BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(Autonomous Institute affiliated to VTU, Belagavi)

(Accredited by NAAC with 'A' grade and NBA)

Yelahanka, Bengaluru-560 064

Blow up Syllabus
(With effect from 2021-22)

Bachelor of Engineering

I & II Semesters

NOVEMBER 2021

Vision

To emerge as one of the finest technical institutions of higher learning, to develop engineering professionals who are technically competent, ethical and environment friendly for betterment of the society.

Mission

Accomplish stimulating learning environment through high quality academic instruction, innovation and industry-institute interface.

PROGRAM OUTCOMES

Program Outcomes as defined by NBA Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Semester: **I/II**

Course Code: 21CS13/23

Course Name: **C** Programming for Engineers **(CPE) (Common to ALL branches)**

Blow-up Syllabus

Department of Computer Science and Engineering

Sl. No.	Topics	Method of Delivery	Aids Required	No. of Hours
	MODULE - 1			
1	Discussion on the Vision and Mission of the department, Course Objectives Outcomes and Introduction to the Course.	PPP	Projector	1
2	Algorithms, Flowcharts.	PPP	Projector	1
3	Significance and scope of C Programming, Basic Structure of a C Program, Character Set, C Tokens, Keywords and Identifiers.	PPP	Projector	1
4	Constant, variable, data types, Declaration of Variables.	PPP	Projector	1
5	Operators and expressions.	PPP	Projector	1
6	Lab: Introductions to UNIX commands.	Live Demo	Projector	1
7	Lab: Introduction to Program Development and debugging skills.	Live Demo	Projector	1
8	Lab: Program demonstration on Operators and expressions.	Live Demo	Projector	1
9	Lab: Program demonstration to illustrate the usage of Constant, variable, data types, Declaration of Variables.	Live Demo	Projector	1
10	Lab: Program execution to demonstration the usage of the usage of Constant, variable, data types, Declaration of Variables.	Live Demo	Projector	1
11	Lab: Hands on session to execution and demonstration the usage of Operators.	Lab Session	system	1
12	Lab: Hands on session to execution and demonstration the usage of Operators.	Lab Session	system	1
13	Lab: Hands on session to execution and demonstration the usage of Operators.	Lab Session	system	1
14	Lab: Hands on session to execution and demonstration the usage of Operators.	Lab Session	system	1

15	Lab: Hands on session to execution and demonstration the usage of Operators and expressions.	Lab Session	system	1
	Module - 2			
16	Input-Output Operations: Introduction, Reading a character, Writing a Character.	PPP	Projector	1
17	Formatted Input, Formatted output.	PPP	Projector	1
18	Decision Making, Branching and Looping: Introduction, Decision making with if statement, Simple if statement, if...else Statement, Nesting of if...else statements, The else if ladder.	PPP	Projector	1
19	The switch Statement, The? : Operator, The goto statement, The while statement.	PPP	Projector	1
21	The do while statement, The for statement, Jumps in loops.	PPP	Projector	1
22	Lab: Program to demonstrate I/O operations.	Live Demo	Projector	1
23	Lab: Program to demonstrate Formatted Input, Formatted output functions.	Live Demo	Projector	1
24	Lab: Program to demonstrate Decision Making statements.	Live Demo	Projector	1
25	Lab: Program to demonstrate Branching and Looping statements.	Live Demo	Projector	1
26	Lab: Hands on session to execution and demonstration I/O operations.	Lab Session	system	1
27	Lab: Hands on session to execution and demonstration decision making statements.	Lab Session	system	1
28	Lab: Hands on session to execution and demonstration decision making statements.	Lab Session	system	1
29	Lab: Hands on session to execution and demonstration branching and looping statements.	Lab Session	system	1
30	Lab: Hands on session to execution and demonstration branching and looping statements.	Lab Session	system	1
	Module - 3			
31	Arrays: Introduction, One dimensional Arrays, Declaration of One dimensional Arrays, Initialization of One dimensional Arrays.	PPP	Projector	1
32	Two dimensional Arrays, Initializing Two dimensional Arrays.	PPP	Projector	1
33	Multi-dimensional Arrays.	PPP	Projector	1

34	Structures and Unions: Introduction, Defining a Structure, Declaring Structure Variables, Accessing Structure Members, Structure Initialization,	PPP	Projector	1
35	Copying and Comparing Structure Variables, Operations on individual members, Arrays of Structures, Arrays within Structures, Structures within Structures, Unions	PPP	Projector	1
36	Demonstration of Linear Search and Binary search Programs.	PPP	Projector	1
37	Demonstration of Bubble sort and Selection sort Programs.	PPP	Projector	1
38	Lab: Solving problems through demonstrating the usage of one dimension array.	Live Demo	Projector	1
39	Lab: Hands on session to execution and demonstration the usage of one dimension array.	Live Demo	Projector	1
40	Lab: Hands on session to execution and demonstration the usage of one dimension array.	Live Demo	Projector	1
41	Lab: Solving problems through demonstrating the usage of two dimension array.	Live Demo	Projector	1
42	Lab: Hands on session to execution and demonstration the usage of two dimension array.	Lab Session	system	1
43	Lab: Hands on session to execution and demonstration the usage of two dimension array.	Lab Session	system	1
44	Lab: Solving problems through demonstrating the usage of Structures.	Lab Session	system	1
45	Lab: Hands on session to execution and demonstration the usage of Structures.	Lab Session	system	1
46	Lab: Hands on session to execution and demonstration the usage of Structures and Unions.	Lab Session	system	1
	Module - 4			
47	User Defined Functions: Introduction, Need for user defined functions, A multi-function program, Elements of user defined functions, Definition of Functions, Return values and their types, Function calls, Function declaration.	PPP	Projector	1
48	Category of Functions, No arguments and no return values, Arguments but no return values, Arguments with return values, No arguments but returns a value, Functions that returns multiple values, Nesting of functions.	PPP	Projector	1
49	Passing arrays to functions, Passing strings to functions.	PPP	Projector	1
50	Pass by value and Pass by reference.	PPP	Projector	1

51	The scope, Visibility and Lifetime of Variables, storage classes.	PPP	Projector	1
52	Lab: Program to demonstrate the use of user defined functions and program modularity.	Live Demo	Projector	1
53	Lab: Program to demonstrate the use of various categories of user defined functions.	Live Demo	Projector	1
54	Lab: Program to demonstrate the concept of Pass by value and Pass by reference.	Live Demo	Projector	1
55	Lab: Program to demonstrate the concept of return values and types.	Live Demo	Projector	1
56	Lab: Program to demonstrate the concept of Nesting of functions.	Live Demo	Projector	1
57	Lab: Program to demonstrate the concept of storage classes.	Live Demo	Projector	1
58	Lab: Hands on session to execution and demonstration the usage of user defined functions and understanding the importance of program modularity.	Lab Session	system	1
59	Lab: Hands on session to execution and demonstration the usage of various categories of user defined functions.	Lab Session	system	1
60	Lab: Hands on session to execution and demonstration the usage of Pass by value and Pass by reference.	Lab Session	system	1
61	Lab: Hands on session to execution and demonstration the usage of Nesting functions.	Lab Session	system	1
62	Lab: Hands on session to execution and demonstration array usage in user defined functions.	Lab Session	system	1
63	Lab: Hands on session to execution and demonstration the usage of storage classes.	Lab Session	system	1
	Module - 5			
64	Strings: Introduction, Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen.	PPP	Projector	1
65	Arithmetic operations on characters, Putting strings together, Comparison of two strings.	PPP	Projector	1
66	String Handling Functions, Table of strings.	PPP	Projector	1
67	Pointers: Introduction, Understanding Pointers, Accessing the address of a Variable, Declaring Pointer Variables, Initialization of Pointer Variables,	PPP	Projector	1
68	Accessing a Variable through its Pointer. Chain of Pointers, Pointer Increments and Scale Factor,	PPP	Projector	1
69	Pointer and Arrays, Pointers and Character Strings,	Live Demo	Projector	1

70	Pointers as Function Arguments, Functions returning Pointers, Pointers to Functions.	PPP	Projector	1
71	Lab: Program to demonstrate the usage of strings.	Live Demo	Projector	1
72	Lab: Program to demonstrate the operations on strings.	Live Demo	Projector	1
73	Lab: Program to demonstrate the usage of string functions.	Live Demo	Projector	1
74	Lab: Program to demonstrate the usage of pointers in C program.	Live Demo	Projector	1
75	Lab: Hands on session to execution and demonstrate the usage of strings in the program.	Lab Session	system	1
76	Lab: Hands on session to execution and demonstrate the usage pointers in the program.	Lab Session	system	1
77	Lab: Hands on session to execution and demonstrate the usage pointers in the program.	Lab Session	system	1
78	Lab: Hands on session to execution and demonstrate the usage pointers in the program.	Lab Session	system	1
	Total Hours			**78**

Course Delivery:

Power point presentation (PPP), Live Demonstrations (Live Demo), Lab Sessions, Interactions, Tutorials, hands on program demonstration.

Textbooks

1. E Balaguruswamy, Programming in ANSI C, Tata McGraw Hill, 8th edition, 2019.
2. Brian W. Kernighan and Dennis Ritchie, The C Programming Language, Pearson Education Limited, 2nd Edition, 1998.

References

1. Behrouz A. Forouzan and Richard F. Gilberg, Computer Science: A Structured Approach Using C, Cengage Learning, 3rd edition, 2013.
2. Yashavant P. Kanetkar, Let Us C, BPB Publications, 15th edition, 2017.
3. Herbert Schildt, C: The Complete Reference, McGraw Hill Education; 4th edition, 2017.

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BLOW-UP SYLLABUS

Department of Chemistry Engineering

Semester: **I/II**

Course Code: **21CH12/22**

Course Name: **ENGINEERING CHEMISTRY**

Course Faculty: **DR. BINCY ROSE VERGIS**

Course code and title: **Engineering Chemistry/ 21CH12/22**	Course Credits: **(3:0:0) 03**
CIE: 5**0 Marks**	SEE: 5**0 Marks**
No. of Theory hours: 4**0 (8L per module)**	Lab support: As Necessary
Prepared by: **Dr. Bincy Rose Vergis**	Date: 01/01/2022
Reviewed by: HOD (Chemistry Department)	Date: 10/01/2022

Detailed Syllabus

Module #	TOPICS	No. of Hours
1	Preamble: Relevance of chemistry in day today activities, Importance of materials in industrial, defense and research application and its economic implications. Influence of new materials for the technological development, study and use of environment friendly materials for healthier society.	1
2	Electrochemistry and Storage devices: Introduction to electrochemical cell, Reactions and Sign Conventions. Single electrode potential & EMF, Derivation of Nernst equation for single electrode potential.	1
3	Numerical problems on E_{cell}. Concentration Cell: working and Potential generated in a concentration cell, and numericals.	1
4	Types of electrodes, Reference Electrodes with examples. Ion-selective electrode, Glass electrode: construction and working of glass electrode. Determination of pH using glass electrode.	1
5	Electrochemical sensors: Definition, principle and broad classification of electrochemical sensors and its applications.	1
6	Batteries- Classification of batteries – Primary, secondary and reserve batteries with examples. Construction, working and applications of metal - air (Zn- air) battery.	1
7	Construction, working and applications of Lithium ion Battery (LIB).	

8	Fuel Cells: Introduction, difference between conventional cell and fuel cell, limitations & advantages. Construction & working of H_2-O_2 fuel Cell.	1
9	Corrosion Science: Introduction to corrosion. Consequences of corrosion, Types of Corrosion: Chemical and electrochemical corrosion. Electrochemical Theory of corrosion.	1
10	Differential metal corrosion, differential aeration corrosion with examples of waterline and pitting corrosion.	1
11	Factors affecting corrosion: Nature of metal, and nature of corrosion product.	1
12	Factors affecting corrosion: Ratio of anodic area to cathodic area, and nature of environment (pH, temperature, conductivity).	1
13	Corrosion control: Cathodic protection- Sacrificial anode method and Impressed current method	1
14	Anodic and Cathodic protective coatings-metal coating: - Galvanization and Tinning.	1
15	Electroplating: Principle. Electroplating of Chromium- Hard and Decorative Cr plating.	1
16	Electroless plating of copper with example of PCB.	1
17	Chemical Fuels and Alternative Fuels: Introduction, Characteristics of a good fuel, Calorific value- gross and net calorific values.	1
18	Determination of calorific value of a fuel using Bomb calorimeter and numerical problems.	1
19	Petrol knocking: Mechanism of petrol knocking, reactions involved and adverse effects of knocking.	1
20	Anti-knocking agents: Leaded and Unleaded petrol.	1
21	Alternate Fuels: Power alcohol: advantages and disadvantages.	1
22	Biodiesel: Synthesis, advantages and disadvantages.	1
23	Solar energy – Introduction, Types of solar energy conversion. Properties of Silicon – Production of Solar grade Silicon from Quartz.	1
24	Construction and working of Photovoltaic cells.	1
25	Smart Materials for Engineers: Smart materials: Introduction, definition, and various types of smart materials.	1
26	Self-healing materials, Introduction, Mechanism, advantages, applications.	1
27	Shape memory alloys, Introduction, mechanism, types of shape memory alloys, advantages, applications.	1
28	Nanomaterials: Introduction and classification of Nanomaterials	1
29	Properties: Electrical, thermal, optical, catalytic properties	1
30	Synthesis of Nanomaterials- Top down and bottom up approach, Sol gel method	1
31	Synthesis of Nanomaterials-Chemical vapour deposition method	1
32	Application of Nanomaterials in Waste water treatment and Nano electronics.	1

33	Water Technology: Determination of Hardness of water and Alkalinity of water	1
34	Determination of sulphate and chloride by gravimetric method.	1
35	Estimation of sodium and potassium by Flame photometry	1
36	Chemical & Biological oxygen demand (COD and BOD), Definition, significance and determination of COD & BOD	1
37	Water softening by Ion – exchange resin.	1
38	Sewage water treatment by primary secondary treatment by activated sludge process and tertiary process	1
39	Causes, effects and impressive solutions for oxides of Carbon, sulphur and nitrogen.	1
40	Causes, effects and impressive solutions for Hydrocarbons, mercury and lead.	1

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BLOW-UP SYLLABUS

Department of Physics Engineering

AY/Semester: **2021-22/ I/II**

Course Code: **21PY12**

Course Name: **ENGINEERING PHYSICS**

Session No.	Topics	No. of Hours	Delivery Method	Assessment Method
Module: 1 Quantum mechanics and Electrical conductivity in Metals				
Self-study topics: Dual nature of light and wave particle dualism, Classical free electron theory, Expression for electrical conductivity, Failure of classical physics and basics of quantum mechanics				
1	1.1**Quantum mechanics:**Introduction, Heisenberg's uncertainty principle and its application: non-existence of an electron inside the nucleus (relativistic case).	1	Class room teaching / PPT presentation	CIE
2	1.2 Wave functions and its physical significance. Probability density, normalization, Eigen values and Eigen functions.	1	Class room teaching / PPT presentation	CIE
3	1.3 Time independent 1-D Schrodinger wave equation (derivation) and its application: particle in infinite potential well: Energy Eigen values and Eigen function	1	Class room teaching / PPT presentation.	CIE
4	1.4 Finite potential well, Quantum tunneling and its applications (qualitative) and Numericals on Heisenberg's uncertainty principle, Probability density and Energy Eigen values and Eigen function.	1	Class room teaching / PPT presentation/Assignment.	CIE
5	1.5**Electrical conductivity in metals:** Introduction, Assumptions of quantum free electron theory, density of states (qualitative), Qualitative discussion of Fermi level, Fermi energy,	1	Class room teaching / PPT presentation	CIE
6	1.6 Fermi-Dirac statistics, Fermi factor, Fermi factor at different temperatures, Electrical conductivity (qualitative),	1	Class room teaching / PPT presentation	CIE
7	1.7 Merits of QFET: Specific heat capacity, dependency of resistivity on temperature and electrical conductivity with electron concentration.		Class room teaching / PPT presentation	CIE
8	Numerical on electrical conductivity, Fermi factor, Fermi energy.	1	Class room teaching/Assignment	CIE
Hands on training topics: Fermi energy of different materials				

Module: 2	**Electrical conductivity in Semiconductors, Laser**			
Self-study topics: Fundamentals of semiconductors, concept of electrons and holes, Concepts of light emission, Ruby laser.				
9	2.1**Electrical conductivity in Semiconductors:** Introduction, expression for electron and hole concentration (Qualitative), relation between E_g and E_f,	1	Class room teaching / PPT presentation	CIE
10	2.2 Electrical conductivity in intrinsic semiconductors (derivation), Photovoltaic and LED principle	1	Class room teaching / PPT presentation	CIE
11	2.3 Hall Effect, expression for Hall voltage in terms of hall coefficient and its applications.	1	Class room teaching / PPT presentation	CIE
12	Numerical on electrical conductivity, Hall effect.	1	Class room teaching/Assign ment	CIE
13	2.4 **Laser:** Interaction of radiation with matter: Induced Absorption, spontaneous emission, stimulated emission. Einstein coefficients.	1	Class room teaching / PPT	CIE
14	2.5 Expression for energy density – derivation of energy density in terms of Einstein's co efficient (Derivations) Conditions for laser emission: Meta stable state, Population inversion (qualitative)	1	Class room teaching / PPT presentation	CIE
15	2.6 Prerequisites of Laser action: active medium, resonant cavity and pumping mechanism (qualitative) CO_2 Laser: Principle, Construction and working with energy level diagram.	1	Class room teaching / PPT presentation	CIE
16	2.7 Semiconductor Diode Laser: Principle, Construction and working with energy level diagram. Application of lasers in industries (welding, cutting and drilling) and data storage (qualitative), Numerical on energy, power of lasers, Einstein's coefficients.	1	Class room teaching / PPT presentation	CIE
Hands on training topics: Hall effect measurement and Laser beam characteristics.				
Module: 3	**Maxwell's equations and Optical Fibers**			
Self-study topics: Fundamentals of vectors, dot and cross product of vectors, line, surface and volume integrals, Total internal reflection, advantages of optical fibers over coaxial metal cable and drawbacks of optical fibres, application of optical fibers in point to point communication.				
17	3.1**Maxwell's equations:** Gradient, Divergence, Curl and their physical significance. Gauss's divergence and Stoke's theorem (no derivation)	1	Class room teaching / PPT presentation	CIE
18	3.2 Derivations of Maxwell's equations: Using Guass' law in Electrostatics ($\nabla \cdot \vec{D} = \rho_v$) Using Guass' law in magnetic field ($\nabla \cdot \vec{B} = 0$)	1	Class room teaching / PPT presentation	CIE

	Faraday's law in Integral form ($\oint \vec{E} \cdot d\vec{L} = -\int_S \frac{\partial \vec{B}}{\partial t} \cdot d\overrightarrow{S}$) Faraday's law in point or differential form ($\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$)			
19	3.3 Ampere's circuital law, concept of Displacement current and modified Ampere's-circuital law, Physical significances of Maxwell's Equations. List the Maxwell's equations in static, time varying field and in free space.	1	Class room teaching / PPT presentation	CIE
20	3.4 Electromagnetic waves in free space, Properties and velocity of E.M. waves, wave equation in terms of electric field, Transverse nature and polarization numericals on Maxwell's equations, Cur, Divergence.	1	Class room teaching / PPT presentation/Numerical	CIE
21	3.5 **Optical fibers:** Introduction, Description of propagation mechanism of light through an optical fiber. Conditions for ray propagation: Acceptance angle, Numerical aperture (derivation), Numericals on acceptance angle, NA.	1	Class room teaching / PPT presentation/Assignment	CIE
22	3.6 Types of optical fibers: 3 types with diagram of Modes of propagation and V-number.	1	Class room teaching / PPT presentation	CIE
23	3.7 Signal degradation in optical fiber and its measurement: Definition of attenuation, name the three types of attenuation, causes of attenuation: Explain absorption, scattering and radiation losses. Mention the expression for attenuation coefficient.	1	Class room teaching / PPT presentation/Assignment	CIE
24	Numericals on fiber loss and modes of propagation.	1		CIE
Hands on training topics: Divergence and curl visualization, transverse nature of light. Condition for ray propagation: TIR and fiber losses.				
Module: 4 Oscillations, Dielectrics and Ultrasonic waves				
Self-study topics: Definition of SHM, characteristics, examples and representation of SHM by linear and circular motion, differential equation of SHM. Basics of dielectrics, dipoles, classification of sound waves.				
25	4.1 **Oscillations:** Free oscillations of simple loaded spring mass system, kinetic and potential energies of loaded spring mass system (qualitative),	1	Class room teaching / PPT presentation	CIE
26	4.2 Series and parallel combinations of springs, theory of damped oscillations.	1	Class room teaching / PPT/Assignment	CIE
27	4.3 Theory of Forced oscillations, Resonance.	1	Class room teaching / PPT/Assignment	CIE

28	4.4 Applications of resonance, Numericals on spring constant, laws of combinations, Resonance and forced oscillations.	1	Class room teaching / PPT/Assignment	CIE
29	4.5**Dielectrics:** Introduction,Various polarization mechanisms involved in dielectric - Electronic polarization, Ionic polarization, Orientation polarization, Space charge polarization.	1	Class room teaching / PPT/Assignment	CIE
30	4.6 Applications of dielectric materials: Dielectrics in transformers and in microwave heating, Non-linear dielectrics (Piezoelectric effect and pyroelectrics).	1	Class room teaching / PPT/Assignment	CIE
31	4.7**Ultrasonic waves:** Introduction, Production of ultrasonic by piezoelectric method, properties and applications of ultrasonic waves: Non-destructive testing of materials.	1	Class room teaching / PPT presentation	CIE
31	Numericals on polarization constants, Dielectric constant, velocity of Ultrasonics.	1		
Hands on training topics: Spring strength calculations and designing of good springs, resonance.				
Module: 5 Crystal structure and Defects, Elastic properties of solids and shock waves				
Self-study topics: Basic terminologies and types of crystal structures, fundamentals of elasticity, Hooke's law, stress-strain curve and elastic moduli.				
32	5. 1**Crystal structure:** Introduction, Crystal systems based on lattice parameters, Miller indices explanation with an example, Expression for interplanar spacing - derivation	1	Class room teaching / PPT presentation	CIE
33	5.2 Bragg's law, X-ray Diffractometer: to find the interplanar distance and crystal structure determination.	1	Class room teaching / PPT presentation	CIE
34	5.3 Crystal defects- types and its applications. Numericals. On Miller indices, interplanar spacing, Bragg's law.	1	Class room teaching / PPT presentation	CIE
35	5.4**Elastic properties of solids:** Introduction, Importance of elastic materials, Poisson's ratio and its limitations.	1	Class room teaching / PPT presentation	CIE
36	5.5 Factors affecting elasticity, strain hardening and softening, Relation between elastic constants: i) Y, n &σ ii) K, Y & σ and iii) σ, k, n & Y (qualitative).	1	Class room teaching	CIE
37	5.6 Bending moment of beams, Single cantilever- Expression for Young's modulus (derivation), Applications of beams	1	Class room teaching / PPT presentation/Assignment	CIE
38	Numericals on elastic constants, Young's modulus.			
39	5.7 **Shock waves:** Introduction, concepts of subsonic, supersonic and hypersonic waves, properties of shock	1	Class room teaching / PPT	CIE

	waves,		presentation	
40	5.8 Reddy's shock tube and its characteristics, applications of shock waves: industry and agricultural fields. Numericals on mach number.	1	Class room teaching / PPT/Assignment	CIE
Hand on training topics: Structure of NaCI and diamond, single cantilever, Reddy's shock tube.				

Suggested learning resources:

Textbooks:

1. M N Avadhanulu and P G Kshirsagar, "Engineering Physics," S. Chand and company Pvt. Ltd., 11th edition, 2014.
2. R K Gaur & S L Gupta, "Engineering Physics," Dhanpat Rai Publications, 8th edition, 2018.

References:

1. S O Pillai, "Solid State Physics," New Age International publishers, 8th edition, 2017.
2. David Jeffery Griffiths, "Introduction to Electrodynamics", Pearson New International Edition, 4th edition, 2017
3. B B Laud, "Lasers and Non-Linear Optics," New Age International publishers, 3rd edition, 2018.
4. Arthur Beiser, "Concepts of Modern Physics", Tata McGraw-Hill Education, 6th edition, 2010.
5. Resnick, Walker and Halliday "Principles of Physics, Wiley publisher, 10th edition, 2015.
6. Ben G. Streetman, Sanjay Banerjee, "Solid State Electronic Devices" Pearson Prentice Hall, 6th edition, 2010.
7. S. K. Dwivedi, A Textbook of Engineering Physics, I K International Publishing House Pvt. Ltd., 1st edition 2010.
8. Chintoo S Kumar, K Takayama and KPJ Reddy, Shock waves made simple-: Willey India Pvt. Ltd. New Delhi2014

Module wise Reference books /Text books:

Module	Article No.	Text Books/Reference books
1	1.1	1. M N Avadhanulu and P G Kshirsagar, "Engineering Physics," S. Chand and company Pvt. Ltd., 11th edition, 2014. 2. R K Gaur & S L Gupta, "Engineering Physics," Dhanpat Rai Publications, 8th edition, 2018.
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2	2.1	1. B B Laud, "Lasers and Non-Linear Optics," New Age International publishers, 3rd edition, 2018. 2. M N Avadhanulu and P G Kshirsagar, "Engineering Physics," S. Chand and company Pvt. Ltd., 11th edition, 2014. 3. Ben G. Streetman, Sanjay Banerjee, "Solid State Electronic Devices" Pearson Prentice Hall, 6th edition, 2010.
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3	3.1	1. David Jeffery Griffiths, "Introduction to Electrodynamics", Pearson New International Edition, 4th edition, 2017 2. B B Laud, "Lasers and Non-Linear Optics," New Age International publishers, 3rd edition, 2018. 3. Arthur Beiser, "Concepts of Modern Physics", Tata McGraw-Hill Education, 6th edition, 2010.
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4	4.1	1. R K Gaur & S L Gupta, "Engineering Physics," Dhanpat Rai Publications, 8th edition, 2018. 2. S. K. Dwivedi, A Textbook of Engineering Physics, I K International Publishing House Pvt. Ltd., 1st edition 2010.
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5	5.1	1. S O Pillai, "Solid State Physics," New Age International publishers, 8th edition, 2017. 2. R K Gaur & S L Gupta, "Engineering Physics," Dhanpat Rai Publications, 8th edition, 2018. 3. Chintoo S Kumar, K Takayama and KPJ Reddy, Shock waves made simple-: Willey India Pvt. Ltd. New Delhi 2014
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DEPARTMENT OF CIVIL ENGINEERING

Elements of Civil Engineering (3:0:0) 3

(Effective from the academic year 2021-22)

Blow-up Syllabus
(Common to all Branches)

Module-1			
Sl. No	**Details**	**Duration in hours**	**Remarks**
1	Introduction to Civil Engineering: Scope of interdisciplinary branches in infrastructure development, Relevance of civil engineer for sustainable development of society. Scope of different fields of Civil Engineering, Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering.	2	Self- study component: (Scope of sub branches of civil engineering)
2	Infrastructure, Types of infrastructure, Role of Civil Engineer in the Infrastructural Development, Effect of the infrastructural facilities on socio-economic development of a country.	1	Concepts
3	Introduction to Engineering Mechanics: Basic idealizations – Particle, Continuum and Rigid body; Newton's laws, Force and its characteristics, Force Systems - Classification of force systems, Principle of physical independence, superposition, transmissibility of forces.	1	Numerical problems on composition and resolution of forces
4	Introduction to SI units. Newton's Laws of Motion, Law of parallelogram of forces, Polygonal law, Triangle law of forces	2	Concepts and Numerical
5	Resolution and Composition of forces-numerical.	2	Concepts and Numerical
Module-2			
Sl. No	**Details**	**Duration in hours**	**Remarks**
6	Equilibrium of Coplanar Concurrent Force Systems: Principle of resolved parts, Resultant & Composition of coplanar-concurrent force system, Related numerical.	1	Concepts and Numerical
7	Lamis's Theorem, Free body Diagram and related numerical.	2	Concepts and Numerical
8	Equilibrium of Coplanar Non-Concurrent Force Systems: Varignon's principle of moments, Resultant and Composition of coplanar non-concurrent force system, Force couple system.	2	Concepts and Numerical
9	Supports & Support reactions in Beams: Types of supports, types of beams, & types of loading, Related numerical on determinate beams.	2	Concepts and Numerical
10	Statically Determinate & indeterminate Beams, Related numerical on determinate beams.	1	Concepts and Numerical

Module-3			
Sl. No	**Details**	**Duration in hours**	**Remarks**
11	Centroid: Introduction - computing centroid for– T, L, I and full/quadrant circular sections and their built up sections. Related Numerical.	2	Concepts and Numerical
12	Moment of Inertia: Introduction to the concept, Radius of gyration, Parallel axis theorem, Perpendicular axis theorem - computing moment of Inertia for – T, L, I and full/quadrant circular sections. Related Numerical.	2	Concepts and Numerical
13	Computing moment of Inertia for built-up sections. Related Numerical.	1	Concepts and Numerical
14	Friction: Friction on inclined & horizontal planes. Related numerical, Ladder friction. Related numerical.	3	Concepts and Numerical
Module-4			
Sl. No	**Details**	**Duration in hours**	**Remarks**
17	Kinematics: Definitions, Displacement, Average velocity, Instantaneous velocity, Speed, Acceleration, Average acceleration, Variable acceleration, Acceleration due to gravity, Newton's Laws of Motion.	2	Concepts and Numerical
18	Rectilinear Motion-Numerical problems. Curvilinear Motion-	**2**	Concepts and Numerical
19	Super elevation, Projectile Motion, Relative motion, Numerical problems. Motion under gravity, Numerical problems.	2	Concepts and Numerical
20	Kinetics: D' Alembert's principle and its applications in plane motion and connected bodies including pulleys	2	Concepts and Numerical
Module-5			
Sl. No	**Details**	**Duration in hours**	**Remarks**
21	**Smart Cities:** Smart city – Challenges in Urbanization – Features of smart city - Strategic development – Selection process of smart cities.	2	Self-study component (case study on smart city)
22	Key outcomes of smart city - Guiding Principles –Structuring of smart city - Smart cities - ecosystem, stakeholders and market dynamics - Smart solutions for smart cities.	2	
23	**Green Building Concept:** What is Green Building, Why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India.	2	Self-study components (Case study on green buildings)
24	What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building	2	-

Suggested Learning Resources:

Text Books

1. Shesha Prakash M.N and Ganesh. B. Mogaveer, "Elements of Civil Engineering and Engineering Mechanics", PHI Learning, 3rd Revised edition (2014).
2. Russell C Hibbeler and Ashok Gupta (2010), Engineering Mechanics: Statics and Dynamics (11th Edition), Published by Pearson Education Inc., Prentice Hall.
3. Beer, Johnston, Cornwell and Sanghi (2013) Vector Mechanics for Engineers: Statics and Dynamics, 10th Edition, McGraw-Companies, Inc., New York.
4. Bhavikatti, S.S, "Elements of Civil Engineering and Mechanics", New Age International Publisher, 6th edition, 2019.
5. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 4th edition, 2010.
6. Dr N Mani, "N Mani Smart Cities & Urban Development in India", New Century Publications, 12 August 2016.
7. Tomwoolley and Samkimings, "Green Building Hand Book" 2009.

References:

1. Timoshenko and Young, "Engineering Mechanics", McGraw Hill Publishers, 5th edition 2013.
2. Nelson A, "Engineering Mechanics-Statics and Dynamics", Tata McGraw Hill Education Private Ltd, 1st edition, 2009.
3. Smart Cities Mission Statement and Guidelines, Ministry of Urban Development, Government of India, June 2015.
4. Smart Cities in India: Framework for ICT Infrastructure, Telecom Regulatory Authority of India, New Delhi, September 2020.
5. Making a city smart: Learnings from the Smart Cities Mission, Ministry of Housing and Urban Affairs, Government of India, March 2021.
6. Complete Guide to Green Buildings by Trish riley.

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Module wise Text Books/Reference Books

Module	Text / Reference Book
1	• Shesha Prakash M.N and Ganesh. B. Mogaveer, "Elements of Civil Engineering and Engineering Mechanics", PHI Learning, 3rd Revised edition (2014). • Bhavikatti, S.S, "Elements of Civil Engineering and Mechanics", New Age International Publisher, 6th edition, 2019.
2	• Shesha Prakash M.N and Ganesh. B. Mogaveer, "Elements of Civil Engineering and Engineering Mechanics", PHI Learning, 3rd Revised edition (2014). • Bhavikatti, S.S, "Elements of Civil Engineering and Mechanics", New Age International Publisher, 6th edition, 2019. • Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 4th edition, 2010.
3	• Shesha Prakash M.N and Ganesh. B. Mogaveer, "Elements of Civil Engineering and Engineering Mechanics", PHI Learning, 3rd Revised edition (2014). • Bhavikatti, S.S, "Elements of Civil Engineering and Mechanics", New Age International Publisher, 6th edition, 2019. • Timoshenko and Young, "Engineering Mechanics", McGraw Hill Publishers, 5th edition 2013.
4	• Shesha Prakash M.N and Ganesh. B. Mogaveer, "Elements of Civil Engineering and Engineering Mechanics", PHI Learning, 3rd Revised edition (2014). • Bhavikatti, S.S, "Elements of Civil Engineering and Mechanics", New Age International Publisher, 6th edition, 2019. • Nelson A, "Engineering Mechanics-Statics and Dynamics", Tata McGraw Hill Education Private Ltd, 1st edition, 2009.
5	• Dr N Mani, "N Mani Smart Cities & Urban Development in India", New Century Publications, 12 August 2016. • Tomwoolley and Samkimings, "Green Building Hand Book" 2009. • Smart Cities Mission Statement and Guidelines, Ministry of Urban Development, Government of India, June 2015. • Smart Cities in India: Framework for ICT Infrastructure, Telecom Regulatory Authority of India, New Delhi, September 2020. • Making a city smart: Learnings from the Smart Cities Mission, Ministry of Housing and Urban Affairs, Government of India, March 2021. • Complete Guide to Green Buildings by Trish riley.

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DEPARTMENT OF ELETRONICS COMMUNICATION ENGINEERING

Elements of Electronics Engineering-21EC14/24
Blow-up Syllabus

Module 1

Sl. No.	Details	Duration in Hours	Remarks
1	Principles of Semiconductors -Definition, types of semiconductors and Characteristics.	$\frac{1}{2}$	Self-study component/ Conduct quiz (No Question to be set for SEE)
2	P-N junction diode and applications: Diode operation (Forward and Reverse bias), Voltage- Current(V-I) characteristics of diode,	1	Discussion of concepts
3	Diode models, Rectification-Half wave rectifier, Full wave rectifier, Bridge rectifier: -Working	$1\frac{1}{2}$	Numerical on Diode models
4	Parameters-ripple factor, efficiency, peak inverse voltage, Capacitor filter circuit.	02	Numerical on Rectifier-Parameters
5	Special purpose diodes: Zener Diode-Characteristics, Zener diode application as a voltage regulator. Light Emitting Diode (LED) -operation and applications.	02	Numerical on Zener diode as regulator
6	Tutorial	1	Involvement of students in respect of their doubts about the module and numerical problems

Module 2

Sl. No.	Details	Duration in Hours	Remarks
7	Bipolar Junction Transistor and Applications (BJT): Construction, operation and parameters.	1	Discussion of concepts
8	BJT Common Base, Common Emitter and Common Collector configurations.	$1\frac{1}{2}$	Discussion of concepts
9	BJT biasing, operating point, Biasing circuits –Voltage divider bias.	$1\frac{1}{2}$	Numericals on Voltage divider bias
10	Self-bias, fixed bias- biasing circuits	$\frac{1}{2}$	Self-study component/Conduct quiz(No Question to be set for SEE)
11	BJT as a switch, Transistor switch circuit to switch ON/OFF an LED and a lamp in a power circuit using a relay	$\frac{1}{2}$	Discussion of concepts
12	Metal Oxide Semiconductor FET: Depletion and Enhancement type MOSFET-Construction, Operation, Characteristics and Symbols, CMOS as an inverter.	$1\frac{1}{2}$	Numerical on MOSFET characteristics

13	Field Effect Transistor(FET)-Construction, Operation, Characteristics and Symbols	$\frac{1}{2}$	Self-study component/Conduct quiz(No Question to be set for SEE)
14	Tutorial	1	Involvement of students in respect of their doubts about the module and numerical problems

Module 3

Sl. No.	Details	Duration in Hours	Remarks
15	Operational amplifiers: Introduction to Op-Amp, Op-Amp Parameters,	1	Discussion of concepts
16	Applications of Op-Amp: Inverting amplifier, Non-Inverting amplifier, Summer, Voltage follower, Integrator, Differentiator, Comparator.	2	Numerical on applications
17	Feedback: Feedback concepts, feedback connection types, Voltage series feedback, Gain stability with feedback.	$1\frac{1}{2}$	Numerical on Voltage series feedback
18	Positive feedback: Barkhaunsen's criteria for oscillation Sinusoidal Oscillators - RC Phase Shift oscillator,	1	Numerical on RC Phase Shift oscillator
19	Wien Bridge oscillator, Hartley, Colpitts and Crystal oscillator .	$1\frac{1}{2}$	Numerical
20	Tutorial	1	Involvement of students in respect of their doubts about the module and numerical problems

Module 4

Sl. No.	Details	Duration in Hours	Remarks
	Communication System: Introduction, Elements of Communication Systems, Basics of wireless communication systems and Cellular communication (GSM).		Discussion of concepts
	Difference between analog and digital signals, Number System representation and conversion -Decimal, Binary, octal and Hexadecimal from one system to the other.	$\frac{1}{2}$	Self-study component/Conduct quiz(No Question to be set for SEE)
	Digital Electronics: Boolean algebra, Basic and Universal Gates, Combinational circuits: Half and Full adder, Multiplexer, Decoder	2	Numerical on all the concepts
	Transducers: Strain gauge, Linear variable differential transducer (LVDT), Piezoelectric transducer.	$1\frac{1}{2}$	Discussion of concepts
	Electronic Instruments: Oscilloscope, Displaying a waveform in Oscilloscope, Digital Multimeter.	$1\frac{1}{2}$	Discussion of concepts/Demonstration of the instruments
	Tutorial	1	Involvement of students in respect of their doubts about the module and numerical problems

Module 5			
Sl. No.	Details	Duration in Hours	Remarks
	Application of Electronic systems Green tech application: Wind turbine for small power application	2	Discussion of the application
	Liquid level control system	2	Discussion of the application
	pH neutralization system for wastewater treatment	2	Discussion of the application
	RFID system, Demonstration: RFID system for an application.	2	Discussion of the application

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Department of Electrical & Electronics Engineering
BLOW-UP SYLLABUS
(Common to all the branches)

AY/Semester: 2021-22/ I/II

Subject: Elements of Electrical Engineering

Course Code: 21EE13/23

Session No.	Topics	No. of Hours	Delivery Method	Assessment Method
Module: 1	**D. C. Circuits**			
1	1.1 Introduction, Preamble	1	Class room teaching / PPT presentation	CIE
2	1.2 Ohm's Law, Series and Parallel Connection of Resistors	1	Class room teaching / PPT presentation	CIE
3	1.3 Kirchhoff's Laws with independent sources	1	Class room teaching / PPT presentation.	CIE
4	1.4 Power and Energy in Electrical Circuit, Illustrative Examples	1	Class room teaching / PPT presentation/Assignment.	CIE
5	1.5 Introduction to AC, Generation AC voltage	1	Class room teaching / PPT presentation	CIE
6	1.6 Definition and derivation of Average and RMS values, form factor and peak factor	1	Class room teaching / PPT presentation	CIE
7	1.7 Phasor representation of alternating quantities		Class room teaching / PPT presentation	CIE
8	1.8 Hands-on session -	1	Class room teaching/Assignment	CIE
Hands on training topics: Reading color code and obtaining given effective value of resistance using Standard Value Resistors.				
Module: 2	**Analysis of Single-phase A.C. Circuits**			
9	2.1 R-circuit and L-Circuit Analysis	1	Class room teaching / PPT presentation	CIE

10	2.2 C- circuit, RL series- circuit analysis	1	Class room teaching / PPT presentation	CIE
11	2.3 RC, RLC- Circuit analysis	1	Class room teaching / PPT presentation	CIE
12	2.4 Parallel R-L-C circuits, illustrative examples	1	Class room teaching/Assign ment	CIE
13	2.5 Service Mains, Meter board, distribution board, Two way and Three way control of Lamp	1	Class room teaching / PPT	CIE
14	2.6 Fuse and MCB, Electric Shock-effects and precautions	1	Class room teaching / PPT presentation	CIE
15	2.7 Earthling- Plate and Pipe earthling.	1	Class room teaching / PPT presentation	CIE
16	2.8 Hands-on session	1	Class room teaching / PPT presentation	CIE
Hands on training topics: Checking the phase, neutral and earthing points in the switch board using the test lamp/tester/multi-meter.				
Module: 3 Three Phase Circuits				
17	3.1 Introduction to three phase systems, necessity and advantages,	1	Class room teaching / PPT presentation	CIE
18	3.2 Generation of Three phase power, phase sequence, balanced and unbalanced supply and load	1	Class room teaching / PPT presentation	CIE
19	3.3 Star and Delta connection, relation between line and phase quantities	1	Class room teaching / PPT presentation	CIE
20	3.4 Measurement of power in three phase circuit, illustrative examples	1	Class room teaching / PPT presentation/Nu merical	CIE
21	3.5 Introduction to generators, principle of operation, Constructional features	1	Class room teaching / PPT presentation/Ass ignment	CIE
22	3.6 Constructional features, emf equation,	1	Class room teaching / PPT presentation	CIE
23	3.7 Illustrative examples	1	Class room teaching / PPT presentation/Ass ignment	CIE

24	3.8 Hands-on session	1	Class room teaching/Assignment	CIE
Hands on training topics: Identification of various parts of stator and rotor through cut section models of machines.				
Module: 4 Transformers:				
25	4.1 Introduction to Transformers, principle of operation, core type transformer	1	Class room teaching / PPT presentation	CIE
26	4.2 Shell type transformer, emf equation, illustrative examples	1	Class room teaching / PPT/Assignment	CIE
27	4.3 Losses and efficiency in transformers	1	Class room teaching / PPT/Assignment	CIE
28	4.4 Voltage regulation, illustrative examples	1	Class room teaching / PPT/Assignment	CIE
29	4.5 Introduction to Induction motor, construction,	1	Class room teaching / PPT/Assignment	CIE
30	4.6 Concept of rotating magnetic field, principle of operation	1	Class room teaching / PPT/Assignment	CIE
31	4.7 Slip and its significance, Application, starting of IM	1	Class room teaching / PPT presentation	CIE
32	4.8 Hands – on session	1	Class room teaching/Assignment	
Hands on training topics: Verification of Primary and Secondary voltages of a Transformer				
Module: 5 DC Machines				
Self-study topics:				
33	5.1 Introduction to DC machines, working principle of DC generator,	1	Class room teaching / PPT presentation	CIE
34	5.2 Construction and types of DC machine,	1	Class room teaching / PPT presentation	CIE
35	5.3 Emf equation of dc generator, illustrative examples	1	Class room teaching / PPT presentation	CIE
36	5.4 Working principle of dc motor, back emf and its significance, Types of dc motors	1	Class room teaching / PPT presentation	CIE

37	5.5 Torque equation and characteristics of shunt dc motor	1	Class room teaching	CIE
38	5.6 Characteristics of series dc motor Illustrative examples on torque	1	Class room teaching / PPT presentation/Assignment	CIE
39	5.7 Application and starting of dc motors	1	Class room teaching / PPT presentation	
40.	Revision of Important topics	1	Class room teaching / PPT/Assignment	CIE

Self- Study Topics:
Electric Vehicles: Introduction, Components of EV, General layout of EV, Classification, Advantages and Disadvantages of EV

Suggested learning resources:

Textbooks:

1. D.C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2nd edition, June 2019.
2. V.K. Mehta, Rohit Mehta, "Principles of Electrical Engineering & Electronics", S. Chand Publications, 2nd edition, 2019.

References:

1. E. Hughes, "Electrical and Electronics Technology", Pearson Education, 12th edition, 2016.
2. S.S. Parker Smith and N.N Parker Smith, "Problems in Electrical Engineering "CBS publishers & Distributors Pvt Ltd, 9th edition, 2018
3. D.P. Kothari and I.J. Nagrath, "Theory and Problems of Basic Electrical Engineering", PHI learning Private Limited, 2nd edition, 2017

Module wise Reference books /Text books:

Module	Article No.	Text Books/Reference books
1	1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8	1. D.C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2nd edition, June 2019. 2. V.K. Mehta, Rohit Mehta, "Principles of Electrical Engineering & Electronics", S. Chand Publications, 2nd edition, 2019. 3. E. Hughes, "Electrical and Electronics Technology", Pearson Education, 12th edition, 2016. 4. S.S. Parker Smith and N.N Parker Smith, "Problems in Electrical Engineering "CBS publishers & Distributors Pvt Ltd, 9th edition, 2018(Numericals)
2	2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8	1. D.C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2nd edition, June 2019. 2. V.K. Mehta, Rohit Mehta, "Principles of Electrical Engineering & Electronics", S. Chand Publications, 2nd edition, 2019. 3. E. Hughes, "Electrical and Electronics Technology", Pearson Education, 12th edition, 2016. 4. S.S. Parker Smith and N.N Parker Smith, "Problems in Electrical Engineering "CBS publishers & Distributors Pvt Ltd, 9th edition, 2018
3	3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8	1. D.C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2nd edition, June 2019. 2. V.K. Mehta, Rohit Mehta, "Principles of Electrical Engineering & Electronics", S. Chand Publications, 2nd edition, 2019. 3. D.P. Kothari and I.J. Nagrath, "Theory and Problems of Basic Electrical Engineering", PHI learning Private Limited, 2nd edition, 2017 4. S.S. Parker Smith and N.N Parker Smith, "Problems in Electrical Engineering "CBS publishers & Distributors Pvt Ltd, 9th edition, 2018
4	4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8	1. D.C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2nd edition, June 2019. 2. V.K. Mehta, Rohit Mehta, "Principles of Electrical Engineering & Electronics", S. Chand Publications, 2nd edition, 2019. 3. E. Hughes, "Electrical and Electronics Technology", Pearson Education, 12th edition, 2016. 4. S.S. Parker Smith and N.N Parker Smith, "Problems in Electrical Engineering "CBS publishers & Distributors Pvt Ltd, 9th edition, 2018

5	**5.1**	1. D.C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2nd edition, June 2019. 2. V.K. Mehta, Rohit Mehta, "Principles of Electrical Engineering & Electronics", S. Chand Publications, 2nd edition, 2019. 3. E. Hughes, "Electrical and Electronics Technology", Pearson Education, 12th edition, 2016. 4. S.S. Parker Smith and N.N Parker Smith, "Problems in Electrical Engineering "CBS publishers & Distributors Pvt Ltd, 9th edition, 2018 5. D.P. Kothari and I.J. Nagrath, "Theory and Problems of Basic Electrical Engineering", PHI learning Private Limited, 2nd edition, 2017
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Department Of Electronics Telecommunication Engineering

Basic Electronics Engineering-21EC14/24
Blow-up Syllabus

Module 1

Sl. No.	Details	Duration in Hours	Remarks
1	Principles of Semiconductors -Definition, types of semiconductors and Characteristics.	$\frac{1}{2}$	Self-study component/ Conduct quiz (No Question to be set for SEE)
2	P-N junction diode and applications: Diode operation(Forward and Reverse bias), Voltage- Current(V-I) characteristics of diode,	1	Discussion of concepts
3	Diode models, Rectification-Half wave rectifier, Full wave rectifier, Bridge rectifier: -Working	$1\frac{1}{2}$	Numericals on Diode models
4	Parameters-ripple factor, efficiency, peak inverse voltage, Capacitor filter circuit.	02	Numericals on Rectifier- Parameters
5	Special purpose diodes: Zener Diode-Characteristics, Zener diode application as a voltage regulator. Light Emitting Diode (LED) -operation and applications.	02	Numericals on Zener diode as regulator
6	Tutorial	1	Involvement of students in respect of their doubts about the module and numerical problems

Module 2

Sl. No.	Details	Duration in Hours	Remarks
7	Bipolar Junction Transistor and Applications (BJT): Construction, operation and parameters.	1	Discussion of concepts
8	BJT Common Base, Common Emitter and Common Collector configurations.	$1\frac{1}{2}$	Discussion of concepts
9	BJT biasing, operating point, Biasing circuits –Voltage divider bias.	$1\frac{1}{2}$	Numericals on Voltage divider bias
10	Self-bias, fixed bias- biasing circuits	$\frac{1}{2}$	Self-study component/Conduct quiz(No Question to be set for SEE)
11	BJT as a switch, Transistor switch circuit to switch ON/OFF an LED and a lamp in a power circuit using a relay	$\frac{1}{2}$	Discussion of concepts

12	Metal Oxide Semiconductor FET: Depletion and Enhancement type MOSFET-Construction, Operation, Characteristics and Symbols, CMOS as an inverter.	$1\frac{1}{2}$	Numerical on MOSFET characteristics
13	Field Effect Transistor(FET)-Construction, Operation, Characteristics and Symbols	$\frac{1}{2}$	Self-study component/Conduct quiz(No Question to be set for SEE)
14	Tutorial	1	Involvement of students in respect of their doubts about the module and numerical problems
Module 3			
Sl. No.	Details	Duration in Hours	Remarks
15	Operational amplifiers: Introduction to Op-Amp, Op-Amp Parameters,	1	Discussion of concepts
16	Applications of Op-Amp: Inverting amplifier, Non-Inverting amplifier, Summer, Voltage follower, Integrator, Differentiator, Comparator.	2	Numerical on applications
17	Feedback: Feedback concepts, feedback connection types, Voltage series feedback, Gain stability with feedback.	$1\frac{1}{2}$	Numerical on Voltage series feedback
18	Positive feedback: Barkhaunsen's criteria for oscillation Sinusoidal Oscillators - RC Phase Shift oscillator,	1	Numerical on RC Phase Shift oscillator
19	Wien Bridge oscillator, Hartley, Colpitts and Crystal oscillator.	$1\frac{1}{2}$	Numerical
20	Tutorial	1	Involvement of students in respect of their doubts about the module and numerical problems
Module 4			
Sl. No.	Details	Duration in Hours	Remarks
	Communication System: Introduction, Elements of Communication Systems, Basics of wireless communication systems and Cellular communication (GSM).	$1\frac{1}{2}$	Discussion of concepts
	Difference between analog and digital signals, Number System representation and conversion -Decimal, Binary, octal and Hexadecimal from one system to the other.	$\frac{1}{2}$	Self-study component/Conduct quiz(No Question to be set for SEE)
	Digital Electronics: Boolean algebra, Basic and Universal Gates, Combinational circuits: Half and Full adder, Multiplexer, Decoder	2	Numerical on all the concepts
	Transducers: Strain gauge, Linear variable differential transducer (LVDT), Piezoelectric transducer.	$1\frac{1}{2}$	Discussion of concepts

	Electronic Instruments: Oscilloscope, Displaying a waveform in Oscilloscope, Digital Multimeter.	$1\frac{1}{2}$	Discussion of concepts/Demonstration of the instruments
	Tutorial	1	Involvement of students in respect of their doubts about the module and numerical problems
Module 5			
Sl. No.	Details	Duration in Hours	Remarks
	Application of Electronic systems Green tech application: Wind turbine for small power application	2	Discussion of the application
	Liquid level control system	2	Discussion of the application
	pH neutralization system for wastewater treatment	2	Discussion of the application
	RFID system, Demonstration: RFID system for an application.	2	Discussion of the application

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Department of Mathematics

BLOW UP SYLLABUS
CALCULUS AND DIFFERENTIAL EQUATIONS
(21MA11)
(Common to all Branches)
(Effective from the academic year 2021-22)

	MODULE – I		
Sl. No	**Details**	**Duration in Hours**	**Remarks**
1.	**1.1 Preamble:** Understanding the importance of the study of Calculus and its applications in the field of Engineering and Economics.	0.5	To understand the relevance of studying this course
2.	**1.2 Differential Calculus**: Determination of n^{th} order derivatives of standard functions - Problems. Leibnitz's theorem (without proof)-problems.	1	**Self-Learning Component** – Determination of n^{th} order derivatives of standard functions (derivation).
3.	**1.3 Polar curves** - Angle between the radius vector and tangent, angle between two curves, Pedal equation of polar curves. Application of Polar curves – Position and Navigation.	2	Discussion restricted to derivation and problems. Applications to be able to understand its relevance in real life applications.
4.	**1.4 Taylor's and Maclaurin's series** for a function of a single variable-problems.	1	Discussion restricted to problems.
5.	**Lab Session 1:** Demonstrate elementary math functions, Create and work with arrays.	2	MATLAB sessions
6.	Tutorials	1.5	Involvement of students in respect of their doubts and solving of numerical problems.
	Module – II		
Sl. No	**Details**	**Duration in Hours**	**Remarks**
7.	2.1 **Partial derivatives**: Definition and simple problems, Euler's theorem (without proof) – problems, total derivatives, partial differentiation of composite functions-problems. Application – Study of temperature in a moving car.	**2**	**Self-Learning Component** – Proof of Euler's theorem. To be able to understand its relevance in real life applications.

8.	2.2 Definition and evaluation of Jacobians.	**1**	Discussion restricted to problems.
9.	2.3 Taylor's and Maclaurin's series of two variables-problems.	**1**	Discussion restricted to problems.
10.	**Lab Session 2:** Calculate the value of functions at different points, Using symbolic objects in computations.	**2**	MATLAB sessions
11.	Tutorials	**2**	Involvement of students in respect of their doubts and solving of numerical problems.
Module – III			
Sl. No	**Details**	**Duration in Hours**	**Remarks**
12.	**3.1 Integral Calculus:** Reduction formulae - $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \sin^m x \cos^n x dx$ (m and n are positive integers). Evaluation of these integrals with standard limits (0 to $\pi/2$) and problems.	**1**	**Self-Learning Component** – Proof of the ***reduction*** formula - $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \sin^m x \cos^n x dx$ (m and n are positive integers).
13.	3.2 Leibnitz rule for differentiation under the integral sign.	**1**	No derivation, only problems
14.	**3.3 Applications:** Finding the length, area, surface area and volume for Cartesian, polar and parametric curves.	**2**	Restricted to asteroid, cardiod and cycloid.
15.	**Lab Session 3:** Programming using an array (or matrix). Plot two dimensional Cartesian and polar curves.	**2**	MATLAB sessions
16.	Tutorials	**2**	Involvement of students in respect of their doubts and solving of numerical problems.
Module – IV			
Sl. No	**Details**	**Duration in Hours**	**Remarks**
17.	**4.1 Differential Equations:** Solution of first order and first degree differential equations –Bernoulli's differential equations, exact, reducible to exact.	**2**	**Self-Learning Component** – Variable separable, homogeneous and linear methods for solving differential equations. No derivations. Reducible to

			exact equations integrating factor is restricted to three cases only, viz: $\frac{1}{Mx+Ny}$ For a homogeneous function. $\frac{1}{M}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right), \frac{1}{N}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right),$
18.	**4.2 Applications:** Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling, LR-Circuit, Exponential growth and decay.	**2**	Discussion restricted to problems
19.	**Lab Session 4:** Set the line style, marker symbol, colour, label axes with text strings and title the graph with a text string in graphs, Plot multiple curves in one graph.	**2**	MATLAB sessions
20.	Tutorials	**2**	Involvement of students in respect of their doubts and solving of numerical problems
Module – V			
Sl. No	**Details**	**Duration in Hours**	**Remarks**
21.	**5.1 Vector Calculus:** Derivative of vector valued functions, Velocity, Acceleration and related problems, Scalar and Vector point functions. Unit tangent vector, Unit normal vector. Gradient of a scalar, Divergence of a vector, Directional derivative and Curl of a vector-problems. Solenoidal and Irrotational vector fields. Vector identities – div (ϕ A), div(gradϕ), curl (ϕ A), curl (grad ϕ), div (curl A). Application-Centre of mass, field theory, kinematics. Summary: The student will be able to analyze and apply various concepts related to vector calculus and differential equations.	**4**	**Self-Learning Component** – Derivative of vector valued functions, Velocity, Acceleration and related problems, Unit tangent vector, Unit normal vector.
22.	**Lab Session 5:** Differentiate symbolic expression or functions of one or several variables	**2**	MATLAB sessions

	with respect to one or more independent variables upto required order.		
23.	Tutorials	**2**	Involvement of students in respect of their doubts and solving of numerical problems

Text Books	
1.	E. Kreyszig, Advanced Engineering Mathematics, 10th ed., John Wiley & Sons, 2015.
2.	B.S. Grewal, Higher Engineering Mathematics, 43rd ed., Khanna Publishers, 2015.
3.	N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, 9th ed., Laxmi Publications (P) Ltd., 2014.
Reference Books	
1.	Srimanta Pal and Subodh C. Bhunia, Engineering Mathematics, 3rd ed., Oxford University Press, 2016.
2.	B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 6th edition, 2010.
3.	H. K. Dass and Er. RajnishVerma, Higher Engineering Mathematics, 1st edition, S. Chand and Company Pvt. Ltd., 3rd edition, 2014.

Module wise Text Books/Reference Books

Module	Article No	Text Book/Reference Book
1	1.1 1.2 1.3 1.4	1. B.S. Grewal, Higher Engineering Mathematics, 43rd ed., Khanna Publishers, 2015. 2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 6th edition, 2010. 3. Srimanta Pal and Subodh C. Bhunia, Engineering Mathematics, 3rd ed., Oxford University Press, 2016.
2	2.1 2.2 2.3	1. B.S. Grewal, Higher Engineering Mathematics, 43rd ed., Khanna Publishers, 2015. 2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 6th edition, 2010. 3. Srimanta Pal and Subodh C. Bhunia, Engineering Mathematics, 3rd ed., Oxford University Press, 2016.
3	3.1 3.2 3.3	1. B.S. Grewal, Higher Engineering Mathematics, 43rd ed., Khanna Publishers, 2015. 2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 6th edition, 2010.
4	4.1 4.2	1. E. Kreyszig, Advanced Engineering Mathematics, 10th ed., John Wiley & Sons, 2015. 2. B.S. Grewal, Higher Engineering Mathematics, 43rd ed., Khanna Publishers, 2015. 3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 6th edition, 2010.

		4. Srimanta Pal and Subodh C. Bhunia, Engineering Mathematics, 3rd ed., Oxford University Press, 2016. 5. H. K. Dass and Er. RajnishVerma, Higher Engineering Mathematics, 1st edition, S. Chand and Company Pvt. Ltd., 3rd edition, 2014.
5	5.1	1. B.S. Grewal, Higher Engineering Mathematics, 43rd ed., Khanna Publishers, 2015. 2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 6th edition, 2010. 3. Srimanta Pal and Subodh C. Bhunia, Engineering Mathematics, 3rd ed., Oxford University Press, 2016. 4. H. K. Dass and Er. RajnishVerma, Higher Engineering Mathematics, 1st edition, S. Chand and Company Pvt. Ltd., 3rd edition, 2014.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA – BANGALORE – 64

Department of Mathematics

BLOW UP SYLLABUS

ADVANCED CALCULUS, LAPLACE TRANSFORMS & LINEAR ALGEBRA

(21MA21)

(Common to all Branches)

(Effective from the academic year 2021-22)

	MODULE – 1		
Sl. No	**Details**	**Duration in Hours**	**Remarks**
1.	**Introduction:** A glimpse of the significance of Calculus, Differential Equations, Laplace Transforms and Linear Algebra in the field of Engineering, Statistics, Economics & Medicine.	0.5	To understand the relevance of studying this course
2.	**1.1 Differential Calculus:** Curvature and Radius of curvature- Cartesian, parametric, polar and pedal forms (without proofs)	2	Discussion restricted only to problems on Cartesian and polar curves
3.	**1.2 Limits:** Indeterminate forms - L' Hospital's rule (0^0, ∞^0, 1^∞)	1	Discussion restricted to problems.
4.	**1.3 Maxima and Minima** for a function of two variables; Method of Lagrange multipliers with one subsidiary condition. Applications of Maxima and Minima with illustrative examples.	1	Discussion restricted to problems on Lagrange's multipliers.
5.	**Self learning component:** Centre and circle of curvature, Evolutes and involutes	-	**No Questions to be set for SEE**
6.	**Lab Session 1:** Using MATLAB, (i) Transform cartesian to polar coordinates in two dimension, cylindrical and spherical polar coordinates in three dimension (ii) Create 2D & 3D plots (cartesian, polar & parametric curves) (iii) Determine Curvature, Radius of Curvature & Evolutes (iv) Evaluate Maxima and Minima of functions of several variables	2	
7.	**Tutorials**	1.5	Involvement of students in respect of their doubts and solving of numerical problems.

Module – 2			
Sl. No	**Details**	**Duration in Hours**	**Remarks**
8.	**2.1 Differential Equations**: Second and higher order homogeneous and non-homogeneous linear ODE with constant coefficients - Inverse differential operators	**2**	Discussion restricted to problems (Cases I-III). P.I. restricted to R(x)= e^{ax}, sinax, cosax, x^n for f(D)y = R(x))
9.	**2.2** Cauchy differential equations and Method of variation of parameters. Applications to oscillations of a spring and L-C-R circuits	**2**	Discussion restricted to problems. Applications to be able to understand its relevance in real life applications.
10.	**Self learning component:** Legendre differential equations & problems	-	**No Question to be set for SEE**
11.	**Lab Session 2:** Using MATLAB, (i) Solve LDE of second and higher order with constant & variable coefficients (ii) Obtain solution of initial and boundary value problems (iii) Determine the Laplace Transform of elementary functions (iv) Develop the Laplace Transform of periodic function, Heaviside (Unit Step) function and Dirac delta (Impulse) function (v) Evaluate the Inverse Laplace Transform of functions in s (vi) Solve ODE formulated for real world problems	2	
12.	**Tutorials**	**2**	Involvement of students in respect of their doubts and solving of numerical problems.
Module – 3			
Sl. No	**Details**	**Duration in Hours**	**Remarks**
13.	**3.1 Multiple Integrals:** Review of elementary Integral Calculus; Multiple integrals: Evaluation of double and triple integrals; Evaluation of double integrals by change of order of integration and changing into polar coordinates **Applications** to find area (using double integration)	**3.5**	Discussion restricted to problems

	and volume (using triple integration)		
14.	**3.2 Beta and Gamma functions**: Definitions, Relation between Beta and Gamma functions and simple problems	**1.5**	Discussion restricted to problems and Proofs of $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$ and relation between Beta and Gamma functions
15.	**Self-learning component :** Applications of double integrals to find surface area & triple integrals to find Centre of gravity	**-**	**No Question to be set for SEE**
16.	**Lab Session 3 :** Using MATLAB, (i) Evaluate double integrals (ii) Evaluate triple integrals	**1**	
17.	**Tutorials**	**2**	Involvement of students in respect of their doubts and solving of numerical problems.
	Module – 4		
Sl. No	**Details**	**Duration in Hours**	**Remarks**
18.	**4.1 Laplace Transforms:** Definition and Laplace transforms of elementary functions, Laplace Transforms of $e^{at}f(t), t^n f(t), n$ is a positive integer & $\frac{f(t)}{t}, t \neq 0$ (without proof), Periodic function (statement only) and Unit-step function – problems.	**3**	Discussion restricted to problems
19.	**4.2 Inverse Laplace Transforms:** Definition and problems, Convolution theorem to find the inverse Laplace Transforms (without Proof) and problems. Solution of linear differential equations using Laplace Transform technique. Applications of Laplace Transforms in Control Engineering	**3**	Discussion restricted to problems related to algebraic, logarithmic & inverse trigonometric functions. Applications to be able to understand its relevance in real life applications.
20.	**Self learning component :** Laplace Transform of Impulse (Dirac delta) function	**-**	**No Question to be set for**
21.	**Tutorials**	**2**	Involvement of students in respect of

			their doubts and solving of numerical problems
Module – 5			
Sl. No	**Details**	**Duration in Hours**	**Remarks**
22.	**5.1 Linear Algebra:** Rank of a matrix-echelon form. Solution of non-homogeneous system of linear equations – consistency; Gauss-elimination method, Gauss –Jordan method and Approximate solution by Gauss-Seidel method	**2**	Discussion restricted to problems
23.	**5.2 Eigen values and eigen vectors** - Rayleigh's power method; Diagonalization of a square matrix of order two. Linear transformations & Quadratic forms - Definition with examples Applications of Linear Algebra to Electrical Circuits, Traffic Flow, Image Processing Techniques, Robotics	**2**	Discussion restricted to problems. Applications to be able to understand its relevance in real life applications.
24.	**Self learning component :** Diagonalization of a square matrix of order three	**-**	**No Question to be set for SEE**
25.	**Lab session 4 :** Using MATLAB, (i) Create and work with matrices (ii) Solve non-homogeneous system of linear equations (iii)i Find the eigenvalues and eigenvectors of a square matrix	**2**	
23.	**Tutorials**	**2**	Involvement of students in respect of their doubts and solving of numerical problems

Suggested Learning Resources:

Text Books :

1. E. Kreyszig, "Advanced Engineering Mathematics", 10th Edition (Reprint), John Wiley & Sons, 2016.
2. B.S. Grewal, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, 2018.
3. N.P. Bali and Manish Goyal, "A textbook of Engineering Mathematics", Latest Edition, Laxmi Publications.

References :

1. B.V. Ramana, "Higher Engineering Mathematics", 11th Edition, McGraw-Hill Education.

2. H. K. Dass and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand Publication, 2014.
3. S. L. Ross, "Differential Equations", 3rd Edition, Wiley India, 1984.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, "An Introduction to Linear Algebra", Reprint Affiliated East–West Press, 2005.

Module wise Text Books:

Module	Article No	Text Books
1	1.2	Article No.4.10, 4.11 (1, 2, 4, 5) of Text Book 2
	1.3	Article No. 4.5 (III) of Text Book 2.
	1.4	Article No.5.11 & 5.12 of Text book 2
2	2.1	Article No. 13.1, 13.2, 13.3, 13.4, 13.5 (Cases I-III), 13.6 & 13.7 of Text Book 2
		Article No. 13.1-13.7 of Text Book 3
	2.2	Article No.13.8 (1) , 13.9 (I), 14.4 (1) & 14.5 (II) of Text Book 2
		Article No. 13.8 & 13.9 of Text Book 3
3	3.1	Article No.7.1-7.5, 7.6 (2) of Text Book 2
		Article 6.1-6.10 of Text Book 3
	3.2	Article No.7.15 & 7.16 of Text Book 2
		Article 15.1-15.6 of Text Book 3
4	4.1	Article No.21.1 to 21.5, 21.7, 21.9, 21.10 & 21.17 of Text Book 2
	4.2	Article No.21.12, 21.13, 21.14 & 21.15 of Text Book 2
5	5.1	Article No.2.7 (1)-(6), 2.10, 28.6(1, 2) and 28.7(2) of Text Book 2
	5.2	Article No. 4.0, 20.8 and 8.4 of Text Book 1
		Article No. 2.11, 2.13, 2.14, 2.16, 2.17 & 2.18 of Text Book 2

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Department of Mechanical Engineering

ENGINEERING GRAPHICS
21ME14/24

Blow-up Syllabus
(Common to all Branches)

Module-1			
Sl. No	**Details**	**Duration in hours**	**Remarks**
1	Importance of learning Engineering Graphics, Industrial /defence application, research in the field of ME, Impact of the course on societal and sustainable solutions. Introduction to Engineering graphics Drawing Instruments and their uses, relevant BIS conventions and standards. Lettering, line conventions, dimensioning, material conventions, and free hand practicing. Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Orthographic Projections: Planes of projection. Projections of points in all the four quadrants.	2	Self study component: (Basics of geometrical constructions) 2+4 Numerical problems
2	Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz., tangency, parallelism, inclination and perpendicularity. Basics of geometrical constructions and Projections of points in all the four quadrants.	2	Numerical problems on projection of points
Module-2			
Sl. No	**Details**	**Duration in hours**	**Remarks**
3	Basics of Projections of straight lines – problems on lines above HP and in front of VP	2	2+2 Numerical problems
4	Basics of Projections of straight lines – problems on lines above HP and in front of VP	2	4 Numerical problems

5	Projections of straight lines – problems on lines on HP/VP	**2**	3+5Numerical problems
6	Projections of straight lines – problems on lines on HP/VP	**2**	8 Numerical problems
	Module-3		
Sl. No	**Details**	**Duration hours**	**Remarks**
7	Introduction to projection of plane surfaces, Projection of Triangular and Square planes inclined to horizontal and vertical planes.	2	Basics and 2 + 2 numerical problems
8	Projection of Triangular and Square planes inclined to horizontal and vertical planes.	2	4 Numerical problems
9	Rectangular, Pentagonal, Hexagonal and Circular planes	2	4+6 Numerical problems
10	Rectangular, Pentagonal, Hexagonal and Circular planes	2	10 Numerical problems
	Module-4		
Sl. No	**Details**	**Duration hours**	**Remarks**
11	Introduction to projections of Solids, Projections of right regular Prisms	2	3 + 3Numerical problems
12	Introduction to projections of Solids, Projections of right regular Prisms	**2**	6 Numerical problems
13	Projection of Pyramids and Cones	2	3+5Numerical problems

14	Projection of Pyramids and Cones	2	8 Numerical problems
15	Tetrahedron and Hexahedron inclined to both the planes.	2	2+2 Numerical problems
16	Tetrahedron and Hexahedron inclined to both the planes.	2	4 Numerical problems
Module-5			
Sl. No	**Details**	**Duratio nin hours**	**Remarks**
17	Isometric Projection Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones, Hemisphere and spheres.	2	3 + 3 Numerical problems
18	Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones, Hemisphere and spheres.	**2**	6 Numerical problems
19	Isometric projection of combination of two solids.	2	4+4 Numerical problems
20	Isometric projection of combination of two solids.	2	8 Numerical problems

Suggested Learning Resources:

Text Books:

1. K.R. Gopalakrishna, *Engineering Graphics*, 32nd ed. Bangalore: Subhas Publications, 2013.
2. N.D. Bhatt, *Engineering Drawing*, 48th ed. Gujarat: V. M. Panchal Charutha Publishing House, 2005.

Reference Books:

1. A Primer on Computer Aided Engineering Drawing, 2nd edition, Published by VTU, Belagavi.
2. Luzadder Warren J., Duff John M Eastern, 2009, Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production, 7th edition, Best Publications.

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Department of Mechanical Engineering

Elements of Mechanical Engineering -21ME15
Blow-up Syllabus
(Common to all Branch)

Sl. No	Details	Duration	Remarks
	Module-1		
1.	**Sources of Energy:** Non-renewable energy sources and their applications. Environmental issue like global warming and ozone depletion.	1	Differences and Common environmental effects.
2	Renewable Energy like Solar, Wind, Hydro, and Bio fuels	2	Line diagram which represents working and major components used in respective plant.
3	**Steam**: Formation of steam at constant pressure and thermodynamic properties of steam	2	Line diagram that represents Steam generation starting from 0°C.
4	Problems on steam	2	Simple numerical to find the quality of steam and its energy content.
	Module-2		
5	**Hydraulic Turbines:** Hydraulic Turbines, Classification and specification, Principle and operation of Pelton wheel turbine and their applications.	1	Line diagram which represents working and major components used in Pelton wheel turbine.
6	Principle and operation of Francis Turbine and Kaplan Turbine with their applications.	2	Line diagram which represents working and major components used in Francis Turbine and Kaplan Turbine
7	**Internal Combustion Engines:** Introduction, Classification, Parts of an IC engine, 4 stroke petrol engine, 4 stroke diesel engine	1	Line diagram which represents major parts of IC engine and their arrangement.
8	PV diagrams of Otto cycle, Diesel cycle, Dual Cycle, Simple numerical on performance parameters of IC Engines	2	Working of 4-Stroke Petrol and diesel engines and basic differences between them
9	Problems	2	Simple numerical to evaluate performance parameters of IC Engines
10	Electric Vehicles	1	Basic configuration of EVs and merits and demerits over standard IC engines.

Module-3			
11	**Refrigeration:** Definitions- Refrigeration effect, Ton of Refrigeration, Ice making capacity, COP, Relative COP, Unit of Refrigeration, Refrigerant, Commonly used Refrigerants.	1	Definitions, formulas and their units of all basic terms used in Refrigeration system
12	Properties of Refrigerants, Principle and working of Vapour compression refrigeration. Principle and application of air conditioners, Window and Split air conditioners.	2	Line diagram which represents major components used in VCR system and Split AC and there working.
13	**Belt Drives:** Open and Cross belt drives, Definitions – Slip, Creep, Velocity ratio, Derivation of length for open belt drives	1	Definitions, formulas and their units of all basic terms used in belt drives. Derivation to find length of belt.
14	Derivation of length for cross belt drives	2	Derivation to find length of belt.
15	**Problems on Belt drives**	2	Simple numerical problems To find length of belt, distance between pulley, Diameter and speed of pulleys.
16	**Gear Drives:** Types – Spur, Helical, Bevel, Worm, rack and Pinion, Advantages and disadvantages over belt drives	2	Line diagram that represents Size of gears, directions of teeth, arrangements of gears, number of gears in drive system.
Module-4			
17	**Engineering Materials:** Introduction, Classification, Properties, and Industrial Application of Ferrous, Materials	2	List of aterials used for engineering application. Classification, and their basic properties.
18	Composites Materials, Smart Materials	1	Classification, advantages over conventional materials and their applications.
19	**Metal Joining processes:** Classifications, Principle of Soldering, Brazing and Welding processes, Working of Arc welding,	1	Classifications of different joining process, Line diagram that represents working and components used in Arc welding.
20	Working of Oxy – Acetylene welding, TIG and MIG Welding.	1	Line diagram that represents working and components used in Arc welding. Hands on.
21	**Lathe Machine Tool:** Principle of working of a centre Lathe, Specifications, Operations: Turning, Facing, Taper Turning by swiveling compound rest,	2	Sketches (Line diagram) only for explaining the Lathe operations. No sketch to represent Lathe machine tool. Hands on.

22	Lathe Operations: Knurling, Thread cutting, Drilling.	2	Sketches (Line diagram) only for explaining the Lathe operations. Hands on.
Module-5			
23	**Automation:** Introduction and types of automation. **Introduction to Advanced Manufacturing Systems:** Computer Numerical Control (CNC) Machines: Introduction, Components of CNC Machines,	2	Classification of Advanced manufacturing system, Line diagram to represent the working and major components used in CNC.
24	**Robotics:** Robot anatomy, Joints and links, Common Robot configurations,	2	Line diagrams that represents different robotic configurations.
25	Applications of Robots in Material handling, Processing, Assembly and inspection	1	Various applications of robots in different field.

Suggested Learning Resources:

Textbooks:

1. K. R. Gopalakrishna, "Elements of Mechanical Engineering", Subhas Publications, 38th Edition, 2019.
2. S. Trymbaka Murthy, "Text book of Elements of Mechanical Engineering", MEDTECH, Scientific International Pvt Ltd, 1st Edition, 2019.
3. Mehrdad Ehsani, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles", CRC Press, 1st Edition, 2005.

References:

1. Groover, Milell P, "Automation, Production Systems & Computer-integrated Manufacturing", Pearson, 4th Edition, 2018.

2. K. P Roy, "Elements of Mechanical Engineering", Media Promoters & amp; Publishing Pvt. Ltd, 7th Edition, 2014.

3. Dr. A. S. Ravindra, "Elements of Mechanical Engineering", Best Publications, 7th Edition, 2009.

Module wise Text Books/Reference Books

Module	Text Book / Reference Book
1	1. K. R. Gopalakrishna, "Elements of Mechanical Engineering", Subhas Publications, 38th Edition, 2019. 2. S. Trymbaka Murthy, "Text book of Elements of Mechanical Engineering", MEDTECH, Scientific International Pvt Ltd, 1st Edition, 2019. 3. K. P Roy, "Elements of Mechanical Engineering", Media Promoters & amp; Publishing Pvt. Ltd, 7th Edition, 2014. 4. Dr. A. S. Ravindra, "Elements of Mechanical Engineering", Best Publications, 7th Edition, 2009.
2	1. K. R. Gopalakrishna, "Elements of Mechanical Engineering", Subhas Publications, 38th Edition, 2019. 2. S. Trymbaka Murthy, "Text book of Elements of Mechanical Engineering", MEDTECH, Scientific International Pvt Ltd, 1st Edition, 2019. 3. K. P Roy, "Elements of Mechanical Engineering", Media Promoters & amp; Publishing Pvt. Ltd, 7th Edition, 2014. 4. Dr. A. S. Ravindra, "Elements of Mechanical Engineering", Best Publications, 7th Edition, 2009. 5. Mehrdad Ehsani, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles", CRC Press, 1st Edition, 2005.
3	1. K. R. Gopalakrishna, "Elements of Mechanical Engineering", Subhas Publications, 38th Edition, 2019. 2. S. Trymbaka Murthy, "Text book of Elements of Mechanical Engineering", MEDTECH,

	Scientific International Pvt Ltd, 1st Edition, 2019. 3. K. P Roy, "Elements of Mechanical Engineering", Media Promoters & amp; Publishing Pvt. Ltd, 7th Edition, 2014. 4. Dr. A. S. Ravindra, "Elements of Mechanical Engineering", Best Publications, 7th Edition, 2009.
4	1. K. R. Gopalakrishna, "Elements of Mechanical Engineering", Subhas Publications, 38th Edition, 2019. 2. S. Trymbaka Murthy, "Text book of Elements of Mechanical Engineering", MEDTECH, Scientific International Pvt Ltd, 1st Edition, 2019. 3. K. P Roy, "Elements of Mechanical Engineering", Media Promoters & amp; Publishing Pvt. Ltd, 7th Edition, 2014. 4. Dr. A. S. Ravindra, "Elements of Mechanical Engineering", Best Publications, 7th Edition, 2009.
5	1. K. R. Gopalakrishna, "Elements of Mechanical Engineering", Subhas Publications, 38th Edition, 2019. 2. S. Trymbaka Murthy, "Text book of Elements of Mechanical Engineering", MEDTECH, Scientific International Pvt Ltd, 1st Edition, 2019. 3. Groover, Milell P, "Automation, Production Systems & Computer-integrated Manufacturing", Pearson, 4th Edition, 2018.