numerical methods in solving problems.	1	3
	CO 2	Relate the importance of Calculus, Linear Algebra and numerical methods in computer science stream.	1	1
	CO 3	Demonstrate the understanding of Calculus, Linear Algebra and numerical methods through programming skills using modern tool.	1, 5	2

COs and POs Mapping

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3											
CO2	1											
CO3	2				2							

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	Reduced Marks	Total	Min. Marks required for eligibility	Total Marks
CIE – Theory	Quiz/AAT	20	20	10	50	20	50
	Test 1	40					
	Test 2	40					
CIE				50		20	
SEE	End Exam			100		30	50
Grand Total Marks							100

Semester End Examination: (QP PATTERN)

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 2, 4, 5 and two questions each from Unit 1 and Unit 3.

Suggested Learning Resources:

Text Books

1	B. S. Grewal: “Higher Engineering Mathematics”, Khanna publishers, 44 th Ed., 2021.
2	E. Kreyszig: “Advanced Engineering Mathematics”, John Wiley & Sons, 10 th Ed., 2018.
3	D. C. Lay: “Linear Algebra and its Applications”, Pearson Publishers, 4 th Ed., 2018.



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

Reference Books

1	V. Ramana: “Higher Engineering Mathematics” McGraw-Hill Education, 11th Ed., 2017
2	Srimanta Pal & Subodh C. Bhunia: “Engineering Mathematics” Oxford University Press, 3rd Ed., 2016.
3	N. P. Bali and Manish Goyal: “A textbook of Engineering Mathematics” Laxmi Publications, 10th Ed., 2022.
4	C. Ray Wylie, Louis C. Barrett: “Advanced Engineering Mathematics” McGraw – Hill Book Co., New York, 6th Ed., 2017.
5	Gupta C.B., Sing S. R. and Mukesh Kumar: “Engineering Mathematic for Semester I and II”, Mc-Graw Hill Education (India) Pvt. Ltd 2015.
6	H. K. Dass and Er. Rajnish Verma: “Higher Engineering Mathematics” S. Chand Publication, 3rd Ed., 2014.
7	James Stewart: “Calculus” Cengage Publications, 7th Ed., 2019.
8	Gareth Williams: “Linear Algebra with applications”, Jones Bartlett Publishers Inc., 6 th Ed., 2017.

Web links and Video Lectures (e-Resources):

1	Integral Calculus: https://www.classcentral.com/course/youtube-integral-calculus-90616b and https://www.edx.org/course/mathtrackx-integral-calculus
2	Integral and Vector Calculus: https://onlinecourses.nptel.ac.in/noc22_ma03/preview
3	Vector Calculus: https://www.classcentral.com/course/mit-opencourseware-multivariable-calculus-fall-2007-40962/classroom and https://www.classcentral.com/course/vector-calculus-engineers-17387
4	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
5	Numerical Methods: https://www.classcentral.com/course/numerical-methods-engineers-32822 ,



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

Course Title	Professional Writing Skills in English	Course Code	22MA2AEPWE
Credits	01	L – T – P	1:0:0

Course Objectives:

- To understand and identify the common errors in writing and speaking
- Developing listening and speaking skills through classroom activities based on listening comprehension, recapitulation, interpretation and debate on the same
- To read technical proposals and write good technical reports, to acquire better analytical skills and methodology required for writing projects and research papers.
- Perform as a member of a team and engage in group presentation.

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.

(i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation-based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) 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.

UNIT – 1

[03 hours]

Identifying Common Errors in Writing and Speaking English: Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused. Analogy of Comparison

Teaching-Learning Process

Chalk and talk method / Power Point Presentation

UNIT - 2

[03 hours]

Nature and Style of Sensible Writing: Organizing Principles of Paragraphs, Writing Introduction and Conclusion, Importance of Proper Punctuation, Precis writing, Essay writing, Sentence arrangements and Corrections activities. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words.

Teaching-Learning Process

Chalk and talk method / Power Point Presentation

UNIT - 3

[03 hours]



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

Technical Reading and Writing Practices: Technical writing process, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar – Voices and Reported Speech, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.	
Teaching-Learning Process	Chalk and talk method / Power Point Presentation
<u>UNIT - 4</u>	
[03 hours]	
Professional Communication for Employment: Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. Reading Comprehension, Tips for effective reading. Emails, Blog Writing and Memos.	
Teaching-Learning Process	Chalk and talk method / Power Point Presentation
<u>UNIT - 5</u>	
[03hours]	
Professional Communication at Workplace: Group Discussion and Professional Interviews, Characteristics and Strategies of a GD and PI's, Non-Verbal Communication Skills and its importance in GD and Interview. Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills	
Teaching-Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skills Set)

Course Outcomes		PO
CO1	To understand and identify the common errors in writing and speaking.	10
CO2	Developing listening and speaking skills through classroom activities based on listening comprehension, recapitulation, interpretation and debate on the same.	10
CO3	To read Technical proposals and write good technical reports, to acquire better analytical skills and methodology required for writing projects and research papers.	10
CO4	Perform as a member of a team and engage in group presentation.	9, 10

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total
CIE – Theory	AAT	10	50
	Test 1 (Descriptive + MCQ)	40	
SEE	End Exam		

Only one CIE shall be conducted.

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.



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

Semester End Examination:

SEE paper will be set for 50 marks. The pattern of the question paper is **Descriptive and MCQ mode**. The time allotted for SEE is 120 minutes.

Suggested Learning Resources:

Textbook:

1. **“Professional Writing Skills in English”** published by Phillip Learning – Education (ILS), Bangalore – 2022.
2. **“Functional English”** (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].

Reference Books:

1. **English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
2. **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-0) Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
3. **Technical Communication – Principles and Practice**, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
4. **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd – 2015.
5. **Effective Technical Communication – Second Edition** by M Ashraf Rizvi, McGraw Hill Education (India) Private



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

ಬಳಕೆ ಕನ್ನಡ			
ವಿಷಯ ಸಂಕೇತ (Course Code)	22MA1HSBAK / 22MA2HSBAK	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯ ಮಾಪನ ಅಂಕಗಳು.	50
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ (Teaching Hours / week (L:T:P:S))	1-0-0	ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು	50
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Hours of Pedagogy	15 ಗಂಟೆಗಳು	ಒಟ್ಟು ಅಂಕಗಳು	100
ಕ್ರೆಡಿಟ್ಸ್ (Credits)	01		

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

1. To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To train the learners for correct and polite conservation.
5. To know about Karnataka state and its language, literature and General information about this state.

ಭೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching – Learning Process – General Instructions):

These are sample Strategies; which teacher can use to accelerate the attainment of the course outcomes.

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿ ಕೊಡುವುದು.
3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧ ಪಟ್ಟ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
4. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚಿಗೆ ಡಿಜಿಟಲೀಕರಣ ಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚುರ್ಚಿಸಲು ಕ್ರಮ ಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
5. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯ ಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.



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

UNIT – 1		2 Hours
<p>1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.</p> <p>2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening and Speaking Activities. Key to Transcription.</p> <p>3. ವ್ಯಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯ ಸೂಚಕ / ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words</p>		
ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು.	
UNIT – 2		3 Hours
<p>1. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು – Possesive forms of nouns, dubitive question and Relative nouns.</p> <p>2. ಗುಣ ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣ ಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and colour Adjectives, Numerals.</p>		
ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು.	
UNIT – 3		3 Hours
<p>1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative cases, and numerals.</p> <p>2. ಸಂಖ್ಯಾವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು – Ordinal numerals and Plural markers.</p>		
ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು.	
UNIT – 4		3 Hours
<p>1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು. Permission, Commands, encouraging and Urging words (Imperative words and sentences)</p> <p>2. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯ ಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು. – Helping verbs "iru and iralla", corresponding Future and negation verbs.</p>		



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

ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಸ್ವಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು.	
UNIT – 5		4 Hours
1. ಕನ್ನಡ ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯ. Kannada Language and History. 2. Kannada Language Script Part – 1		
ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಸ್ವಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು.	

ಬಳಕೆ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22MA1HSBAK / 22MA2HSBAK	CO 1	To create an awareness regarding the necessity of learning local language for a comfortable living and to know more about Kannada culture and literature.	PO10	3
	CO 2	To develop proper speaking, reading and writing skills in Kannada.	PO10	3
	CO 3	To engage as a member of a team and enhance the skill in group communication and presentation.	PO9	1

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total
CIE – Theory	AAT 1	10	100
	Test 1	40	
SEE	End Exam	50	

Only one CIE shall be conducted after CIE2 and before CIE 3. 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.

ಪಠ್ಯ ಪುಸ್ತಕ:

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ, ಬಳಕೆ ಕನ್ನಡ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.



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

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ			
ವಿಷಯ ಸಂಕೇತ (Course Code)	22MA1HSSAK / 22MA2HSSAK	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯ ಮಾಪನ ಅಂಕಗಳು.	50
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ (Teaching Hours / week (L:T:P:S))	1-0-0	ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು	50
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Hours of Pedagogy	15 ಗಂಟೆಗಳು	ಒಟ್ಟು ಅಂಕಗಳು	100
ಕ್ರೆಡಿಟ್ಸ್ (Credits)	01		
ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು : 1. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು. 2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು. 3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು. ಕನ್ನಡ ಶಬ್ದ ಸಂಪತ್ತಿನ ಪರಿಚಯ.			
ಭೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching – Learning Process – General Instructions): These are sample Strategies; which teacher can use to accelerate the attainment of the course outcomes. 6. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು. 7. ಇವತ್ತಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ - ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು. ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶನಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಕಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು. 8. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸುವುದು.			
ಘಟಕ - 1			3 Hours
ಲೇಖನಗಳು: 1. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ: ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ. 2. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ.			
ಭೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪ್ಪ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು.		



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

ಘಟಕ - 2		4 Hours
ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ: 1. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕ ಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ಯಕ್ಕಿ ಲಕ್ಕಮ್ಮ. 2. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ - ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು		
ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಸ್ವಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪ್ಪ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು .	
ಘಟಕ - 3		3 Hours
ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ: 1. ಡಿ. ವಿ. ಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲ ಭಾಗಗಳು 2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ. ರಾ. ಬೇಂದ್ರೆ . 3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು		
ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಸ್ವಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪ್ಪ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು .	
ಘಟಕ - 4		3 Hours
1. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ: ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ ಎನ್ ಮೂರ್ತಿರಾವ್ 2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ		
ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಸ್ವಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪ್ಪ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು.	
ಘಟಕ - 5		2 Hours
1. ಮಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ ಚಿ ಬೋರಲಿಂಗಯ್ಯ		
ಭೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಸ್ವಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪ್ಪ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಕಾಂತರ ಚರ್ಚಿಸುವುದು.	



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

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು (course Outcomes):

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO
22KBK17/27	CO 1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ.	PO10
	CO 2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳ ಹಾಗೂ ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿ ಮೂಡುತ್ತದೆ.	PO10
	CO 3	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ, ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.	PO9

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total
CIE – Theory	AAT 1	10	100
	Test 1	40	
SEE	End Exam	50	

Only one CIE shall be conducted after CIE2 and before CIE 3. 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.

ಪಠ್ಯ ಪುಸ್ತಕ:

ಡಾ. ಹಿ. ಚಿ. ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ, ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.



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

Course Title	Constitution of India and Professional Ethics	Course Code	22MA1HSCIP / 22MA2HSCIP
Credits	01	L-T-P-S	1-0-0-0

Total Hours: 15

Course objectives:

The course **Constitution of India and Professional Ethics (22MA1HSCIP/22MA2HSCIP)** will enable the students,

- To educate students about the country's highest law.
- To be familiar with the political system and practices of both state and the central government.
- To know about the risk, workplace safety and to understand issues related to the profession.

Teaching-Learning Process

These are sample strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- Innovative lecture methodologies to be adapted to improve the teaching and learning process.
- Short videos for better understanding and group discussion.
- Encourage collaborative (Group Learning) learning in the class.
- Ask Higher Order Thinking (HOT) questions in the class, which promotes critical thinking.
- Classroom discussions focused on case studies help students strengthen their analytical skills and thinking abilities, such as the capacity to assess, generalise, and analyse knowledge rather than just recollect it.

UNIT-1

[03 hours]

Introduction to Indian Constitution

Indian Constitution: Introduction and Necessity of the Indian constitution, Making of the Constitution, Role of the Constituent Assembly. Preamble and Salient features of the Constitution of India, Fundamental Rights and its limitations.

Teaching-Learning Process	Chalk and talk method / Power Point Presentation
---------------------------	--

UNIT -2

[03 hours]

Fundamental Duties and Directive Principles of State Policy

Fundamental Duties and their significance. Directive Principles of State Policy: Importance and its relevance. Case Studies.

Teaching-Learning Process	Chalk and talk method / Power Point Presentation
---------------------------	--

UNIT -3

[03 hours]

Union Executive and State Executive

The Union Executive – The President and the Vice President, the Prime Minister and The Council of Ministers. The Union Parliament – Lok Sabha & Rajya Sabha. The Supreme Court of India. State Executive – The Governors, the Chief Ministers and the Council of Ministers. The State Legislature – Legislative Assembly and Legislative Council. State High Courts.

Teaching-Learning Process	Chalk and talk method / Power Point Presentation
---------------------------	--



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

UNIT-4

[03 hours]

Election Commission of India, Amendments and Emergency Provisions

Election Commission of India – Powers & Functions – Electoral Process in India.

Methods of Constitutional Amendments and their Limitations.

Important Constitutional Amendments – 42nd, 44th, 61st, 74th, 76th, 77th, 86th and 91st. Emergency Provisions. Case Studies.

Teaching-Learning Process	Chalk and talk method / Power Point Presentation
---------------------------	--

UNIT-5

[03 hours]

Professional Ethics

Scope and Aims of Engineering Ethics, Responsibilities of Engineers and impediments to Responsibilities. Honesty, Integrity and Reliability; Risks – Safety and Liability in Engineering. Case Studies

Teaching-Learning Process	Chalk and talk method / Power Point Presentation
---------------------------	--

Course outcomes (Course Skills Set)

At the end of the course, the student will have the ability to

COURSE CODE	CO	COURSE OUTCOME (CO)	PO	Strength
22MA1HSCIP / 22MA2HSCIP	CO1	Recognize the significance of the Indian Constitution as the supreme legal authority.	PO6, PO12	3
	CO2	Understand the powers & functions of organs of the government at the centre and state level.	PO6, PO12	3
	CO3	Apply the principles of moral obligations and duties to safeguard the public's welfare and safety.	PO8, PO12	2

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total
CIE – Theory	AAT 1	10	100
	Test 1	40	
SEE	End Exam	50	

Only one CIE shall be conducted after CIE2 and before CIE 3. 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.



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

Text Books:

- “An Introduction to Constitution of India and Professional Ethics” by Merunandan K.B. and B.R. Venkatesh, Meragu Publications, 3rd edition, 2011.
- “Constitution of India & Professional Ethics & Human Rights” by Phaneesh K. R., Sudha Publications, 10th edition, 2016.

Reference Books:

- “V.N. Shukla's Constitution of India” by Prof (Dr.) Mahendra Pal Singh (Revised), Eastern Book Company, Edition: 13th Edition, 2017, Reprint 2019.
- “Ethics in Engineering” by Martin, W. Mike., Schinzinger, Roland., McGraw-Hill Education; 4th edition (February 6, 2004).

E books and online course materials:

1. <https://www.smartworld.com/notes/constitution-of-india-and-professional-ethics-notes-vtu-cip-pdf/>
2. <https://legalstudymaterial.com/constitution-of-india/>

Question Paper Pattern:

SEE Multiple Choice Questions (Online Examination)
