BACHELOR OF ENGINEERING
SCHEME & SYLLABUS
I & II SEMESTERS
2020-2021

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

BMS COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

FIRST YEAR SYLLABUS BOOK

With effect from the A.Y.2020-2021

CONTENTS

Scheme & Syllabus for UG Programme – I & II Semesters

ABBREVATIONS

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
ES	Engineering Science
NC	No Credit

Scheme & Syllabus for UG Programme – I Semester
Scheme of Instruction for First Semester B.E. 2020-2021

(PHYSICS CYCLE)

S No	Course Code	Course Title	Credits			
			L	T	P	Total
1	18MAB1ESEM1	Engineering Mathematics – 1	3	1	0	4
2	18PYB1SPHY	Applied Physics	4	0	1	5
3	18ECE1ESCE	Elements of Electronics Engineering	3	0	0	3
4	18ME1ESME	Elements of Mechanical Engineering	3	0	1	4
5	18CS1ESCCP	'C' Programming	3	0	1	4
6	18HSINCKAN	Kannada Language*	Mandatory Course			0
	Total					20

Scheme of Instruction for First Semester B.E. 2020-2021
(CHEMISTRY CYCLE)

S No	Course Code	Course Title	Credits			
			L	T	P	Total
1	18MAB1ESEM1	Engineering Mathematics – 1	3	1	0	4
2	18CYB1SCHY	Engineering Chemistry	4	0	1	5
3	18EE1ESELE	Elements of Electrical Engineering	3	0	1	4
4	18CV1ESENM	Engineering Mechanics	3	1	0	4
5	18ME1ESEED	Elements of Engineering Drawing	1	0	2	3
6	18HSINCENG	Functional English*	Mandatory Course			0
	Total					20

L-Lecture (1 credit=1 contact hr.);

T-Tutorial (1 credit=2 contact hrs.);

P-Practical (1 credit=2 contact hrs.);

***** CIE only

Scheme & Syllabus for UG Programme – II Semester
Scheme of Instruction for Second Semester B.E. 2020-2021
(CHEMISTRY CYCLE)

S No	Course Code	Course Title	Credits			
			L	**T**	**P**	**Total**
1	18MAT2BSEM2	Engineering Mathematics – 2	3	1	0	4
2	18CHY2BSCHY	Engineering Chemistry	4	0	1	5
3	18EE2ESELE	Elements of Electrical Engineering	3	0	1	4
4	18CV2ESENM	Engineering Mechanics	3	1	0	4
5	18ME2ESEED	Elements of Engineering Drawing	1	0	2	3
6	18HS2NCENG	Functional English*	Mandatory Course			0
	Total					20

Scheme of Instruction for Second Semester B.E. 2020-2021
(PHYSICS CYCLE)

S No	Course Code	Course Title	Credits			
			L	**T**	**P**	**Total**
1	18MAT2BSEM2	Engineering Mathematics – 2	3	1	0	4
2	18PHY2BSPHY	Applied Physics	4	0	1	5
3	18EE2ESELE	Elements of Electronics Engineering	3	0	0	3
4	18ME2ESEME	Elements of Mechanical Engineering	3	0	1	4
5	18CS2ESCCP	'C' Programming	3	0	1	4
6	18HS2NCKAN	Kannada Language*	Mandatory Course			0
	Total					20

L-Lecture (1 credit=1 contact hr.);

T-Tutorial (1 credit=2 contact hrs.);

P-Practical (1 credit=2 contact hrs.);

***** CIE only

COURSE TITLE	ENGINEERING MATHEMATICS-1	COURSE CODE	18MA1BSEM1
CREDITS	04	L – T – P	3 – 1 – 0
CONTACT HOURS	48 Hours		

Course Objectives: To acquaint the students with principles of mathematics through Calculus and Differential Equations, that serves as an essential tool in several engineering applications.

UNIT-I

DIFFERENTIAL CALCULUS – 1

Polar curves - Angle between the radius vector and tangent, angle between two curves, length of the perpendicular from pole to the tangent, pedal equation. Curvature and radius of curvature- Cartesian and polar forms (without proof). Taylor's and Maclaurin's series expansions for function of one variable (without proof). **[9 hours]**

UNIT-II

DIFFERENTIAL CALCULUS – 2

Partial differentiation; Total derivatives-differentiation of composite functions. Jacobians, Taylor's and Maclaurin's series expansions for function of two variables. Maxima and minima for a function of two variables. **[10 hours]**

UNIT-III

INTEGRAL CALCULUS

Multiple integrals: Evaluation of double integrals- change of order of integration and changing into polar co-ordinates, triple integrals. Applications: Area (Polar curves) and volume.

Beta and Gamma functions: Definitions, Relation between Beta and Gamma functions and problems. **[11 hours]**

UNIT-IV

ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER

Bernoulli's equation. Exact and reducible to exact differential equations.
$(i)\frac{M_y - N_x}{N} = g(x)$ $(ii)\frac{N_x - M_y}{M} = h(y)$. Initial value problems. Applications: Orthogonal trajectories and Mixing problems. **[9 hours]**

UNIT-V

ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second and higher order linear ordinary differential equations with constant coefficients- Inverse differential operators, Particular Integrals of e^{ax}, $\sin(ax), \cos(ax)$ and x^m. Method of variation of parameters; Cauchy's and Legendre homogeneous equations. **[9 hours]**

Text Books

1) Higher Engineering Mathematics, B.S. Grewal, 43rd edition, 2014, Khanna Publishers.
2) Higher Engineering Mathematics, B.V. Ramana, 7th reprint, 2009, Tata Mc. Graw Hill.

Reference Books

3) Advanced Engineering Mathematics, Erwin Kreyszig, edition 2014, Vol.1 and Vol.2, 2014, Wiley-India.
4) Advanced Engineering Mathematics, Dennis Zill, Warren S Wright, Michael R. Cullen, 4th edition, 2011, Jones & Bartlett Learning.

E-books and Online Resources

5) Advanced Engineering Mathematics, P.V. O'Neil, 7th Indian reprint, 2011, Cengage learning India Pvt. Ltd.
https://ndl.iitkgp.ac.in/ and
https://www.pdfdrive.com/engineering-mathematics-books.html
6) Engineering Mathematic, K. A. Stroud, Dexter J. Booth, Industrial Press,2001,
https://ndl.iitkgp.ac.in/ and
https://www.pdfdrive.com/engineering-mathematics-books.html

NPTEL/SWAYAM/MOOCs:

7) http://nptel.ac.in/courses.php/
8) https://www.class-central.com/subject/math (MOOCS)

Course Outcomes:

Course Code	CO's	At the end of the course, the student will have the ability to:	PO's mapped	Strength of mapping
18MA1BSEM1	CO 1	**Understand** the concepts of Calculus and differential equations.	--	--
	CO 2	**Apply** the concepts of calculus and Differential Equations to Engineering Problems.	1	3
	CO 3	**Demonstrate** an understanding of the multiple integrals using alternate tools.	5	1

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COURSE TITLE	**APPLIED PHYSICS**	**COURSE CODE**	**18PY1BSPHY/ 18PY2BSPHY**
CREDITS	**05**	**L – T – P**	**4 – 0 – 1**
CONTACT HOURS	**Theory: 48 Hours. Practical: 24 Hours**		

Course Objectives: To disseminate to the students, the concepts of quantum mechanics, electrical and thermal properties of solids, materials science, lasers, optical fibers, oscillations and facilitate students to apply in their area of specialization.

UNIT – I

Quantum Mechanics

de-Broglie hypothesis. Definition and expression 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. Derivation of de-Broglie wavelength using group velocity. Matter waves – characteristic properties. 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 wave equation. Eigen functions and eigenvalues. Applications of Schrodinger's wave equation: 1. Free particle, 2. Particle in a one-dimensional potential well of infinite height and finite width (Eigen functions, probability density and eigenvalues for the first three states). Problems.

[10 hours]

UNIT – II

Electrical and Thermal Properties of Solids

Electric 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. Expression for Fermi energy. 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. Density of states (qualitative), Problems.

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.

[9 hours]

UNIT – III

Materials Science

Dielectric Materials: Introduction, polarization, expression for polarization, types of polarization, Frequency dependence of polarization. Expression for electronic polarizability. Expression for internal field in liquids and solids (one dimensional), Lorentz field and Clausius – Mossotti relation. Expression for dielectric loss. Problems.

Physics of Semiconductor: Introduction, Fermi level in intrinsic and extrinsic semiconductors, Expression for concentration of electrons in conduction band. Mention of the expression for hole concentration in valance band, Expression for intrinsic carrier concentration, Conductivity of semiconductors, Hall effect, Expression for Hall coefficient. Problems.

[10 hours]

UNIT – IV

Lasers and Optical Fibers

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, condition for laser action using Einstein's coefficients, basic requisites of a laser system. Construction and working of He-Ne laser and semiconductor diode laser. Applications of lasers. Holography – recording of hologram and reconstruction of image. Problems.

Optical Fibers: Introduction. Principle of propagation in optical fibers. Angle of acceptance, expression for numerical aperture and condition for propagation. Fractional index change. Number of modes – V number, inter-modal dispersion. Classification of optical fibers. Attenuation – causes of attenuation, expression for coefficient of attenuation. Applications of optical fibers. Problems.

[10 hours]

UNIT – V

Theory of Oscillations

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 in SHM, electric to magnetic in an LC circuit. Theory of damped vibrations: Resistive forces, equation of motion-expression for decaying amplitude, cases of damping. Logarithmic decrement, relaxation time and quality factor. Theory of forced vibrations and resonance: Equation of motion-expression for amplitude, mechanical impedance, expression for maximum amplitude. Examples of resonance – ESR and NMR. Problems.

[9 hours]

LIST OF EXPERIMENTS

No.	Name of the experiment	Skill
1	Wavelength of LEDs	Determine
2	Fermi energy of copper	Determine
3	Thermal conductivity of a poor conductor by Lee Charlton's method	Determine
4	Thermal conductivity of a metal by Forbe's method	Determine
5	Dielectric constant of a material by charging and discharging of a capacitor	Determine

6	Energy gap of a semiconductor using four probe method	Determine
7	Wavelength of semiconductor laser source using diffraction grating	Determine
8	Divergence angle of semiconductor laser beam	Determine
9	Numerical aperture of an optical fiber	Analyse
10	Series and parallel LCR circuits	Analyse

Text Books:

1. Solid State Physics – Sixth Edition – S. O Pillai – New Age International Publishers.
2. Engineering Physics – V Rajendran – Tata Mcgraw–Hill.

Reference Books:

3. Concepts of Modern Physics – Fifth edition- Arthur Beiser – Tata Mcgraw-Hill.
4. Engineering Physics – R K Gaur and S L Gupta – Dhanpat Rai Publications.

E-Books/Resources:

5. http://de.physnet.net/PhysNet/education.html
6. http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html

NPTEL/SWAYAM/MOOCs:

7. http://nptel.ac.in/
8. https://swayam.gov.in/

Course Outcomes:

Course Code	CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
18PY1BSPHY/ 18PY2BSPHY	**CO1**	**Understand** the principles of quantum mechanics, transport phenomena, dielectric and semiconductor material properties of solids, laser and optical fiber and concept of vibrations.	--	--
	CO2	**Apply** the principles of quantum mechanics, transport phenomena, dielectric and semiconductor material properties of solids, laser and optical fibre and types of vibrations to obtain desired parameters.	PO1	3
	CO3	**Conduct** experiments to obtain the desired parameter of the given material / physical system.	PO4	3

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COURSE TITLE	ELEMENTS OF ELECTRONICS ENGINEERING	COURSE CODE	18EC1ESECE/ 18EC2ESECE
CREDITS	03	L – T – P	3 – 0 – 0
CONTACT HOURS	36 Hours		

Course Objectives:

- To provide an understanding of Electronic Devices and Circuits.
- To introduce the fundamentals of Digital Electronics.
- To assimilate concepts of Electronic Communication Systems and Subsystems.
- To reinforce the application based areas of Electronic Systems.

UNIT-I

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.

UNIT-II

Transistor & Applications

Transistor: Operation, Configurations and Input-Output Characteristics. DC load line and Operating Point, Transistor as a Switch. Transistor as Amplifier: Voltage Divider Bias Circuit, Bias Stabilization, CE Amplifier, Frequency Response. Feedback Principle, Advantages of Negative Feedback.

UNIT-III

Oscillators and Op-amps

Oscillators: Principle of Oscillations, RC Phase Shift Oscillator, Hartley and Colpitts Oscillator, Crystal Oscillator. Operational Amplifiers: Block Diagram of Op-Amp, Ideal Op-Amp v/s Practical Op-Amp, Virtual Ground, Applications: Inverting and Non-Inverting Amplifier, Voltage Follower, Summing Amplifier, Integrator and Differentiator.

UNIT-IV

Digital Electronics & Circuits

Introduction to Number Systems, Boolean Algebra, Boolean laws, Universality of NAND and NOR Gates, Logic Circuits, Sum of Product and Product of-Sum Forms, Simplification of Boolean Expressions using Boolean laws, Simplification of Boolean Expressions: K- Map (Using 2 and 3 variables only). Combinational Logic Circuits: Half Adder, Full Adder. Multiplexer, Decoder, SR and JK flip-flops.

UNIT-V

Communication Systems

Analog and Digital Communication: Fundamental Concepts with Block Diagram, Introduction to Cellular Communication, Computer Communication Networks and IOT.

Text Books:

1. Basic Electronics Devices, Circuits and its Fundamentals, Santiram Kal, PHI.2009
2. Electronic Devices and Circuits, David A Bell, PHI, 5th Edition, 2007

Reference Books:

3. Integrated Electronics, Millman & Halkias, International Student Edition, McGraw Hill Kogakusha Ltd, 2010
4. Electronic Devices and Circuit Theory, Robert L Boylestad and L. Nashelsky,Pearson Education, 9th edition, 2005

E-Books:

5. https://www.elsevier.com/books/basic-electronics/holbrook/978-0-08-006865-7
6. http://www.worldcat.org/title/basic-electronics/oclc/681543319

NPTEL/SWAYAM/ MOOC:

7. http://nptel.ac.in/courses/117103063/
8. https://swayam.gov.in/course/3595-basic-electronics
9. https://www.mooc-list.com/course/introduction-electronics-coursera

Course Outcomes:

Course Code	CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
18EC1ICECE/ 18EC2ICECE	CO1	**Understand** the Concepts of Electronic Devices and Circuits and **realize** the Applications of Electronics in Interdisciplinary Engineering Domains.	0	1
	CO2	**Apply** the basic principles of Electronics to solve Analog and Digital circuits.	1	3
	CO3	**Analyze** the characteristics/ performance parameters of Electronic Circuits.	2	3
	CO4	**Design** basic Electronic Circuits for given Specifications.	3	1
	CO5	**Build cognizance on Electronic Waste and its Management.**	6	1

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COURSE TITLE	ELEMENTS OF MECHANICAL ENGINEERING	COURSE CODE	18ME1ESEME/ 18ME2ESEME
CREDITS	04	L – T – P	3 – 0 – 1
CONTACT HOURS	Theory: 36 Hours. Practical: 12 Hours		

Course Objectives:

- To provide a general understanding of energy-machine-application relationship.
- To introduce the fundamentals of harnessing energy.
- To familiarize the working principles of basic mechanical systems.
- To acquaint with basic fabrication processes.

UNIT-I

Sources of Energy

Introduction to sources of energy, conventional and non-conventional sources, solar energy (heliothermal, flat plate, parabolic), Steam formation, properties of steam, specific volume, enthalpy & internal energy, types of steam, Introduction & principle of boilers, types of boilers (No sketching of Boilers),Introduction and classification of steam turbines (Impulse & Reaction),Open and Closed Gas turbines, Working of hydro power plant, Classification of Hydraulic turbines, working principle of Impulse & Reaction turbines (Pelton, Francis turbine with simple diagram). **[9 hours]**

UNIT-II

Refrigeration and Internal Combustion Engines

Introduction to refrigeration, properties of an ideal refrigerant, COP, types of refrigerants, working principle of vapour compression and vapour absorption refrigerators, Classification of IC engines, parts of IC engines (simple sketch), working principle of 4-stroke petrol engine, diesel engine, numerical problems on 4 stroke petrol and diesel engines (power and efficiency calculation).

[6 hours]

UNIT-III

Metal joining and Machine Tools

Introduction to metal joining process-permanent & temporary joints, nuts and bolts, metric thread profile. Arc welding (explanation with sketch), brazing, soldering. Introduction to Lathe, parts of Lathe, Lathe specifications, type of Lathe operations (turning, taper turning, thread cutting & knurling).Introduction to drilling machine, classification of drilling machines, radial drilling machine, drilling operations (Boring, counter boring, countersinking, reaming, tapping), Introduction to grinding machine, working principle of cylindrical, surface and centreless grinding (line diagram).

[9 hours]

UNIT-IV

Power Transmission

Introduction to power transmission, open and crossed belt drives (no derivations), velocity ratio of belt drive, simple numerical problems, Types of gear drives, simple and compound gear trains, numerical problems on gear ratio, velocity ratio calculation, Introduction to Bearing, Classification of Bearings (Ball & Roller) Lubrication – Types &Examples.

[6 hours]

UNIT-V

Mechatronics & Additive Manufacturing

Introduction, definition of mechatronic systems, measurement and control systems, open and closed loop control systems (simple block diagrams), Examples for Open and Closed Loop systems, Introduction to AM - eight step process of AM (detailing not needed), Materials used in AM, Types of AM processes - FFF process and DLP process, Applications of AM in various industries.

[6 hours]

LIST OF EXPERIMENTS

No.	Name of the experiment	Skill
1	Drilling, Tapping	Fabrication Skills
2	Thread cutting using Dies	Fabrication Skills
3	Welding (Lap Joint)	Fabrication Skills
4	Sheet metal-Development, joints (Funnel)	Fabrication Skills, Apply
5	Soldering	Fabrication Skills
6	Demonstration of Additive Manufacturing	Demonstrate
7	Demonstration of Lathe operations	Demonstrate
8	Lathe- Model on Plain turning	Demonstrate
9	Model on step turning	Demonstrate

Text Books:

1. Elements of Mechanical Engineering, K. R. Gopalakrishna, Subhas Publications, Bangalore- 2008
2. Additive Manufacturing Technologies, Ian Gibson, David Rosen, Brent Stucker, Second Edition, Springer Publication
3. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 3rd Edition by W. Bolton

Reference Books:

3. A Text Book of Elements of Mechanical Engineering – S. Trymbaka Murthy I. K. International Pvt Ltd, 2010 - Mechanical engineering
4. Elements of Mechanical Engineering – Dr. A.S. Ravindra, Best Publicaions, 7th edition, 2009.
5. Elements of Mechanical Engineering, Vol.1 & 2, Hajra Choudhury, Media Promoters, New Delhi, 2001.

E-Books:

6.https://www.books-by-isbn.com/81-265/8126553030-Elements-of-Mechanical-Engineering-J-K-Kittur-81-265-5303-0.html
7. Elements of Mechanical Engineering by V. K. MANGLIKhttps://books.google.co.in/books/about/Elements_of_MECHANICAL_ENGINEERING.html?id=QlYorohzY_AC

NPTEL//MOOC:

8.http://ocw.mit.edu/courses/mechanical
9.www.distance.lehigh.edu/credit/me.html
10.http://www.nptelvideos.com/mechanical/?pn=0

Course Outcomes:

Course Code	CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
18ME1ESEME/ 18ME2ESEME	CO1	**Understand** the working principles of various mechanical systems.	-	-
	CO2	**Identify** practical applications of mechanical elements, systems and processes	1	2
	CO3	**Distinguish** the different refrigeration systems, IC engines, fasteners and power transmission systems	1	2
	CO4	**Compute** various performance parameters of IC engines, velocity ratio of belt and gear drives.	1	2
	CO 5	**Impact** of Energy sources on Environment and sustainability	7	1
	CO 6	**Develop** basic fabrication skills through hands on Laboratory Exercises.	4	3
	CO7	**Apply** the knowledge of engineering drawing in the fabrication of sheet metal components	1	1

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Course Title: C Programming	**Course Code**: **18CS1ESCCP/ 18CS2ESCCP**	**Credits**: 04
L:T:P: 3-0-1	**Contact Hours**:36	**Hours/Week**: 03

Course Objectives:

- To understand basic programming concepts.
- To provide knowledge for problem solving through programming.
- To provide hands-on experience with the concepts.

Note: All the units shall include sample programs.

UNIT -I

INTRODUCTION TO PROGRAMMING [8 hours]

Introduction to computer software, Program Design Tools: Algorithms, Flowcharts, Pseudo codes, Structure of a C program, Writing the first C program, Keywords, Identifiers, Basic Data Types in C, Variables, Constants, Input / Output Statements in C, Operators in C- Arithmetic, Relational, Logical, Conditional, Type conversion and Typecasting.

UNIT -II

CONDITIONAL AND LOOPING STATEMENTS [7 hours]

Conditional branching statements, if, if-else, if-else-if and switch statements, Iterative statements, while, do-while and for loop statements, Nested loops, the break and continue statements.

UNIT-III

FUNCTIONS AND ARRAYS [7 hours]

Functions: Function Declaration/Function Prototype, Function definition, Function call, passing parameters to functions.

Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, operations on 1-d arrays – Inserting an Element in an array, Deleting an Element from an Array, searching for a Value in an Array, two-dimensional arrays, operations on two-dimensional arrays – Sum, Difference.

UNIT-IV

STRINGS AND STRUCTURES [7 Hours]

Strings: Introduction, Operations on Strings – finding the length of a String, converting characters of a string into upper case, Converting characters of a string into lower case.

Structures: Introduction to Structures, Copying and comparing structures, Nested structures.

UNIT-V

POINTERS AND FILE PROCESSING [7 hours]

Pointers: Introduction to Pointers, Declaring pointer variables, Passing arguments to function using pointers.

File Processing: Introduction to Files, Read Data from Files, Writing data to Files.

Text Books:

1. Computer Fundamentals and Programming in C - Reema Thareja: Oxford University Press, Second Edition.
   (6.1, 8.4, 9.2, 9.3, 9.9, 9.10, 9.11, 9.12, 9.13, 9.14, 9.15.1, 9.15.2, 9.15.4, 9.15.6, 9.16, 10.2, 10.3, 10.4, 10.5, 11.3, 11.4, 11.5, 11.7, 12.2, 12.3, 12.4,12.5.2, 12.5.3,12.5.5,12.7, 12.8, 15.1,15.2,14.2,14.3,14.7,16.1,16.3,16.4)

Reference Books:

2. Programming in C – Reema Thareja, Oxford University Press, Second Edition.
3. Programming with C- B S Gottfried: Schaums Outline Series 2003.

Online References:

VTU e learning,

4. http://videos.vtu.ac.in/video_groups.php?group=COMPUTER%20SCIENCE

Concepts of Programming in C Lab

1.	Develop a program to find the largest of three numbers.
2.	Develop an interactive program to calculate roots of quadratic equation by accepting the coefficients.
3.	Develop a program to sum the series: 1/1! + 4/2! + 27/3! +….. using functions.
4.	Develop a program to insert a number at a given location in an array.
5.	Implement a program to perform a binary search on 1D sorted Array.
6.	Develop a program to read a two dimensional array “marks” which stores marks of 5 students in three subjects. Display the highest marks in each subject.
7.	Develop a program to concatenate two strings and determine the length of the concatenated string.
8.	Develop a program to read and display the information about a student using structures.
9.	Implement a program to enter a character and then determine whether it is a vowel or not using pointers.
10.	Develop a program to read data from the keyboard, write it to a file called “Input”, again read the same data from the “Input” file and display it on the screen.
	Mini Projects

1.	Implement a commercial calculator to solve simple computational problems using arithmetic expressions (without using built-in math function).
2.	An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs. 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs. 400, then an additional surcharge of 15% of total amount is charged. Develop an application to read the name of the user, number of units consumed and print out the charges.
3.	Design and implement an interactive application to calculate Semester Grade Point Average (SGPA) of a student in a Semester End Examination (SEE).

Course Outcomes and mapping for the C Programming Course

CO1	Ability to describe the basic concepts of C programming
CO2	Ability to apply the knowledge of C programming constructs for a given problem
CO3	Ability to analyse the given problem to determine the output and correctness of the programs given
CO4	Ability to develop C programs to find a solution for the given requirements.
CO5	Ability to conduct practical experiments for demonstrating the features of C programming concepts.

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Course Code	18HS1NCKAK/ 18HS2NCKAK	Course Name	KANNADA KALI
Credits	0	L – T – P- S	1 -0 -0 -0

KANNADA KALI 12hours
(ONLY FOR NON-KARNATAKA STUDENTS)

OBJECTIVES : ಕನ್ನಡೇತರ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ 'ಕನ್ನಡ ಕಲಿ' ಎಂಬ ಪಠ್ಯದಿಂದ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಸಲಾಗುತ್ತದೆ.

PART-1 **[06 hours]**

Lesson-1: Introducing each other-1. Personal Pronouns, Possessive forms, Interrogative forms.

Lesson-2: Absolute Ramayana. Possessive forms of nouns, dubietive question, relative nouns.

Lesson-3: Enquiring about a room for rent, Qualitative and Quantitative adjectives.

Lesson-4: Vegetable market, Numeral, Plurals.

PART-2 **[06 hours]**

Lesson-1: Planning for a picnic, Imperative, Permissive, hortative.

Lesson-2: About Brindavan Garden, Past tense, negation.

Lesson-3: About routine activities of a student, verbal principle, reflexive form, negation.

Lesson-4: About Halebid, Belur, relative, principle, Negation.

OUTCOMES: ಕನ್ನಡೇತರ ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯುವುದರಿಂದ ಕರ್ನಾಟಕದಲ್ಲಿ ಓದುವ ಸಂದರ್ಭದಲ್ಲಿ ಕನ್ನಡಿಗರೊಂದಿಗೆ ವ್ಯವಹರಿಸಲು ಸಾಧ್ಯವಾಗುತದೆ.

TEXT BOOKS: Kannada Kali, Prasaranga, Kannada university, Hampi.

Reference Books:

1. Kannada Kali – Dr. Lingadevaru Halemane
2. Spoken Kannada – Kannada Sahithya Parishath, Bangalore .

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Course Code	18HS1NCKAM / 18HS2NCKAM	Course Name	KANNADA MANASU
Credits	0	L – T – P- S	1 -0 -0 -0

ಕನ್ನಡ ಮನಸು 12hours

(ONLY FOR KARNATAKA STUDENTS)

OBJECTIVES : ಕರ್ನಾಟಕದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ 'ಕನ್ನಡ ಮನಸು'ಎಂಬ ಪಠ್ಯದಿಂದ ಕರ್ನಾಟಕದ ಸಂಸ್ಕೃತಿಯನ್ನು ಪರಿಚಯಿಸಲಾಗುತ್ತದೆ.

ಭಾಗ–1 [06 hours]

1. ಡಾ.ವಿಶ್ವೇಶ್ವರಯ್ಯ–ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ (ವ್ಯಕ್ತಿ ಚಿತ್ರ) – ಎ.ಎನ್.ಮೂರ್ತಿರಾವ್
2. ಬೆಡ್ ನಂಬರ್ ಏಳು (ಕಥೆ) – ತ್ರಿವೇಣಿ
3. ಶ್ರಾವಣ (ಪದ್ಯ) – ದ.ರಾ.ಬೇಂದ್ರೆ
4. ನಮ್ಮ ಎಮ್ಮೆಗೆ ಮಾತು ತಿಳಿಯುವುದೇ? (ವಿನೋದ) – ಗೊರೂರು ರಾಮಸ್ವಾಮಿ ಅಯ್ಯಂಗಾರ್

ಭಾಗ–2 [06 hours]

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ಒಂದು ಚಿತ್ರ (ಪರಿಚಯ ಲೇಖನ) – ಡಾ. ರಹಮತ್ ತರೀಕೆರೆ
2. ತಾಂತ್ರಿಕ ಯುಗದಲ್ಲಿ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಸ್ತುತತೆ – ಡಾ. ವಿ.ಜಯರಾಮ್
3. ಗುಬ್ಬಚ್ಚಿಯ ಗೂಡು (ಅಂಕಣ ಬರಹ) – ಪಿ.ಲಂಕೇಶ್
4. ಎಲ್ಲ ಹುಡುಗಿಯರ ಕನಸು (ಕವನ) – ಸವಿತಾ ನಾಗಭೂಷಣ

OUTCOMES: ಕರ್ನಾಟಕದ ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಸ್ಕೃತಿ ಅಧ್ಯಯನದ ಮೂಲಕ ಕರ್ನಾಟಕ ಚರಿತ್ರೆ, ಪರಿಸರ, ಧರ್ಮ, ಆಚಾರ, ವಿಚಾರ ಮುಂತಾದ ವಿಷಯಗಳನ್ನು ಮೈಗೂಡಿಸಿ ಕೊಳ್ಳುತ್ತಾರೆ.

ಪಠ್ಯ ಪುಸ್ತಕ: ಕನ್ನಡ ಮನಸು, ಪ್ರಸಾರಂಗ, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ.

ಪಾರಮಾರ್ಶನ ಗ್ರಂಥಗಳು:

1. ಗ್ರಾಮಾಯಣ – ರಾವ್‌ಬಹುದ್ದೂರ್
2. ಕಾನೂರು ಹೆಗ್ಗಡತಿ – ಕುವೆಂಪು
3. ನಮ್ಮ ಹೊಟ್ಟೆಯಲ್ಲಿ ದಕ್ಷಿಣ ಅಮೇರಿಕಾ – ಬಿ.ಜಿ.ಎಲ್. ಸ್ವಾಮಿ

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COURSE TITLE	**ENGINEERING CHEMISTRY**	**COURSE CODE**	**18CY1BSCHY/ 18CY2BSCHY**
CREDITS	**05**	**L – T – P**	**4 – 0 – 1**
CONTACT HOURS	**Theory: 48 Hours. Practical: 24 Hours**		

Course Objectives:
To impart the knowledge of Chemistry involved in water treatment, electrochemistry, corrosion and its control, conventional energy sources, electrochemical and renewable sources of energy, polymers, nanomaterials and instrumental methods of analysis.

UNIT-I

Water Treatment

Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water - boiler scales - formation, disadvantages and prevention, removal of hardness by ion exchange method, Desalination of water - reverse osmosis, forward osmosis and electro dialysis. Dissolved oxygen, BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water, treatment of waste water - aerobic and anaerobic oxidation, primary, secondary and tertiary treatment methods, numerical problems on hardness & COD. Applications of NTO and Ag NP in waste water treatment.

[9 hours]

UNIT-II

Electrochemistry and Corrosion

Electrodes and cells – Introduction, classification of cells-primary, secondary and concentration cells, reference electrodes–calomel electrode and Ag/AgCl electrode, ion-selective electrode - glass electrode, determination of pH using glass electrode, determination of pKa of weak acids, numerical problems on concentration cells and pH determination.

Corrosion – Definition of chemical corrosion, electrochemical theory of corrosion, types of corrosion - differential metal, differential aeration (pitting and water line corrosion) and stress corrosion, factors affecting the rate of corrosion, corrosion control: inorganic coatings – anodizing and phosphating, metal coatings - galvanization, tinning and electroplating of chromium, cathodic protection.

[10 hours]

UNIT-III

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 problems on calorific value, petroleum cracking - fluidized bed catalytic cracking, Octane number, reformation of petrol, synthetic petrol – Fischer-Tropsch's process, power alcohol, biodiesel and hydrogen as a fuel – advantages, production and storage.

Photovoltaic cells – Production of solar grade silicon, physical and chemical properties of silicon relevant to photovoltaics, doping of silicon, construction and working of a PV cell and advantages. **Batteries** - Basic concepts, classification of batteries – primary and secondary batteries, battery characteristics, modern batteries - construction, working and applications of zinc–air, nickel-metal hydride and Li-ion batteries (one example).

Fuel cells - Introduction, construction and working of methanol-oxygen fuel cell with acid electrolyte. **[11 hours]**

UNIT-IV

Polymer Chemistry

Polymers - Introduction, mechanism of coordination polymerization (Ziegler - Natta polymerization), methods of polymerization – bulk, solution, suspension and emulsion polymerization, number average and weight average molecular weight, numerical problems, glass transition temperature, structure and property relationship of 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, fiber glass, Kevlar, Carbon based composites. **Conducting polymers** - Introduction, synthesis of polyaniline and mechanism of conduction in it and uses.

Biodegradable polymers- Introduction, polyglycolic acid-synthesis, degradation and uses.

[9 hours]

UNIT-V

Nanomaterials and Instrumental methods of analysis

Nanomaterials: Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: Top down and bottom up approaches, Synthesis by solgel, hydrothermal and chemical vapour deposition methods. Nanoscale materials: Carbon nanotubes and graphene – properties and applications.

Instrumental methods of analysis: Principle, instrumentation and applications of Colorimetry, Flame Photometry, Potentiometry and Conductometry (mixture of strong acid and a weak acid with a strong base). **[9 hours]**

LIST OF EXPERIMENTS

No.	Name of the experiment	Skill
1	Determination of percentage of copper in brass using standard sodium thiosulphate solution (brass solution to be prepared by weighing brass-making up method).	Alloy composition
2	Determination of total hardness of a sample of water using disodium salt of EDTA.	Estimation hardness of water
3	Determination of chemical oxygen demand (COD) of the given industrial waste water sample.	Estimation of Pollutant level in industrial waste water
4	Determination of pKa of a weak acid using pH meter.	Determination of strength of weak acid
5	Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.	Application of different electrodes
6	Determination of percentage of iron in the given rust solution (using potassium dichromate) by external indicator method.	Corrosion product analysis
7	Determination of calorific value of a solid fuel using Bomb calorimeter.	Fuel characteristics
8	Synthesis of polyaniline and its conductivity measurement	Synthesis of conducting polyaniline

9	Estimation of copper by colorimetric method.	Absorption spectroscopy
10	Conductometric estimation of HCl + CH_3COOH using standard sodium hydroxide solution	Analysis of acid mixture
11	Estimation of sodium in water by flame photometric method	Emission spectroscopy

Text Books:

1. A Text book of Engineering Chemistry - by P. C. Jain and Monica Jain, Dhanapatrai Publications, New Delhi, 2011, 16th Edition, 1404 pages.
2. Engineering Chemistry - by Chandra Shekara B M and Basavaraju B C, Banbayalu (publications), Bengaluru, 2014, 294 pages.

Reference Books:

3. Wiley's Engineering Chemistry (Wiley India), 2nd Edition, 2013, 1026 pages.
4. Engineering Chemistry: Fundamentals and Applications - by Shikha Agarwal, Cambridge University Press, New Delhi, 2016, 1179 pages.

E-Books:

5. 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
6. Introduction to Chemistry - Tracy Poulsen; 250 pages; ISBN-13: 9781478298601; ISBN-10: 147829860X.

NPTEL/SWAYAM/MOOCs:

7. **http://nptel.ac.in/**
8. **https://swayam.gov.in/**

Reference Book: (Laboratory)

9. Engineering Chemistry Lab Manual, written by faculty, Dept. of Chemistry, BMSCE, Bangalore.

Course Outcomes:

Course Code	CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
18CY1BSCHY/ 18CY2BSCHY	**CO1**	**Describe** the principles of Chemistry involved in water treatment, electrochemistry corrosion and its control, conventional energy sources, electrochemical and renewable sources of energy, polymers, nanomaterials and instrumental methods of analysis.	-	-
	CO2	**Address** the problems based on the learnt chemistry principles.	1	3
	CO3	**Apply** the acquired knowledge to **analyze** data, conduct experiments and draw meaningful inferences	2	2

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COURSE TITLE	ELEMENTS OF ELECTRICAL ENGINEERING	COURSE CODE	18EE1ESELE/ 18EE2ESELE
CREDITS	04	L – T – P	3 – 0 – 1
CONTACT	Theory: 24 Hours. Practical: 12 Hours		

Course Objectives:
To introduce fundamental concepts and techniques to analyse the behaviour of electrical circuits. To provide the details regarding principle of operation and methods to evaluate the performance of electrical apparatus. To impart an overview about electrical wiring and protection mechanisms for domestic applications

UNIT-I

D.C.Circuits: Review of Ohm's Law, analysis of series, parallel and series- parallel circuits excited by independent voltage sources (No numerical problems).
Power and energy, Kirchhoff's laws, branch current method, superposition theorem**,** illustrative examples.
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, illustrative examples**.**

[7 hours]

UNIT-II

A.C. Fundamentals:Generation of sinusoidal voltage, frequency of generated voltage, definitions and expressions for average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantity, illustrative examples.
A.C.Circuits: Analysis with phasor diagram of circuits with R, L, C, R-L, R-C, R-L-C for series and parallel configurations. Real power, reactive power, apparent power and power factor, illustrative examples.

[7 hours]

UNIT-III

Three Phase Synchronous Generator: Basic parts, principle of operation, synchronous speed, frequency of generated voltage, emf equation. Concept of winding factor (excluding the derivation of distribution and pitch factors), illustrative examples.
Three phase AC Circuits: Three-phase balanced circuits, voltage and current relations in star and delta connections. Measurement of three phase power using two wattmeter method, effect of power factor on wattmeter readings, illustrative examples**.**

[8 hours]

UNIT-IV

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**.** **[7 hours]**

UNIT-V

Three Phase Induction Motors: Concept of rotating magnetic field, construction and working of a three-phase induction motor, slip and its significance, illustrative examples.
Domestic Wiring: Service mains, meter board and distribution board. Types of wires and Cables used in domestic wiring, power requirement calculation for domestic applications. Elementary discussion on circuit protective devices, fuse and Miniature Circuit Breaker (MCB's).Earthing: pipe and plate earthing, engineering practice for domestic earthing**.**

[7 hours]

LIST OF EXPERIMENTS

No.	Name of the Experiment	Skill
1	Verification of KCL and KVL for DC circuit.	Conduct and analyse
2	Measurement of Power and Power factor in a single phase lighting circuit.	Conduct and analyse
3	Measurement of Power and Power factor in a single phase power load circuit.	Conduct and analyse
4	Measurement of resistance and inductance of a coil using A-V-W method.	Conduct and analyse
5	Verification of voltage and current relationship in a Three phase Star connected load.	Conduct and verify
6	Verification of voltage and current relationship in a Three phase Delta connected load.	Conduct and verify
7	Measurement of three phase power in star connected load using two wattmeter method.	Conduct and analyse
8	Measurement of three phase power in delta connected load using two wattmeter method.	Conduct and analyse
9	The speed versus torque characteristic of a DC Shunt motor.	Conduct and verify
10	Load test on single phase Transformer	Conduct and verify
11	Observation of phase differences between current and voltage	Learn
12	Experiment on safety devices and Earthing	Learn engineering practices

Text Books:

1."Basic Electrical Engineering", D.C.Kulshreshta (2009),1st Edition, Tata-McGraw-Hill.
2. "Basic Electrical Engineering", N. Narasimhaswamy (2015),1st Edition, EBPB publishers.

Reference Books:

3." Electrical and Electronics Technology " E. Hughes (Revised by J. Hiley, K. Brown and I.M Smith), 9th Edition, Pearson Education, 2005.
4."Problems in Electrical Engineering" S.S.Parker Smith and N.N Parker Smith.
5."Electrical Science", P. M. Chandrashekharaiah, Rajeshwari Publications.

E-Book:

6.http://nptel.ac.in/courses/108105053/

ONLINE VIDEO LECTURES:

7.http://nptel.ac.in/courses/108108076/

Course Outcomes:

Course Code	CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
18EE1ESELE/ 18EE2ESELE	CO1	Understand the basic concepts of DC, AC circuits and Electrical Machines.	--	--
	CO2	Apply the basic knowledge of mathematics, science and electrical engineering to obtain the desired parameters/performance characteristics of Electric circuits and Machines.	1	2
	CO3	Analyse the behavior of Electric circuits, transformers and Electrical machines.	2	2
	CO4	Conduct a study on safety aspects, wiring and consumption of electrical power in domestic installations.	6	1
	CO5	Conduct experiments and study the performance of electrical machines, AC and DC circuits.	4	2
	CO6	Norms of engineering practice for domestic earthing.	8	1

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COURSE TITLE	ENGINEERING MECHANICS	COURSE CODE	18CV1ESENM/ 18CV2ESENM
CREDITS	04	L – T – P	3 – 1 – 0
CONTACT HOURS	48 Hours		

Course Objectives:
Day to day activities of every action follows the fundamental laws of physics. There is a need to know how the laws of physics could be applied to explain these activities. Effects of forces/force systems on an object/engineering structure are to be analyzed under static and dynamic conditions. This course is devised keeping the above objectives in mind.

UNIT-1

ENGINEERING MECHANICS – BASIC CONCEPTS AND RESULTANT OF FORCE SYSTEM

Concept of force, force Characteristics, internal and external force, force system and types of force systems, Principle of Transmissibility of force, principle of Superposition and physical independence, Idealization of bodies-particle, rigid body, continuum, Moment of a force about a point and about an axis, Couple, characteristics of couple. Resolution and composition of force, Numerical problems on resolution and composition of forces. Resultant and equilibrant of force system, Numerical problems on Resultant and equilibrant of force system, Parallelogram law, Triangle law, and Polygon law of forces, Numerical problems on Parallelogram law, Triangle law, and Polygon law of forces, Varignon's theorem, problems on resultant of coplanar concurrent and non-concurrent force systems by method of resolution.

[12 hours]

UNIT-II

EQUILIBRIUM OF FORCE SYSTEM:

Free body diagram, conditions of equilibrium of concurrent and non-concurrent co planar force system, Lami's Theorem, problems on particle and rigid body equilibrium; Types of supports in beams; Types of loads. Numerical problems on support reactions in determinate beams and frames. Analysis of plane trusses by method of joints, Numerical problems.

[8 hours]

UNIT-III

FRICTION:

Introduction, coefficient of friction, angle of friction, angle of repose; laws of dry (Coulomb) friction, Numerical problems on single and multi-body system on horizontal planes and incline planes, Numerical problems on wedge friction and ladder friction.

[8 hours]

UNIT-IV

CENTROID AND MOMENT OF INERTIA:

Centroids and centre of gravity of regular geometrical plane areas including parabola, Derivations on centroid of regular geometrical areas by integration, Numerical problems on centroids of composite areas and built up sections. Second moment (moment of inertia) of an area, moment of inertia of regular geometrical shapes by integration method, polar moment of inertia, radius of gyration, Parallel and Perpendicular axis theorems, Numerical problems on moment of inertia of composite areas and built up sections.

[10 hours]

UNIT-V

DYNAMICS:

Kinematics - Introduction, types of motion, position vector, velocity and acceleration, Equations of linear motion (no numerical problems), Projectile motion; Numerical problems on projectiles, Kinetics of particles - Introduction**,** Newton's Second law of motion, D'Alembert's principle and its application to problems on system of particles, banking of roads. Work, Power, energy and efficiency, Kinetic energy of particles, Work-Energy Principle and its application to problems on particles and system of particles. Definition of linear momentum, impulse, impulse-momentum equation, Conservation of linear momentum and related problems. **[10 hours]**

Text Books:

1. Mechanics for Engineers, Statics and Dynamics by Ferdinand Beer and E Russell Johnston, 4th Edition (1972), McGraw Hill Company, New York.
2. Engineering Mechanics by Nelson, 1st Edition (2009) , McGraw Hill Publishers

Reference Books:

3. Engineering Mechanics by Timoshenko and Young; 5th edition (2017) McGraw Hill Book Company , New Delhi
4. Engineering Mechanics , Statics and Dynamics by Meriam JL Kraige, (1993) Wiley Publishers, New Delhi
5. Applied Mechanics by I B Prasad, *Edition* 17, *Publisher*, Khanna Pub., 1996.

E-Books/Resources:

6. VTU e-learning center (Program number 13)
7. NPTEL Lecture Series on Engineering Mechanics, IIT Kanpur
8. MOOCs-http://www.mooc-list.com/course/introduction-engineering-mechanics-coursera

Course Outcomes:

Course Code	COs	At the end of the course, the student will be able to	POs mapped	Strength of mapping
18CV1ESENM/ 18CV2ESENM	**CO1**	**Explain** basic terminologies, definitions, laws and principles related to statics and dynamics.	-	-
	CO2	**Apply** mathematical and engineering fundamentals for solution of coplanar force system, centroid and second moment of composite and built up areas.	PO1	3
	CO3	**Analyze** Engineering problems related to statics, particle Kinematics and Kinetics	PO2	3

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COURSE TITLE	ELEMENTS OF ENGINEERING DRAWING	COURSE CODE	18ME1ESEED/ 18ME2ESEED
CREDITS	03	L – T – P	1 – 0 – 2
CONTACT HOURS	60 Hours		

Course Objectives:

- To understand the concept of projection systems; standards and conventions.
- To develop the views of basic geometrical entities - points, lines, planes and solids.
- To enhance speed and accuracy in use of drawing instruments and sketching capabilities.
- To acquire the skill of expressing two and three dimensional objects as pictorial views.
- Exposure to engineering communication.

UNIT – 1

A: Introduction: Principles of Engineering Graphics and their significance, usage of Drawing Instruments, BIS Conventions and Dimensioning.

[1L + 2P Hrs]

B: Orthographic Projections

Introduction, Planes of projection, Reference line and conventions employed, Projections of points in all the four quadrants. Projections of straight lines (located in first quadrant and without reference to traces), True and apparent lengths and inclinations to reference planes and application problems.

[5L + 10P Hrs]

UNIT – II

Projections of Plane Surfaces in First Angle

Introduction, Projections of plane surfaces: triangle, square, rectangle, rhombus, regular pentagon, regular hexagon and circle in different positions by change of position method.

[4L + 06P Hrs]

UNIT – III

Projections of solids in First Angle

Introduction, Projections of regular upright solid: tetrahedron, cube, prism, pyramid, cylinder and cone in different positions by change of position method.

[5L + 10P Hrs]

UNIT – IV

Development of Lateral Surfaces of Solids

Concept of section planes(horizontal and vertical traces), Development of lateral surfaces of right regular prisms, pyramids, cylinders and cones resting with base on HP,their frustums and truncations.

[4L + 8P Hrs]

UNIT – V

A: Isometric Projection

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 three solids)

[**4L + 8P Hrs]**

B: Use of solid-modelling software for creating cube, right regular prisms, pyramids, cylinders, cones, spheres, and combination of solids (maximum of two solids) and extracting orthographic views, sectional views and Isometric views. Two exercises only.

[1L+4P Hrs]

Text Books:

1. Engineering Drawings Vols-1 & 2, K. R. Gopalakrishna, Subhas Stores, Bangalore,2005.
2. Engineering Drawing, N.D. Bhat& V.M. Panchal, 45 Edition, Charotar Publishing,Gujarat, 2005.

Reference Books:

3. French, Thomas E., Vierck, C. J. and Foster, R. J., Fundamental of Engineering Drawing & Graphics Technology, McGraw Hill Book Company (2005).
4. A Textbook of Engineering Graphics by K. Venugopal & Prabhu Raj, New Age International, 2009.
5. 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.

Publications of Bureau of Indian Standards

6. IS 10711 – 2001: Technical products documentation – Size & layout of drawing sheets.
7. IS 9609 (Parts 0 & 1) – 2001: Technical products documentation – Lettering.
8. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
9. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
10. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

E-Books:

11.Student's Guide To Learning Solid works Software
12. www.solidworks.com/sw/docs/Student_WB_2011_ENG.pdf

NPTEL/SWAYAM/ MOOC:

13.http://www.iitg.ac.in/cet/nptel.html

Course Outcomes:

Course Code	COs	At the end of the course, the student will be able to:	POs mapped	Strength of mapping
18ME1ESEED/ 18ME2ESEED	CO1	Draw orthographic projections of basic geometrical entities in various positions and translate the geometric information of engineering objects into engineering drawings.	1	3
	CO2	Create sketches and Isometric projections of solids	1	3
	CO3	Develop lateral surfaces of solids and appreciate their applications in the industry.	1	3
	CO4	Use modern engineering tool (CAD software) necessary for engineering practice.	5	1

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COURSE TITLE	FUNCTIONAL ENGLISH	COURSE CODE	18HS1NCENG/ 18HS2NCENG
CREDITS	00	L – T – P	1 – 0 – 1
CONTACT HOURS	24 Hours		

Course Objectives:

- To impart basic English grammar and essentials of language skills
- To train to identify the nuances of phonetics, intonation and enhance pronunciation skills
- To enhance with English vocabulary and language proficiency

UNIT -I

COMMUNICATION:

- Introduction- Role and Importance of English in the Corporate World.
- Communication-Importance of technical communication-levels, flow of organizational communication
- Effective Presentation strategies: non-verbal communication aspects, Preparing Power Point Presentation
- Public Speaking
- Listening-Types, traits and importance of listening
- Telephone Etiquette
- Interviews-types and preparation.
- InterpersonalCommunication Skills –Group Discussion

Additional Reference:

- Communication: Organizational communication, Communication cycle, Barriers
- Language as a tool of communication, characteristics of language
- Non-verbal communication
- Power point presentations
- Traits of a good listener, barriers
- Interviews: questions frequently asked
- Business Meetings/Conferences: Spoken
- Effective reading skills **[4 hours]**

UNIT -II

Technical Writing / Speaking: Specific Focus

- Letter Writing –Job Applications, E-mails and other Official Letters
- Writing a résumé
- Writing reports and dissertation/thesis-structure and significance
- Description of Graphics -kinds, construction, use and application (in scientific texts) and Interpretation

Additional Reference:

- Paragraph Writing, Expansion of ideas – Précis Writing
- Business Letters: Significance, purpose, structure, layout, types and samples
- Curriculum Vitae/ résumé/bio-data–different formats

- Technical Reports: objectives, characteristics and categories
- Manuscript format, prefatory parts and main text
- Interpretation of the diagrams and graphs in paragraphs
- Structure of a Research dissertation/thesis. **[4 hours]**

UNIT -III

Grammar: Basics and Structures

- Parts of Speech-in brief
- Transformation of Sentences, Active and Passive Voice, Direct and Indirect Speech.
- Subject-Verb Agreement

Additional Reference:

- Nouns, Pronouns, Tenses, Articles and Prepositions. Adjectives, Conjunctions, Adverbs, Interjection
- Degrees of comparison
- Punctuation
- Types of sentences
- Simple-compound and complex sentences
- Rules governing Active-Passive voice and Direct-Indirect Speech
- Singular and plural nouns and verbs. **[2 hours]**

UNIT -IV

Vocabulary

- Correct pronunciation of important words
- Identifying errors in sentences-often mispronounced and misspelt word
- Difference between American and British English,
- Indianism-Mother tongue influence
- Using Idioms and phrases –words commonly misused and confused
- Analogy of Comparison
- Corporate/conventional idioms.

Additional Reference:

- IPA script chart to read sounds-vowels and consonants
- Spellings chart
- Words often mispronounced\
- Homophones and homonyms
- American English- evolution, expressions and slangs
- How American English has influenced corporate world
- Indianized expressions in English
- phrasal verbs and proverbs. **[2 hours]**

Language Lab

For augmenting LSRW and GV skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning systems can be referred. (10 levels) **[12 hours]**

Text Book:

1. Practice and Perfect- a workbook issued by the Department of Mathematics and Humanities, BMS College of Engineering.
2. Additional Reference Source prepared by the Faculty of English-issued by the Department of Mathematics and Humanities, BMSCE.

Reference Books:

3. *IELTS Preparation and Practice* by Wendy Sahanaya and Terry Hughes, OUP, 2007.
4. *Technical Communication; Principles and Practice* – Meenakshi Raman and Sangeetha Sharma.
5. *English for Presentations* by Marion Grussendorf, OUP, 2015
6. *Making Sense of English*, M.Yadugiri, Viva Publications
7. *Advanced English Grammar* – Thomson and Martinet, Cambridge University Press.

Course Outcomes:

Course Code	COs	At the end of the course, the student will be able to:	POs mapped	Strength of mapping
18HS1NCENG/ 18HS2NCENG	CO1	**Communicate** effectively and creatively in both non-verbal and verbal forms in various multi-disciplinary activities.	10	3
	CO2	**Upgrade** organizational skills/traits, team spirit/working in liaison and thus boost professional etiquette and ethics.	9, 10	3, 2
	CO3	**Write** effective technical reports, dissertation and project documents and make effective oral and written presentations.	9, 10	1, 3
	CO4	**Enhance** employability via training in writing correct and effective Applications/Resumes.	10	3
	CO5	**Perform** well against Domestic and International Industry Standards via group discussions and Power Point Presentations.	9, 10	3, 3
	CO6	**Strengthen** basic grammar components/structures and overcome mistakes/wrong pronunciation and thereby, encourage speaking/writing in flawless English.	10	3

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COURSE TITLE	ENGINEERING MATHEMATICS-2	COURSE CODE	18MA2BSEM2
CREDITS	04	L – T – P	3 – 1 – 0
CONTACT HOURS	48 Hours		

Course Objectives: To provide students with a solid foundation in mathematical fundamentals such as Laplace Transforms, vectors and orthogonal curvilinear coordinates required for different branches of engineering.

UNIT-I

LAPLACE TRANSFORMS

Definitions, properties, transforms of elementary functions, transforms of derivatives and integrals. Applications: Evaluation of Improper integrals using Laplace transforms, Laplace transform of Periodic functions and Unit step function. **[9 hours]**

UNIT-II

INVERSE LAPLACE TRANSFORMS

Inverse Laplace Transforms-properties, inverse transforms of standard functions, $L^{-1}\left[\frac{F(s)}{s}\right]$, $L^{-1}\left[e^{-as}F(s)\right]$, $L^{-1}\left[F^{(n)}(s)\right]$. Applications: Solution of differential Equations, LRC series circuits and system of differential Equations. **[10 hours]**

UNIT-III

PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations by elimination of arbitrary constants and functions. Solution of non-homogeneous partial differential equations by direct integration. Solution of Lagrange's linear partial differential equations. Solution of partial differential equations by the method of separation of variables, Derivation of one dimensional heat and wave equations and various possible solutions by the method of separation of variables. **[10 hours]**

UNIT-IV

VECTOR CALCULUS

Scalar and vector point functions, Gradient, directional derivative, Divergence, Curl, Laplacian of a vector point function, solenoidal, irrotational vectors. Vector identities: divcurl $\vec{A}$, curlgradϕ, div$\left(\phi\vec{A}\right)$, curl$\left(\phi\vec{A}\right)$, div$\left(\vec{A}\times\vec{B}\right)$, curlcurl $\vec{A}$ and problems on vector identities.

Vector integration: Statement and problems on Green's theorem, Stokes' theorem and Gauss divergence theorem (without proofs). **[10 hours]**

UNIT-V

ORTHOGONAL CURVILINEAR COORDINATES (OCC):

Definitions - Orthogonal curvilinear coordinates, scale factors, base vectors, cylindrical and spherical coordinate systems, expressing a given vector in cylindrical and spherical coordinates.

Expressions for gradient, divergence, curl and Laplacian in orthogonal curvilinear coordinates. **[9 hours]**

Text Books

1) Higher Engineering Mathematics, B.S. Grewal, 43rd edition, 2014, Khanna Publishers.
2) Higher Engineering Mathematics, B.V. Ramana, 7th reprint, 2009, Tata Mc. Graw Hill.

Reference Books

3) Advanced Engineering Mathematics, Erwin Kreyszig, edition 2014, Vol.1 and Vol.2, 2014, Wiley-India.
4) Advanced Engineering Mathematics, Dennis Zill, Warren S Wright, Michael R. Cullen, 4th edition, 2011, Jones & Bartlett Learning.

E- Books and Online Resources

5) Advanced Engineering Mathematics, P.V. O'Neil, 7th Indian reprint, 2011, Cengage learn ing India Pvt. Ltd.
https://ndl.iitkgp.ac.in/ and
https://www.pdfdrive.com/engineering-mathematics-books.html
6) Engineering Mathematics, K. A. Stroud, Dexter J. Booth, Industrial Press, 2001,
https://ndl.iitkgp.ac.in/ and
https://www.pdfdrive.com/engineering-mathematics-books.html

NPTEL/SWAYAM/MOOCs:

7) http://nptel.ac.in/courses.php/
8) https://www.class-central.com/subject/math (MOOCS)

Course Outcomes:

COURSE CODE	CO's	At the end of the course, the student will be able to:	PO's	CO-PO Mapping (Strength)
18MA2BSEM2	CO 1	Understand the concepts of transforms, partial differential equations and vector calculus.	--	--
	CO 2	Apply the concepts of transforms, partial differential equations and calculus to Engineering problems.	1	3
	CO 3	Demonstrate an understanding of the Laplace transforms of functions using alternate tools.	5	1

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