UNIVERSITY OF MYSORE

(Re-accredited by NAAC with 'A' Grade)

(NIRF-2022: Ranked 33rd in University Category and 54th in Overall Category)

MYSORE UNIVERSITY SCHOOL OF ENGINEERING

SCHEME AND SYLLABUS OF

B.E IN ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Outcome Based Education (OBE)

and

Choice Based Credit System (CBCS)

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DIRECTOR
Mysore University
School of Engineering
Manasagangotri, Mysuru - 06

MYSORE UNIVERSITY SCHOOL OF ENGINEERING

Scheme of Teaching and Examination 2021-2022 (As per NEP-2020)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2021–2022)

I-SEMESTER BE (Physics Cycle)

Sl No.	Course & Course Code		Course Title	Teaching Dept.	Paper Setting Board	Teaching Hours/week			Examination				Credits
						Theory lectures	Tutorial	Practical/ Drawing	Examination in Hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	21MAT11	Engineering Mathematic-I	MAT	MAT	3	2	-	03	50	50	100	4
2	BSC	21PHY12	Engineering Physics	PHY	PHY	3	-	-	03	50	50	100	3
3	ESC	21ELN13	Basic Electronics Engineering	BM & RE	BM & RE	3	-	-	03	50	50	100	3
4	ESC	21CIV14	Elements of Civil Engineering	CEE	CEE	3	-	-	03	50	50	100	3
5	BSC	21BIE15	Biology for Engineers	CHE	CHE	3	-	-	03	50	50	100	3
6	BSC	21PHYL16	Engineering Physics Laboratory	PHY	PHY	-	-	2	03	50	50	100	1
7	ESC	21EEL17	Basic Electrical & Electronics Laboratory	BM & RE	BM & RE	-	-	2	03	50	50	100	1
8	ESC	21IDT18	Innovation & Design Thinking	Respective Dept.	Respective Dept.	-	2	-	-	50	-	50	1
9	HSMC	21EGH19	Technical English	HSMC	HSMC	-	-	2	-	50	-	50	1
Total						**15**	**04**	**06**	**21**	**450**	**350**	**800**	**20**

Note: BSC: Basic Science Courses, ESC: Engineering Science Courses, MAT: Mathematics, PHY: Physics, BM & RE: Bio-medical and Robotics Engineering, CEE: Civil Environmental Engineering, CHE: Chemistry, HSMC: Humanity, Social Science and Management Courses.

Credit Definition:

- 1-hour lecture**(L)** per week per semester = **1 Credit**
- 2-hour tutorial **(T)** per week per semester = **1 Credit**
- 2-hour Practical/Drawing **(P)** per week per semester = **1 Credit**

- **Four-credit** courses are to be designed for **50** hours of Teaching-Learning process.
- **Three credit** courses are to be designed for **40** hours of Teaching-Learning process.
- **Two credit** courses are to be designed for **25** hours of Teaching-Learning process.
- **One credit** courses is to be designed for **15** hours of Teaching-Learning process

AICTE Activity Points to be earned by students admitted to BE/B.Tech., day college programme (For more details refer to Chapter 6, AICTE Activity Point Programme, Model Internship Guidelines):

Over and above the academic grades, every Day College regular student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to UoM. The Activity Points earned shall be reflected on the student's eighth semester Grade Card.

The activities can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression.

In case students fail to earn the prescribed activity Points, an Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

MYSORE UNIVERSITY SCHOOL OF ENGINEERING

Scheme of Teaching and Examination 2021-2022(As per NEP-2020)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2021–2022)

II-SEMESTER BE (Chemistry Cycle)

Sl No.	Course & Course Code		Course Title	Teaching Dept.	Paper Setting Board	Teaching Hours/week			Examination				Credits
						Theory lectures	Tutorial	Practical/ Drawing	Examination in Hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	21MAT21	Engineering Mathematic-II	MAT	MAT	3	2	-	03	50	50	100	4
2	BSC	21CHE22	Engineering Chemistry	CHE	CHE	3	-	-	03	50	50	100	3
3	ESC	21ELE23	Basic Electrical Engineering	BM & RE	BM & RE	3	-	-	03	50	50	100	3
4	ESC	21CPS24	C Programming for Problem Solving	CS & E	CS & E	3	-	-	03	50	50	100	3
5	BSC	21EME25	Elements of Mechanical Engineering	BM & RE	BM & RE	3	-	-	03	50	50	100	3
6	BSC	21CHEL26	Engineering Chemistry Laboratory	CHE	CHE	-	-	2	03	50	50	100	1
7	ESC	21CPL27	C Programming Laboratory	CS & E	CS & E	-	-	2	03	50	50	100	1
8	ESC	21AEC28	Ability Enhancement Course	Respective Dept.	Respective Dept..	-	2	-	-	50	-	50	1
9	HSMC	21KAN29	Technical Kannada	HSMC	HSMC	-	2	-	-	50	-	50	1
Total						**15**	**06**	**04**	**21**	**450**	**350**	**800**	**20**

Note: BSC: Basic Science Courses, ESC: Engineering Science Courses, MAT: Mathematics, CHE: Chemistry, BM & RE: Bio-medical and Robotics Engineering, CS & E: Computer Science and Engineering, HSMC: Humanity, Social Science and Management Courses

Credit Definition:

- 1-hour lecture **(L)** per week per semester = **1 Credit**
- 2-hour tutorial **(T)** per week per semester = **1 Credit**
- 2-hour Practical/Drawing **(P)** per week per semester = **1 Credit**

- **Four-credit** courses are to be designed for **50** hours of Teaching-Learning process.
- **Three credit** courses are to be designed for **40** hours of Teaching-Learning process.
- **Two credit** courses are to be designed for **25** hours of Teaching-Learning process.
- **One credit** course are to be designed for **15** hours of Teaching-Learning process

AICTE Activity Points to be earned by students admitted to BE/B.Tech., day college programme (For more details refer to Chapter 6, AICTE Activity Point Programme, Model Internship Guidelines):

Over and above the academic grades, every Day College regular student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to UoM. The Activity Points earned shall be reflected on the student's eighth semester Grade Card.

The activities can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression.

In case students fail to earn the prescribed activity Points, an Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

Physics Cycle

Engineering Mathematics-I (21MAT11)

Semester I (Common for both Physics and Chemistry Cycle)			
No. of Teaching hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	2	**SEE Marks**	50
Total No. of Lecture hours	50	**Exam Hours**	03
L: T :P	3:2:0	**Credits**	04

Modules	Course Content	Teaching Hours
Module 1	**Differential Calculus:** **Partial Differentiation**: Basics; Euler's theorem of first kind (only problems); Total derivatives; Jacobian; Maclaurin's series of one and two variable; Differentiation under Integral sign. **Applications:** Problems on evaluation of non-elementary integrals using Maclaurin's series	**10 Hours**
Module 2	**Ordinary Differential Equations** **Linear Equations**: Bernoulli's equation; Exact Equations; Reducible to Exact (If of the form); Orthogonal Trajectory (Cartesian only); and Newton's law of cooling. **Non- Linear Equations:** Solve for p, Clairaut's form(singular, general solution). **Applications:** Problems on LR circuits leading to linear differential equations.	**10 Hours**
Module 3	**Integral Calculus:** **Multiple Integrals:** Double integrals, changing the order of integration, changing Cartesian form to polar form. Special Functions- Beta and Gamma Functions, relation between beta and gamma function, properties, and its problems (related to reduction formula of definite integral). **Applications:** Problems on centre of gravity and moment of inertia which involve evaluation of multiple integrals.	**10 Hours**
Module 4	**Numerical methods and Infinite Series** **Numerical methods:** Types of errors in numerical methods, Solution of Algebraic and Transcendental Equation: Newton-Raphson. Finite Differences: Forward and Backward, Interpolation, Lagrange's Interpolation. Numerical Integration- Simpson's $1/3^{rd}$rule. **Infinite Series: C**onvergence of infinite series: D-Alembert's Ratio Test, Raabe's Test, Leibniz test, absolute and conditional convergent. **Applications:** Problems on application of Newton-Raphson method to some physical contexts	**10 Hours**

Module 5	**Linear Algebra** Vectors, linearly dependent and independent vectors, Solution to systems of Linear Equation: Rank, Consistency, Gauss Elimination, LU decomposition. Eigen values- Eigen vectors, Diagonalization, Gauss–Seidel Method, Rayleigh Power method. **Applications:** Problems on Kirchhoff's law leading to solving system of linear equations. Problems on computation of inverse matrix using LU decomposition.	**10 Hours**

Course outcomes:
At the end of the course the students will be able to:

- Explain the basic concepts of calculus for a single and multivariable function, ordinary.
  differential equations, infinite series, numerical methods and linear algebra.
- Apply the above concepts of the syllabus in their respective branches of engineering.
- Analyze the solutions of engineering problems using these concepts.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

Continuous Internal Evaluation (CIE): The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall bethree tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each fullquestion carries 20 marks.

- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text and Reference Books:

1. S C Chapra and R P Canale, *Numerical Methods for Engineering,* 15th Edition, Tata McGraw Hill
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, Latest edition, Wiley Publications.
3. B.S. Grewal, *Higher Engineering Mathematics*, Latest edition, Khanna Publishers.
4. Gilbert Strang, Linear Algebra and its Applications, Wellesley Publishers.
5. Peter V. O'Neil, *Engineering Mathematics*, CENGAGE Learning India Pvt Ltd.
6. B.V. Ramana, *Higher Engineering Mathematics*, Latest edition, Tata McGraw Hill.
7. Thomas and Finney, *Calculus and Analytic Geometry,* 9th Edition, Pearson Education.

Engineering Physics (21PHY12/22)

Semester I/II			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	40	**Exam Hours**	03
L: T:P	3:0:0	**Credits**	03

Modules	Course Content	Teaching Hours
Module 1	**Electrostatics, Magnetostatics and Elastic properties of materials:** **Electrostatics:** Electrostatic field and potential of a dipole, dielectric constant, Bound charges due to electric polarization, electric displacement, dielectric slab in uniform electric field, relation between dielectric susceptibility (χ), dielectric constant and polarization density (P). Numerical problems. **Magnetostatics:** Biot Savart's law, divergence and curl of static magnetic field, Gauss divergence theorem sand stokes' theorem, Faraday's law in terms of EMF produced by changing magnetic flux. **Elastic properties of materials:** concept of elasticity, stress, strain, tensile stress, shear stress, compressive stress. Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus and Rigidity modulus (n) in terms of α and β. Relation between Y, n and K. Derivation of expression for bending moment of a beam with circular and rectangular cross section. Numerical problems.	**08 Hours**
Module 2	**Crystal physics:** Space lattice, Basis vectors, Unit cell, lattice parameters. Bravais lattice and crystal systems, Estimation of directions and planes in a crystal lattice, Miller indices and expression for interplanar spacing in terms of Miller indices. Expression for lattice constant for a cubic lattice, Co-ordination number, Atomic packing factor-Atomic packing factor for sc, bcc and fcc structures. Crystal structures of NaCl and diamond, Diffraction of X-rays –derivation of Bragg's law, X-ray spectrometer, –problems on Bragg's law.	**08 Hours**
Module 3	**Introduction to solids**: Review of classical free electron theory, Quantum free electron theory, Fermi energy and Fermi factor in metals, Variation of Fermi factor with energy and temperature, Fermi-Dirac statistics, Derivation of density of states, Band theory of solids (qualitative approach) Intrinsic semiconductors, concept of effective mass (qualitative) Intrinsic carrier density, Fermi level in intrinsic semiconductors, Extrinsic semiconductors- types, variation of carrier concentration with temperature, variation of Fermi	**08 Hours**

	level with temperature, numerical problems.	
Module 4	**Modern Physics** **Dual nature of matter**: Wave particle dualism, de-Broglie hypothesis, Davisson and Germer experiment, Matter waves and their characteristic properties. Phase velocity and group velocity, Relation between phase velocity and group velocity. Relation between group velocity and particle velocity. Problems on de-Broglie's wavelength. **Wave mechanics**; Heisenberg's uncertainty principle, significance and its applications: non-existence of electron inside the nucleus. Properties of wave function and physical significance. Probability density and Normalization of wave function, Schrodinger time independent wave equation in one-dimension, Eigen values and Eigen functions. Particle in one dimensional infinite potential well. Numerical problems.	**08 Hours**
Module 5	**Lasers, optical fibers and nanomaterials**: **Lasers:** Laser Characteristics, Spatial and Temporal Coherence, Einstein Coefficient and its significance, Population inversion, Two, three and four level systems, Pumping schemes, Threshold gain coefficient, Components of laser, Nd-YAG, He-Ne, and Dye laser and their engineering applications. Numerical problems. **Optical fibers**- Construction and light propagation mechanism in optical fibers (total internal reflection and its importance), Propagation mechanism in optical fibers. Angle of acceptance. Numerical aperture. Types of optical fibers and modes of propagation. Attenuation, Pulse dispersion (qualitative only). **Nanomaterials**- Effect of nano-scale dimension, Classification of nano materials, Properties and applications of nano systems, Carbon nanotubes (CNTs).	**08 Hours**

Course Outcomes:
At the end of the course the students will be able to:

- Recall and relate the knowledge of quantum physics to the properties of advanced materials such as conductors, semiconductors, dielectrics, lasers, optical fibers and nanomaterials.
- Interpret the physical laws to study the materials properties.
- Apply the problem-solving ability to identify and construct the applications of the advanced materials in new technologies.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall bethree tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. The students will have to answer five full questions, selecting one full question from each module.

Text and Reference books:

1. Fundamentals of Physics - Halliday and Resnick, 10th Edition, 2012, Wiley, UK
2. Introduction to Mechanics - MK Verma, 2008, CRC Press, Taylor and Francis.
3. Quantum Mechanics - D.J Griffiths, 2013, Pearson Pentice Hall, New Jercy.
4. Lasers and Nonlinear Optics - B.B Laud, 2011, New Age International, New Delhi.
5. Solid State Electronics Devices - B.G. Streetman, 7th Edition, 2014, Pearson Pentice Hall, New Jersy.
6. Concept of Modern Physics - Arthur Beiser, 2009, MacGraw Hill, New Delhi.

Basic Electronics Engineering (21ELN13/23)

Semester I/II			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	40	**Exam Hours**	03
L: T:P	3:0:0	**Credits**	03

Modules	Course Content	Teaching Hours
Module 1	**Semiconductor Diode and its Applications**: Construction, working, and characteristics of PN-junction Diode, Diode approximations, Shockley's Equation, Half-wave, Full-wave, and Bridge Rectifiers, Mention of expression for average, RMS, and Peak Inverse Voltage, and Ripple Factor to each configuration, Zener Diode and its Characteristics, **Transistor:** Construction and working of Bipolar Junction Transistor, Transistor voltages and currents, mention of CB, CE and CC configurations, Input and Output characteristics of CE configuration, Circuit diagram and working of Transistor as Switch and Amplifier. **Amplifiers:** Need for transistor biasing, Voltage-Divider Bias Circuit, Classification of amplifiers.	**08 Hours**
Module 2	**Field Effect Transistors:** Construction and working of JFET, Common Drain and Transfer Characteristics of JFET. **MOSFET:** Construction, working and Characteristics of Depletion and Enhancement mode MOSFETs. **CMOS:** Construction, Working and Characteristics of CMOS transistors.	**08 Hours**
Module 3	**Basics of Digital Electronics:** Analog verses Digital Signals, Decimal, Binary, Octal and Hexadecimal Numbers and interconversion among them, 2's complement Arithmetic, Addition and Subtraction of Binary Numbers, Basic and Universal Gates. **Combinational Logic Circuits:** Boolean Algebra and Theorems, Simplification of Logic Circuits, SoP and PoS forms, 2 and 3 variable K-Maps. **Sequential Logic Circuits:** Basics of Flip-flops, SR and JK Flip-flops.	**08 Hours**
Module 4	**Operational Amplifiers and its Applications:** Basics of Differential Ampler, Block diagram of Op-amp and its modes, Ideal verses Practical Op-amps, Open and Closed Loop Op-amp configurations. **Op-amp Parameters**: Definition and expression for Voltage gain, CMRR, Input Offset Voltage and Current, Input Bias Current, Virtual Ground, Input and Output impedance, Slew	**08 Hours**

	Rate.	
Module 5	**Basics of Electronic Communication:** Definition of Modulation and Demodulation, Need for Modulation, Electromagnetic Frequency Spectrum. **Analog Communication:** Block Diagram of Analog Communication System, Principles of AM and FMModulation Schemes and their Comparison. **Digital Communication:** Block Diagram of Digital Modulation System, Advantages of Digital Communication over Analog Communication.	**08 Hours**

Course Outcome:
At the end of the course the student will be able to:

- Analyze the characteristics of Basic Electronic Devices
- Realize the importance of Electronic Devices in everyday life
- Apply the principles of working of Electronic Devices to design the Electronic circuits
- Analyze the importance of Electronic Communication System
- Gain the fundamental knowledge on the operation of Mobile Telephones

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall bethree tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each fullquestion carries 20 marks.

- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books:

1. David A. Bell, "Electronic Devices and Circuits," 5th Edition, Oxford University Press, 2015.
2. Ramakanth A Gayakwad, "Op-Amps and Linear ICs," Pearson Education, 4th Edition, 2015.
3. D. P. Leach, A.P. Malvino, Goutham S, "Digital Principles and Applications," 8th Edition, MGH, 2014.
4. Wayne Tomasi, "Electronic Communications Systems," 5th Edition, Pearson Education, 2009.

Reference Books:

1. Robert L Boylestad and Louis Nashelsky, "Electronic Devices & Circuit Theory," 11th Edition, Pearson Education India, 2018.
2. David A. Bell, "Operational Amplifiers and Linear ICs," 3rd Edition, Oxford University Press, 2011.
3. Morris Mano, "Digital Logic and Computer Design," Pearson Education, 2004
4. Kennedy and Davis, "Electronic Communication System," 5th Edition, MGH, 2011.
5. R. S. Sedha, "A Text book of Applied Electronics," 7th Edition, S. Chand and Company Ltd., 2011.

E-Resources:

1. https://www.elsevier.com/books/basic-electronics/holbrook/978-0-08-006865-7
2. http://nptel.ac.in/courses/117103063/
3. https://nptel.ac.in/courses/117/105/117105143/
4. https://swayam.gov.in/
5. https://www.mooc-list.com/course/introduction-electronics-coursera

Elements of Civil Engineering (21CIV14/24)

Semester I/II			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	40	**Exam Hours**	03
L: T:P	3:0:0	**Credits**	03

Modules	Course Content	Teaching Hours
Module 1	**Introduction:** Definition of Civil Engineering, Scope of different fields of Civil Engineering; Building Materials, Surveying, Geotechnical Engineering, Structural Engineering, Construction Technology, Hydraulics, Water Resources & Irrigation Engineering, Transportation Engineering and Environmental Engineering. Role of Civil Engineers in the Infrastructural development, effect of infrastructural facilities on social- economic development of a country. Bridges: Types of Bridges and Culverts, RCC, Steel and Composite Bridges Dams: Different types of Dams based on Material, Structural behaviour and functionality with simple sketches.	**08 Hours**
Module 2	Virtual Work and Energy Method-Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.	**08 Hours**
Module 3	Review of particle dynamics-Rectilinear motion; Plane curvilinear motion(rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular).	**08 Hours**
Module 4	Introduction to Kinetics of Rigid Bodies covering, Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in planemotion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation.	**08 Hours**
Module 5	Mechanical Vibrations covering, Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple,	**08 Hours**

	compound and torsion pendulums.	

Course outcomes:
At the end of the course the students will be able to:

- Mention the application of the various fields of civil Engineering.
- Determining the basic knowledge of mathematics and physics to solve real-world problem.
- Use scalar and vector analytical techniques for analysing forces in statically determinate structures
- Understand basic kinematics concepts – displacement, velocity and acceleration.
- Understand basic dynamics concepts – force, momentum, work and energy.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall be three tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30 marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text/Reference Books:

1. Reddy Vijaykumar K. and K. Suresh Kumar Singer's "Engineering Mechanics", 2010.
2. Tayal A.K.," Engineering Mechanics", Umesh Publications, 2010.
3. F. P. Beer and E. R. Johnston, "Vector Mechanics for Engineers", Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill,2011.
4. Andy Ruina and Rudra Pratap, "Introduction to Statics and Dynamics", Oxford University Press,2011.

Biology for Engineers (21BIE15/25)

Semester I/II			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	40	**Exam Hours**	03
L: T:P	3:0:0	**Credits**	03

Modules	Course Content	Teaching Hours
Module 1	Need to study Biology: – Life Science Studies Significance - Bio Inspired Inventions - Role of Biology in Next Generation Technology Development – Cell Structure – Cell Potential - Action Potential – ECG and other common signals – Sodium	**08 Hours**
Module 2	Potassium channels – Neuron function – Central Nervous Systems – Discussion Topics: Evolution of Artificial Neural Networks, Machine Learning techniques.	**08 Hours**
Module 3	Genetics: Basic Principles of Mendel, molecular genetics, Structure and function of genes and chromosomes, Transcription and Translation, Gene expression and regulation	**08 Hours**
Module 4	Sensing Techniques: - Understanding of Sense organs working – Sensing mechanisms - Sensor Development issues – Discussion Topics: Digital Camera – Eye Comparison, electronic nose, electronic tongue, electronic skin.	**08 Hours**
Module 5	Physiological Assist Device: Artificial Organ Development: Kidney, Liver, Pancreas, heart valves – Design Challenges and Technological Developments	**08 Hours**

Course Outcome:
At the end of the course the students will be able to:

- Understand the biological concepts from an engineering perspective.
- Understand the concepts of biological sensing and its challenges.
- explain the fundamentals of genetic and transfer of genetic information.
- Understand development of artificial systems mimicking human action.
- Integrate biological principles for developing next generation technologies.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall be three tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30 marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books:

1. "Biology for Engineers: As per Latest AICTE Curriculum" Wiley Editorial ISBN:9788126576340.
2. Biology for Engineers (ISBN: 9781121439931), TMH
3. Leslie Cromwell, Biomedical Instrumentation, Prentice Hall 2011.
4. Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., Biology for Engineers, Tata McGraw-Hill, New Delhi, 2012.
5. Medicine Dentistry Electronic Nose
6. Electronic Tongue

Reference Books:

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

Engineering Physics Laboratory (21PHYL16/26)

Semester I/II			
No. of Lecture hour/Week	-	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	-	**Exam Hours**	03
L: T:P	0:0:2	**Credits**	01

Sl No.	List of experiments
1	**Resonance in LCR circuits-** Study frequency response of series and parallel resonance circuits
2	**Dielectric constant**- Determination of dielectric constant of the given dielectric material by charging and discharging
3	**Zener diode-** I-V characteristics of Zener diode
4	**B-H curve**- Determination of energy loss, remnant flux density and coercive field of the given ferromagnetic material
5	**Planck's constant**- Determination of the Planck's constant using light emitting diodes
6	**Stefan's law**- Verification of Stefan's law
7	**Fermi Energy-** Determination of Fermi energy of given material
8	**Band gap**- Determination of energy gap of a given semiconductor
9	**Laser diffraction-** Determination of wavelength of given laser
10	**Torsional Pendulum-** Determination of moment of inertia of the given irregular body

Course Outcomes:
At the end of the course the students will be able to:

- Understand the Measuring Techniques
- Understand the characteristics of devices and materials.
- Use different techniques of measuring instruments

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain minimum of 40% marks individually both in CIE and SEE to pass. Practical Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration). Based on this grading will be awarded.

Continuous Internal Evaluation (CIE): The 75% (35 marks) CIE marks awarded in case of Practical shall be based on the weekly evaluation of laboratory journals/ reports after the

conduction of every experiment and 25% (15 marks) marks for one practical test. The total CIE marks shall be the sum of marks secured by students in the above events.

Semester End Evaluation (SEE): The practical examinations to be conducted as per the time table of University in a batch wise with strength of students not more than 10-12 per batch.

1. All laboratory experiments are to be included for practical examination.
2. The instructions printed on the cover page of answer script to be strictly adhered by the examiners.
3. Break up of marks are 15% marks for procedure, 70% marks for conduction and calculation and 15% of marks for viva voce.
4. Students can pick one experiment from the questions lot prepared by the examiners.
5. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

Basic Electrical and Electronics Laboratory (21EEL17/27)

Semester I/II			
No. of Lecture hour/Week	-	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	-	**Exam Hours**	03
L: T:P	0:0:2	**Credits**	01

Sl No.	List of experiments
1	Verification of KVL and KCL for DC circuits
2	Measurement of resistance and inductance of a choke coil using three voltmeter method
3	Two-Way and Three-Way control of lamp.
4	Measurement of Current, Power and Power Factor of Incandescent Lamp, Fluorescent Lamp and LED Lamp.
5	Determination of Electrical Characteristic of Photovoltaic cells.
6	Obtain the V-I Characteristics of a Diode.
7	Zener diode as a Voltage Regulator with variable load.
8	Design and Verify the truth table of logic gates
9	Calculate the efficiency of Half Wave and Full Wave diode rectifier.
10	Obtain the characteristic of MOSFET.

Course Outcomes:
At the end of the course the student will be able to:

- To conduct experiment to verify KVL and KCL.
- To conduct experiment to measure impedance of a choke coil & power factor of different lamps.
- To understand the working of two-way and three-way control of lamp.
- To obtain the characteristic of Diode, Zener diode, MOSFET & PV Cell.
- To verify the truth table of Logic gates
- To compute the efficiency of half wave and full wave diode rectifier

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain minimum of 40% marks individually both in CIE

and SEE to pass. Practical Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration). Based on this grading will be awarded.

Continuous Internal Evaluation (CIE): The 75% (35 marks) CIE marks awarded in case of Practical shall be based on the weekly evaluation of laboratory journals/ reports after the conduction of every experiment and 25% (15 marks) marks for one practical test. The total CIE marks shall be the sum of marks secured by students in the above events.

Semester End Evaluation (SEE): The practical examinations to be conducted as per the time table of University in a batch wise with strength of students not more than 10-12 per batch.

1. All laboratory experiments are to be included for practical examination.
2. The instructions printed on the cover page of answer script to be strictly adhered by the examiners.
3. Break up of marks are 15% marks for procedure, 70% marks for conduction and calculation and 15% of marks for viva voce.
4. Students can pick one experiment from the questions lot prepared by the examiners.
5. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

Innovation and Design Thinking (21IDT18/28)

Semester I/II			
No. of Lecture hour/Week	-	**CIE Marks**	50
No. of Tutorial hours/week	02	**SEE Marks**	-
Total No. of Lecture hours	-	**Exam Hours**	-
L: T:P	0:2:0	**Credits**	01

Module 1	
PROCESS OF DESIGN: Understanding Design thinking Shared model in team-based design – Theory and practice in Design thinking – Exploring work of Designers across globe – MVP or Prototyping.	
Pedagogy	*Introduction about the design thinking: Chalk and Talk method* *Theory and practice through presentation* *MVP and Prototyping through live examples and videos.*
Module 2	
Tools for Design Thinking Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design.	
Pedagogy	*Case studies on design thinking for real-time interaction and analysis,* *Simulation exercises for collaborated enabled design thinking,* *Live examples on the success of collaborated design thinking.*
Module 3	
Design Thinking in IT Design Thinking to Business Process modeling – Agile in Virtual collaboration environment – Scenario based Prototyping.	
Pedagogy	*Case studies on design thinking and business acceptance of the design,* *Simulation on the role of virtual eco-system for collaborated prototyping.*
Module 4	
DT For strategic innovations Growth – Story telling - Predictability – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.	
Pedagogy	*Business model examples of successful designs* *Presentation by the students on the success of design* *Live project on design thinking in a group of 4 students.*
Module 5	
Design thinking workshop Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test.	
Pedagogy	*8 hours design thinking workshop from the expect and then presentation by the students on the learning from the workshop.*

Course Outcome:

At the end of the course the student will be able to:

- Explain various design process.

- Generate and develop ideas through different techniques.
- Identify the significance of reverse engineering
- Draw technical drawings for design ideas.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50%. The student has to obtain minimum of 40% marks in CIE to pass.

Continuous Internal Evaluation:

1. Methods suggested: Test, Open Book test, Written Quiz, Seminar, report writing micro project etc.
2. The class teacher has to decide the topic for closed book test, open book test, Written Quiz and Seminar. In the beginning only teacher has to announce the methods of CIE for the subject.

Text Books:

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011.
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

Reference Books:

1. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
2. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

Technical English (21EGH19)

Semester I (Common for both Physics and Chemistry Cycle)			
No. of Lecture hour/Week	-	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	-
Total No. of Lecture hours	-	**Exam Hours**	-
L: T:P	0:0:2	**Credits**	01

Modules	Course Content	Teaching Hours
Module 1	1.1 Word Formation 1.2 Etymology, origin of foreign words and their use in English Language 1.3 Familiarizing with prefixes and suffixes from foreign languages in English to form derivatives. 1.4 Synonyms, Antonyms and Standard Abbreviations. Basic Writing Skills	**05 Hours**
Module 2	2.1 Structure of Sentences 2.2 Use of Idioms and phrases in sentences 2.3 Punctuation of Sentences 2.4 Syntax and Creating coherence 2.5 Organizing principles of paragraphs in documents	**05 Hours**
Module 3	Identifying Common Errors in Writing 3.1 Subject-verb agreement 3.2 Noun-pronoun agreement 3.3 Misplaced modifiers 3.4 Articles 3.5 Prepositions 3.6 Redundancies 3.7 Clichés	**05 Hours**
Module 4	Nature and Style of Proper Writing 4.1 Defining 4.2 Describing and Classifying 4.3 Illustrations with suitable examples 4.4 Formulating Introduction and Conclusion Honing Writing Skills	**05 Hours**
Module 5	5.1 Report Writing/Comprehension 5.2 Précis Writing 5.3 Essay Writing 5.4 Critical analysis of unknown Prose Pieces/Poems Oral Communication (This unit involves interactive practice sessions in Language Lab) Listening Comprehension- Active Listening, Feedback and Response, Pronunciation, Intonation and Accent, Common	**05 Hours**

	Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal and PPT Presentations	

Course Outcomes:
At the end of the course the Student will be able to:

- Comprehend and Perceive things/issues to be Creative and Innovative.
- To voice the opinions with precision.
- Communicate and Converse with exuberance with the Global Audience.

Assessment Details (CIE)

The weightage of Continuous Internal Evaluation (CIE) is 50%. The student has to obtain a minimum of 40% marks in CIE to pass.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall bethree tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Text Books

1. Balasubramanian, P. Phonetics for Indian Students. (Second Edition) Macmillan, Mumbai, 2013
2. CIEFL, Hyderabad , Exercises in Spoken English. Parts. I-III. Oxford University Press.
3. Liz Hamp-Lyons and Ben Heasly Study Writing. Cambridge University Press. 2006.
4. Raman, M & Sharma. S. Technical Communication: Principles and Practice. OUP, New
5. Delhi, 2014
6. Sanjay Kumar and PushpLata Communication Skills. Oxford University Press. 2011.
7. Swan, Michael. Practical English Usage. (Fourth Edition) OUP. 2017.
8. Wood. F.T. Remedial English Grammar. Macmillan.2007
9. Zinsser William. On Writing Well. Harper Resource Book. 2001

Chemistry Cycle

Engineering Mathematics-I (21MAT11)

Semester I (Common for both Physics and Chemistry Cycle)			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	2	**SEE Marks**	50
Total No. of Lecture hours	50	**Exam Hours**	03
L: T:P	3:2:0	**Credits**	04

Modules	Course Content	Teaching Hours
Module 1	**Differential Calculus:** **Partial Differentiation**: Basics; Euler's theorem of first kind (only problems); Total derivatives; Jacobian; Maclaurin's series of one and two variable; Differentiation under Integral sign. **Applications:** Problems on evaluation of non-elementary integrals using Maclaurin's series.	**10 Hours**
Module 2	**Ordinary Differential Equations** **Linear Equations**: Bernoulli's equation; Exact Equations; Reducible to Exact (If of the form); Orthogonal Trajectory (Cartesian only); and Newton's law of cooling. **Non- Linear Equations:** Solve for p, Clairaut's form(singular, general solution). **Applications:** Problems on LR circuits leading to linear differential equations.	**10 Hours**
Module 3	**Integral Calculus:** **Multiple Integrals:** Double integrals, changing the order of integration, changing Cartesian form to polar form. Special Functions- Beta and Gamma Functions, relation between beta and gamma function, properties, and its problems (related to reduction formula of definite integral). **Applications:** Problems on centre of gravity and moment of inertia which involve evaluation of multiple integrals.	**10 Hours**
Module 4	**Numerical methods and Infinite Series** **Numerical methods:** Types of errors in numerical methods, Solution of Algebraic and Transcendental Equation: Newton-Raphson. Finite Differences: Forward and Backward, Interpolation, Lagrange's Interpolation. Numerical Integration- Simpson's $1/3^{rd}$rule. **Infinite Series: C**onvergence of infinite series: D-Alembert's Ratio Test, Raabe's Test, Leibniz test, absolute and conditional convergent. **Applications:** Problems on application of Newton-Raphson method to some physical contexts	**10 Hours**

Module 5	**Linear Algebra** Vectors, linearly dependent and independent vectors, Solution to systems of Linear Equation: Rank, Consistency, Gauss Elimination, LU decomposition. Eigen values- Eigen vectors, Diagonalization, Gauss–Seidel Method, Rayleigh Power method. **Applications:** Problems on Kirchhoff's law leading to solving system of linear equations. Problems on computation of inverse matrix using LU decomposition.	**10 Hours**

Course outcomes:
At the end of the course the students will be able to:

- Explain the basic concepts of calculus for a single and multivariable function, ordinary differential equations, infinite series, numerical methods and linear algebra.
- Apply the above concepts of the syllabus in their respective branches of engineering.
- Analyze the solutions of engineering problems using these concepts.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

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1. Thirty (30) marks shall be considered to evaluate students in tests. There shall be three tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30 marks.
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3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.

- The students will have to answer five full questions, selecting one full question from each module.

Text and Reference Books

1. S C Chapra and R P Canale, *Numerical Methods for Engineering*, 15th Edition, Tata McGraw Hill
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, Latest edition, Wiley Publications.
3. B.S. Grewal, *Higher Engineering Mathematics*, Latest edition, Khanna Publishers.
4. Gilbert Strang, Linear Algebra and its Applications, Wellesley Publishers.
5. Peter V. O'Neil, *Engineering Mathematics*, CENGAGE Learning India Pvt Ltd.
6. B.V. Ramana, *Higher Engineering Mathematics*, Latest edition, Tata McGraw Hill.
7. Thomas and Finney, *Calculus and Analytic Geometry*, 9th Edition, Pearson Education.

Engineering Mathematics-II (21MAT21)

Semester II (Common for both Physics and Chemistry Cycle)			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	2	**SEE Marks**	50
Total No. of Lecture hours	50	**Exam Hours**	03
L: T:P	3:2:0	**Credits**	04

Modules	Course Content	Teaching Hours
Module 1	**Higher Order Differential Equations** Inverse Differential Operator: Particular integral of the form e^{ax}, Sinax, polynomials and $e^{ax}V(x)$ (up to third order) and Variation of Parameters. Differential Equation with variable coefficient: Cauchy's and Legendre differential equations. **Applications:** Problems on LRC circuit leading to higher order differential equation. Problems on forced oscillation leading to homogeneous linear ODE	**10 Hours**
Module 2	**Power Series Solutions:** Frobenius method of Power Series (only second order), Bessel's Differential Equation leading to $J_n(x)$, $J_{1/2}(x)$, $J_{-1/2}(x)$, Legendre's Differential Equations, Rodrigues formula (without proof)-Legendre's Polynomial.	**10 Hours**
Module 3	**Vector Calculus**: VPDO- Gradient of a scalar field (angle between two surfaces & Directional Derivatives), Divergence and Curl of Vector field and its properties (Solenoidal and Irrotational). Line integrals, Green's theorem, Stroke's theorem, and Gauss Divergence theorem. **Applications:** Problems on calculating work done using line integrals. Problems on finding the outward flux of a filedusing Green's theorem	**10 Hours**
Module 4	**Laplace Transform** Definition and Laplace transforms of elementary functions (statements only). Laplace transforms of Periodic functions and unit-step function (problems only). Inverse Laplace Transform: Inverse Laplace transforms by method of partial fractions, Convolution theorem to find the inverse Laplace transforms. Solution of linear differential equations using Laplace transforms. **Applications:** Problems on Laplace transforms related to electric circuits.	**10 Hours**
Module 5	**Advanced Linear Algebra:** Vector Space, basis and span, subspace, linear Transformation (LT), Matrix representation of LT, Change of basis, Rank nullity theorem, inverse LT.	**10 Hours**

Course outcomes:
At the end of the course the students will be able to:

- Explain the basic concepts of vector calculus, higher order differential equations,
- Laplace transforms and advanced linear algebra.
- Apply the above concepts of the syllabus in their respective branches of engineering.
- Analyze the solutions of engineering problems using these concepts.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall be three tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30 marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text and Reference Books:

1. S C Chapra and R P Canale, *Numerical Methods for Engineering,* 15th Edition, Tata McGraw Hill
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, Latest edition, Wiley Publications.
3. B.S. Grewal, *Higher Engineering Mathematics*, Latest edition, Khanna Publishers.
4. Gilbert Strang, Linear Algebra and its Applications, Wellesley Publishers.

5. Peter V. O'Neil, *Engineering Mathematics*, CENGAGE Learning India Pvt Ltd.
6. B.V. Ramana, *Higher Engineering Mathematics*, Latest edition, Tata McGraw Hill.
7. Thomas and Finney, *Calculus and Analytic Geometry,* 9th Edition, Pearson Education.

Engineering Chemistry (21CHE12/22)

Semester I/II			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	40	**Exam Hours**	03
L: T:P	3:0:0	**Credits**	03

Modules	Course Content	Teaching Hours
Module 1	**Thermodynamics and Energy Balance** Introduction, Terminology of thermodynamics, Zeroth law; First law of thermodynamics- Heat and work, Enthalpy, Standard Enthalpies, Bond Enthalpy; The Second Law of Thermodynamics- Entropy the Carnot Cycle; The Third Law of Thermodynamics- Entropy and Temperature-Gibbs Free Energy, Standard Gibbs Free Energies and Chemical Equilibrium. **Electrochemical Energy Systems** Introduction, Single Electrode Potential-origin and terminology; Derivation of Nernst Equation and its applications; Standard Electrode Potential; Measurement of Single Electrode Potential and its applications- Definition, construction of a galvanic cell; Classification of galvanic cells-primary, secondary and concentration cells; EMF of a cell-Definition, notation and conventions; Types of electrodes; Reference electrodes- calomel electrode and Ag / AgCl electrode. **Battery Technology: A New Era Emerging:** **Batteries**-Basic concepts, battery characteristics, Classification of batteries-primary, secondary and reserve batteries; Classical batteries-construction, working and applications of Nickel-metal hydride, lithium-MnO_2 and Li-ion batteries.	**08 Hours**
	Self-Study Components: Concentration Cells- construction and working; Determination of pH using Glass Electrode; Ion Selective Electrode-Principle, construction and applications.	
Module 2	**Science of Corrosion and Electrolysis** **Corrosion**: Introduction, electrochemical theory of corrosion, galvanic series. **Factors affecting the rate of corrosion**: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity, and temperature. **Types of corrosion**- Differential metal, differential aeration	**08 Hours**

	(Pitting and water line) and stress. **Corrosion control**: Inorganic coatings- Anodizing of Al and phosphating; Metal Coatings-Galvanization and Tinning. Cathodic protection (sacrificial anodic and impressed current methods). **Metal Finishing:** Introduction, Technological importance. **Electroplating:** Introduction, principles governing- Polarization, decomposition potential and overvoltage. Factors influencing the nature of electro deposit-current density, concentration of metal ion and electrolyte; pH, temperature and throwing power of plating bath; additives- brighteners, levellers, structure modifiers and wetting agents. Electroplating of Nickel (Watt's Bath) and Chromium (decorative and hard).	
	<u>Self-Study Components</u>: **Electroless plating:** Introduction, distinction between electroplating and electro less plating, electro less plating of copper and manufacture of double-sided Printed Circuit Board with copper.	
Module 3	**<u>Energy Sources</u>** **Chemical Fuels**: Introduction, classification, calorific value-gross and net calorific values, determination of calorific value of fuel using bomb calorimeter, numerical problems. **Cracking**: Introduction, fluidized catalytic cracking, synthesis of petrol by Fishcher-Tropsch process, reformation of petrol, octane and cetane numbers. Gasoline and diesel knocking and their mechanism, anti-knocking agents, power alcohol and biodiesel. **Solar Energy:** Introduction, utilization and conversion, photovoltaic cells (PV)- construction and working. **Design of PV cells**: modules, panels and arrays. Advantages and disadvantages of PV cells.	**08 Hours**
	<u>Self-Study Components</u>: **Production of solar grade silicon**: Union carbide process, purification of silicon (zone refining), doping of silicon-diffusion technique (n- and p-types). Construction and working of energy storage supercapacitors.	
Module 4	**Water Technology** Introduction**,** Boilers and Boiler Troubles, Determination of hardness, DO, BOD and COD, Determination of acidity, chlorides and alkalinity. **Sewage treatment**: Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion- exchange process. Desalination of sea water by reverse osmosis and electro dialysis (ion selective) **Silicate Technology** Introduction, Cement nomenclature, manufacture of Portland cement, setting of cement, Analysis of Cement, Plaster of Paris/Gypsum Plaster. **Refractories**: Characteristics of Good Refractory Materials,	**08 Hours**

	Classification of refractories, Properties of Refractories, Manufacture of High-Alumina Bricks, Magnesite Bricks and Zirconia Bricks.	
	Self-Study Components: Public Health Significance of heavy metal ions, fluoride, nitrate and detergents	
Module 5	**Functional Materials for Engineers** **Polymers:** Introduction, Classification of Polymers, Functionality, Mechanism of Polymerisation, Polymerisation Techniques, Molecular Weight of Polymers. Plastics, Individual Polymers, Rubbers (Elastomers), Fibres, Speciality Polymers, Properties of Polymers, Degradation of Polymer and Polymer Composites. **Nanomaterials** Introduction, Nanotechnology in the Twenty-First Century, Classification of Nanomaterials, Synthesis of Nanomaterials by Top-down and Bottom-up approaches, Properties of nanomaterials (Surface area, Magnetic, Optical, Electrical, catalytic and thermal).	**08 Hours**
	Self-Study Components: Carbon nanotubes and Graphene and their applications.	

Course Outcome:

At the end of the course the student will be able to:

- Explain the basic concept of thermodynamics, batteries and their applications.
- Develop the knowledge in corrosion science and also to control corrosion problems.
- Understand different energy sources and storage devisors
- Determine the contaminants in the water samples by suitable analytical procedures.
- Explain the properties and applications of functional materials in the different fields.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall bethree tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30marks.

2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books:

1. Essentials of Engineering Chemistry, S. K. Bhasin and Vijay Sharma, Himalaya Publishing House (2010).
2. Engineering Chemistry: Fundamentals and Applications, Shikha Agarwal, Cambridge University Press (2015).
3. Engineering Chemistry, R. Mukhopadhyay and Sriparna Datta, New Age International Ltd (2007).
4. Engineering Chemistry, V. Srinivasan, S. Rekha and K. Sudhakar, Pearson Ltd (2017).
5. Engineering Chemistry, K N Jayaveera, G V Subba Reddy and C Ramachandraiah, McGraw Hill Education (India) Private Limited (2016).
6. Engineering Chemistry, K. SeshaMaheswaramma and MridulaChugh, Pearson India Education Services Pvt. Ltd (2017).
7. Nanomaterials and Nanocomposites: Synthesis, Properties, Characterization Techniques and Applications, Rajendra Kumar Goyal, CRC Press, Taylor and Francis (2018).

Reference Books

1. Fundamentals of Corrosion: Mechanisms, Causes and Preventive Methods, Philip A. Schweitzer, CRC Press (2010).
2. Applied Chemistry- A Textbook for Engineers and Technologists, 2nd Edition, O.V. Roussak and H.D. Gesser, Springer (2013).
3. Introduction to Polymer Chemistry, 3rd Edition, Charles E. Carraher, Jr. CRC Press (2013).
4. Fundamentals of Electrochemistry, Second Edition, V. S. Bagotsky, Wiley Inter science (2006).
5. Introduction to Corrosion Science, E. McCafferty, Springer (2010).

Basic Electrical Engineering (21ELE13/23)

Semester I/II			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	40	**Exam Hours**	03
L: T:P	3:0:0	**Credits**	03

Modules	Course Content	Teaching Hours
Module 1	**DC Circuits:** Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series-parallel circuits excited by independent voltage sources. Power and Energy. **AC Fundamentals:** Generation of sinusoidal voltage, frequency of generated voltage, definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities.	**08 Hours**
Module 2	**Single Phase Circuits:** Analysis of circuits with R, L, C, R-L, RC, R-L-C for series and parallel configurations with phasor diagram, Real power, reactive power, apparent power and power factor. **Three Phase circuits:** Advantages of 3-phase power, Generation of 3-phase power, voltage and current relations in star and delta connections.	**08 Hours**
Module 3	**Electrical Machines:** Constructional features, Operation and applications: Single and three phase induction motors, universal motor, stepper motor, Single-phase transformers: Principle and emf equation.	**08 Hours**
Module 4	**Renewable and Non-Renewable Energy Resources:**Sources of energy-Power generation: thermal, hydel, nuclear, Advantages of renewable energy sources, power generation Solar, Wind, Tidal, biomass, geothermal, Electrical characteristic of PV Cell.	**08 Hours**
Module 5	**Tariff**: Tariff Schemes, Study of Electricity Bill, Calculation of electricity bill **Protection Devices:** Need of earthing, types of Earthing: Plate and Pipe Earthing, Fuse, MCB, Electrical Safety Issues, Two-way and Three-Way control of lamp. **Battery:** Types of Batteries: lead acid, Nickel-iron and lithium-ion, important characteristic of batteries: Voltage, Capacity and efficiency.	**08 Hours**

Course Outcome:

At the end of the course the students will be able to:

- To explain the fundamental laws of electric circuits and behaviour of single-phase circuit with circuit elements.
- To explain the generation and operation of three-phase power
- To understand the construction and operation of Electrical Machines.
- To Describe the working principle of both renewable and non-renewable power generating plant.
- To explain the tariff, electricity billing, protection devices and batteries.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall be three tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30 marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books:

1. D.C. Kulshreshtha “Basic Electrical Engineering” Tata McGraw Hill Education, Revised first edition, 2019.
2. Edward Hughes “Electrical and Electronic Technology” Pearson, 12th edition, 2016.
3. Mittle V.N. and A. Mittal, “Basic Electrical Engineering” Tata McGraw Hill, 2nd Edition, 2005
4. Kothari D.P., L.J. Nagrath “Basic Electrical Engineering”, Tata McGraw Hill, 2009

C Programming for Problem Solving (21CPS14/24)

Semester I/II			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	40	**Exam Hours**	03
L: T:P	3:0:0	**Credits**	03

Modules	Course Content	Teaching Hours
Module 1	**Introduction to computer Hardware and Software:** Computer Generations, Von Neumann Architecture, ports & its functions, Port Vs. Connector, Input and Output Devices, Types of Computer Network, basic concepts of software. **Overview of C:** Basic structure of C program, C program execution. Keywords, Constant & Variable, data types, Operators and expressions.	**08 Hours**
Module 2	**Managing Input and output operations in C:** Reading and writing a character, C-formatted I/O Functions, Control statements in C with Programming examples.	**08 Hours**
Module 3	**C Array:** 1-D & 2-D Arrays, return an Array in C, Passing Arrays to a function, Basic Searching & Sorting Algorithms: (Linear search, Binary search, Bubble sort and Selection sort). C Strings: string basics, String Functions.	**08 Hours**
Module 4	**C Functions:** What is function- Advantages, Function aspects, Types of functions, Different aspects of Function call,call by value and call by reference, Programming Examples. Introduction to Recursive function. C Pointers: Pointer basics, Simple programming examples. Dynamic Memory allocation in C.	**08 Hours**
Module 5	**Structure**: What is Structure? declaring structure variable, Accessing Members of the Structure, Programming examples. **File Handling in C:** Functions for file handling, Simple Programming examples.	**08 Hours**

Course Outcomes:

At the end of the course the student will be able to:

- Analyse the given problem and develop an algorithm to solve the problem.
- Optimize the solution given for an existing problem.
- Use ‘C’ language constructs in the right way.
- Develop and test programs written in ‘C’.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE

and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall be three tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30marks.
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3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw• Hill
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, PrenticeHall of lndia.

Reference Books:

1. Sumitabha Das, Computer Fundamentals & C Programming, Mc Graw Hill Education.
2. Gary JBronson, ANSI C Programming, 4th Edition, Ceneage Leam in g.
3. Dey and Ghosh, Programming in C, 3rd Edition, Oxford University Press.
4. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press 2013.
5. RS Bichkar, Programming with C, University Press, 2012.
6. V Rajaraman: Computer Programming in C, PHI, 2013.
7. Basavaraj S. Anami, Shanrnukhappa A Angadi, Sunilkumar S. Manvi, Computer Concepts and C Programming: A Holistic Approach to Leaming C, Seond edition, PHI India, 2010.

Elements of Mechanical Engineering (21EME15/25)

Semester I/II			
No. of Lecture hour/Week	3	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	40	**Exam Hours**	03
L: T:P	3:0:0	**Credits**	03

Modules	Course Content	Teaching Hours
Module 1	**Energy Sources:** Sources and Classification of Energy Resources. Non-renewable and renewable energy resources, Brief Description and Utilization of Solar Energy, Wind Energy, Ocean Thermal Energy Conversion (OTEC), Geothermal Energy, Tidal Energy and Nuclear Energy. Steam: Steam Formation, Steam Properties, Boilers-Classification, Lancashire boiler, Simple numerical.	**08 Hours**
Module 2	**Steam turbines** – Classification, Principle of Operation and Working of Impulse and Reaction. Type Steam Turbines. **Gas turbines** – Classification, Working Principles and Operations of Open Cycle and Closed Cycle Gas Turbines. **Water turbines** –Classification, Principles and Working of Pelton wheel and Francis turbine **Internal Combustion Engines:** Classification, Two and Four Stroke Petrol and Diesel Engines. P-V Diagramsof Otto and Diesel Cycles. Comparison of Petrol and Diesel Engines. Comparison of two and Four Stroke Engines.	**08 Hours**
Module 3	**Refrigeration Air conditioning:** Refrigeration - Definitions - Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, relative COP, Unit of Refrigeration. Refrigerants, Properties of refrigerants, List of commonly used refrigerants. Domestic refrigerator. Principles and applications of air conditioners. **Power Transmission:** Belt Drives – Open and Cross Belt drives, Definition-slip, creep, velocity ratio, Derivation of length of the belt in open and crossed belt drive, ratio of tension in belt drives. Gear Drives – Types of gears, velocity ratio, advantages and disadvantages over belt drives. Simple numerical problems.	**08 Hours**
Module 4	**Machine Tools:** Lathe: Working Principle of engine lathe, Main parts of lathe, Operations on lathe: Turning, facing, knurling, thread cutting, taper turning and drilling. **Drilling Machine:** Working Principle, Operations of drilling machines, Drilling, grinding machine: working principle of cylindrical and surface grinding machines.	**08 Hours**

	Metal Joining Processes: Definitions and methods of Soldering, Brazing and Welding	
Module 5	**Automation and Robotics:** Automation: CNC- Introduction, components of CNC, Advantages and disadvantages of CNC. Robotics: Introduction, Robot anatomy, Robots configuration- Polar, cylindrical, Cartesian coordinate and spherical. Applications, Advantages, and disadvantages. **Engineering Materials:** Properties, Composition and Industrial Applications of engineering materials Metals – Ferrous: cast iron, tool steels and stainless steels and Non-ferrous: aluminium, brass, bronze. **Polymers** - Thermoplastics and thermosetting polymers. **Ceramics** - Glass, optical fiber, glass, cermet's.**Composites** - Fiber reinforced composites, Metal Matrix Composites	**08 Hours**

Course Outcomes:
At the end of the course the student will be able to:

- Identify different sources of energy and their conversion process
- Explain the working principle of hydraulic turbines, pumps, IC engines and refrigeration.
- Understand the properties of common engineering materials and their applications in engineering industry.
- Recognize power transmission elements.
- Discuss the working of conventional machine tools, machining processes, tools and accessories.
- Describe the advanced manufacturing systems.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and then it is reduced to 50. Based on this grading will be awarded.

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1. Thirty (30) marks shall be considered to evaluate students in tests. There shall bethree tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30marks.

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Question Paper Pattern (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks. Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books

1. Elements of Mechanical Engineering by K.P. Roy, S K Hajra Choudhury, A K Hajra Choudhury, Media Promoters, 2012
2. Elements of Mechanical Engineering b K R Gopalakrishna, Subhash Publishers, Bangalore
3. Elements of Mechanical Engineering - Kestoor Praveen, Ramesh M R: Interline Publishing House

Reference Books

1. Workshop Technology, Vol I & II, - by SK Hajra Choudhury, A K Hajra Choudhury, Nirjhar Roy, 11th edition 2001, Media Promotors and Publishers, Mumbai.
2. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication
3. S.Trymbaka Murthy, "A Text Book of Elements of Mechanical Engineering", 4th Edition2006, Universities Press (India) Pvt Ltd, Hyderabad.

Engineering Chemistry Laboratory (21CHEL16/26)

Semester I/II			
No. of Lecture hour/Week	-	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	-	**Exam Hours**	03
L: T:P	0:0:2	**Credits**	01

Sl No.	List of experiments
	Part-A
1	Determination of total hardness in water by complexometric titration.
2	Determination of total alkalinity of soda ash.
3	Analysis of chromate-dichromate mixture by acid-base titration.
4	Determination of manganese dioxide in pyrolusite by permanganate method.
5	Determination of Iron in the Haematite ore by dichromate method.
6	Determination of Chemical Oxygen Demand (COD) of the given industrial waste water sample.
7	Determination of Calcium Oxide (CaO) in the given sample of cement by Rapid EDTA method.
	Part-B
9	Determination of Iron (II) by Potentiometric titration.
10	Conductometric titration of a mixture of HCl and CH_3COOH against NaOH.
11	Determination of dissociation constant of a weak acid using pH meter.
12	Colorimetric method for the determination of Iron (III) using thiocyanate.
13	Determination of chromium in industrial waste by colorimetric method using diphenyl carbazide reagent.
14	Electro gravimetric method for the determination of copper.

(Note: Any ten experiments may be conducted)

Course Outcome:

At the end of the course the student will be able to:

- Carryout quantitative determination of analytes accurately and handling of some minor equipment's.
- Validation of the data and interpret the experimental results.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain minimum of 40% marks individually both in CIE and SEE to pass. Practical Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration). Based on this grading will be awarded.

Continuous Internal Evaluation (CIE): The 75% (35 marks) CIE marks awarded in case of Practical shall be based on the weekly evaluation of laboratory journals/ reports after the conduction of every experiment and 25% (15 marks) marks for one practical test. The total CIE marks shall be the sum of marks secured by students in the above events.

Semester End Evaluation (SEE): The practical examinations to be conducted as per the time table of University in a batch wise with strength of students not more than 10-12 per batch.

1. All laboratory experiments are to be included for practical examination.
2. The instructions printed on the cover page of answer script to be strictly adhered by the examiners.
3. Break up of marks are 15% marks for procedure, 70% marks for conduction and calculation and 15% of marks for viva voce.
4. Students can pick one experiment from the questions lot prepared by the examiners.
5. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

Reference Books

1. Vogels textbook of quantitative chemical analysis, 5th edition revised by G.H.Jeffery, J.Bassett, J. Mendham and R.C.Denny, Longman Scientific Technical (2005).
2. Analytical Chemistry, 6th Edition, G.D.Christian, John Wiley & Sons (2004).
3. Quantitative Chemical Analysis, 8th Edition, Daniel C. Harris, W. H. Freeman and Company (2010).

C Programming Laboratory (21CPL17/27)

Semester I/II			
No. of Lecture hour/Week	-	**CIE Marks**	50
No. of Tutorial hours/week	-	**SEE Marks**	50
Total No. of Lecture hours	-	**Exam Hours**	03
L: T:P	0:0:2	**Credits**	01

Sl No.	Title of the experiment
	Part-A
1	Develop a C program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
2	Write a C program to perform arithmetic operations using switch statement.
3	Develop a program to find the reverse of a positive integer and check for palindrome or not using while- loop and display appropriate messages wherever necessary.
4	Develop a C program to generate the first ‘n’ terms of the Fibonacci sequence using for- loop.
5	Develop a C Program to Sort the Array elements in an Ascending Order i. Bubble sort ii. Selection Sort
6	Develop a C Program to search for an element in an array using i. Linear Search ii. Binary Search Display appropriate messages for successful and unsuccessful attempts.
7	Implement a C program using function to check whether the given number is prime or not.
	Part-B
9	Develop a program to introduce 2D Array manipulation and implement Matrix multiplication and ensure the rules of multiplication are checked.
10	Develop a C program to find the square root of a given number N and execute for all possible inputs with appropriate messages. Note: Don’t use library function sqrt(n).
11	Develop a C Program using structure i. To read student information such as (Sname, RollNo, Marks in 3 subjects) ii. Compute average- marks and appropriate grades. (S:98% to 100%, A+: 95 to 97%, A: 94 to 90%, B- 85 to 89%, C- 84% to 80%, D- 79% to 65%, E- >35% to 64%, F: <35%) iii. Print student details along with computed grade for a class of ‘N‘students.
12	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers.
13	Implement Recursive functions for Binary to Decimal Conversion.
14	Write a C program to copy the contents of one file (t1.txt) to another file (t2.txt).

Course Outcomes:
At the end of the course the student will be able to:

- Analyses of a given problem and implement an algorithm to solve the problem.
- Improve upon a solution to a problem.
- Implement the 'C' language constructs in the right way.
- Develop and test programs written in 'C'.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain minimum of 40% marks individually both in CIE and SEE to pass. Practical Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration). Based on this grading will be awarded.

Continuous Internal Evaluation (CIE): The 75% (35 marks) CIE marks awarded in case of Practical shall be based on the weekly evaluation of laboratory journals/ reports after the conduction of every experiment and 25% (15 marks) marks for one practical test. The total CIE marks shall be the sum of marks secured by students in the above events.

Semester End Evaluation (SEE): The practical examinations to be conducted as per the time table of University in a batch wise with strength of students not more than 10-12 per batch.

1. All laboratory experiments are to be included for practical examination.
2. The instructions printed on the cover page of answer script to be strictly adhered by the examiners.
3. Break up of marks are 15% marks for procedure, 70% marks for conduction and calculation and 15% of marks for viva voce.
4. Students can pick one experiment from the questions lot prepared by the examiners.
5. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

Ability Enhancement Course-I (21AEC18/28)

Personality Development and Soft Skills			
Semester I/II			
No. of Lecture hour/Week	-	**CIE Marks**	50
No. of Tutorial hours/week	02	**SEE Marks**	-
Total No. of Lecture hours	-	**Exam Hours**	-
L: T:P	0:2:0	**Credits**	01

Modules	Course Content	Teaching Hours
Module 1	**Personal Skills** Self-Assessment; Identifying Strength & Limitations; Habits, Will-Power and Drives; Developing Self-Esteem and Building Self-Confidence, Significance of Self-Discipline, Understanding Perceptions, Attitudes, and Personality Types Mind-Set: Growth and Fixed; Values and Beliefs, Motivation and Achieving Excellence; Self-Actualisation Need, Goal Setting, Life and Career Planning; Constructive Thinking	**05 Hours**
Module 2	**Professional Skills** Communicating Clearly: Understanding and Overcoming barriers; Cross gender/Cross Cultural communication, Strategic Communication. Active Listening, Persuasive Speaking, Conducting Meetings, Writing Minutes, Sending Memos and Notices, Netiquette: Effective E-mail Communication; Telephone Etiquette, Body Language in Group Discussion and Interview	**05 Hours**
Module 3	**Presentation Skills:** Overcoming fear, Presentation Skills: Becoming a professional, Presentation Skills: the role of body language, Presentation Skills: using visuals, Reading skills: Effective Reading.	**05 Hours**
Module 4	**Interpersonal Skills** Enhancing Empathy, Showing Sympathy and Dealing with Antipathy; Gaining Trust and Developing Emotional Bonding Ethics and Etiquettes (Social and Official Settings); Respecting Privacy; Civic Sense and Care for theEnvironment, Negotiating, Decision-Making, Conflict- Resolution, Five Styles, Emotional Literacy; Assertiveness versus Aggressiveness; Learning to Say "No."; Learning to Appreciate and Give Praise; Presenting Bad News, Humour, Jokes and Anecdotes in Effective Communication	**05 Hours**
Module 5	**Management Skills** Managing Time and Beating Procrastination Managing People: Leading and Working with Team (Co-	**05 Hours**

	ordination and Co-operation); Developing Accountability, Commitment and Responsibility; Behaving Conscientiously Managing Stress and Maintaining Positive Outlook, Managing Health, Boosting Memory, Enhancing Study Skills, Managing Money and Love; Balancing Personal and Professional Life	

Course Outcome:

At the end of the course the student will be able to:

- Understand the role of soft skills in professional and interpersonal communication.
- Develop an all-round development of personality.

Assessment Details (CIE)

The weightage of Continuous Internal Evaluation (CIE) is 50%. The student has to obtain a minimum of 40% marks in CIE to pass.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall bethree tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.
3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

Text and Reference Books:

1. Dorch, Patricia, "What Are Sift Skills?" New York: Execu Dress Publisher, 2013.
2. Kamin, Maxine, "Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers, Teams and Leaders", Washington, DC: Pfeiffer & Company, 2013.
3. Klaus, Peggy, Jane Rohman & Molly Hamaker," The Hard truth about Soft Skills", London: HarperCollins E- books, 2007.
4. Petes S. J., Francis, "Soft Skills and Professional Communication", New Delhi: Tata McGraw-Hill Education, 2011
5. Stein, Steven J. & Howard E. Book, "The EQ Edge: Emotional Intelligence and Your Success", Canada: Wiley & Sons, 2006.

Technical Kannada (21KAN29)

Semester II (Common for both Physics and Chemistry Cycle)			
No. of Lecture hour/Week	-	**CIE Marks**	50
No. of Tutorial hours/week	2	**SEE Marks**	-
Total No. of Lecture hours	-	**Exam Hours**	-
L: T:P	0:2:0	**Credits**	01

Modules	Contents	Teaching Hours
Module 1	1) ಶ್ರಾವಣ (ಕವನ) ದ.ರಾ.ಬೇಂದ್ರೆ 2) ಡಾ. ವಿಶ್ವೇಶ್ವರಯ್ಯ ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ (ವ್ಯಕ್ತಿಚಿತ್ರ) ಎ.ಎನ್. ಮೂರ್ತಿರಾವ್ 3) ದೋಣಿ ಹರಿಗೋಲುಗಳಲ್ಲಿ (ಪ್ರವಾಸ ಕಥನ) ಶಿವರಾಮ ಕಾರಂತ	**06 Hours**
Module 2	4) ಅಣ್ಣಪ್ಪನ ರೇಷ್ಮೆ ಕಾಯಿಲೆ (ಪ್ರಬಂಧ) ಕುವೆಂಪು 5) ನಮ್ಮ ಎಮ್ಮೆಗೆ ಮಾತು ತಿಳಿಯುವುದೇ (ವಿನೋದ) ಗೋರೂರು ರಾಮಸ್ವಾಮಿ ಅಯ್ಯಂಗಾರ್ 6) ಆನೆಹಳ್ಳದಲ್ಲಿ ಹುಡುಗಿಯರು(ವಿಜ್ಞಾನ ಲೇಖನ) ಬಿ.ಜಿ.ಎಲ್ ಸ್ವಾಮಿ	**06 Hours**
Module 3	7) ಬೆಡ್ ನಂ. ಏಳು (ಕತೆ) ತ್ರಿವೇಣಿ 8) ರೊಟ್ಟಿ ಮತ್ತು ಕೋವಿ (ಕವನ) ಸು.ರಂ.ಎಕ್ಕುಂಡಿ 9) ಗುಬ್ಬಚ್ಚಿ ಗೂಡು (ಅಂಕಂ ಬರಹ) ಲಂಕೇಶ್	**06 Hours**
Module 4	10) ಚೀಂಕ್ರ ಮೇಸ್ತ್ರಿ ಮತ್ತು ಹಾವು ಗಿಮೀನು (ಪರಿಸರ ಲೇಖನ) ಕೆ.ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ 11) ಗಾಂಧಿ (ಕತೆ) ಬೆಸಗರಹಳ್ಳಿ ರಾವುಣ್ಣ 12) ಬೆಲ್ಚಿಯ ಹಾಡು (ಕವನ) ಸಿದ್ಧಲಿಂಗಯ್ಯ 13) ಎಲ್ಲ ಹುಡುಗಿಯರ ಕನಸು (ಕವನ) ಸವಿತಾ ನಾಗಭೂಷಣ	**06 Hours**
Module 5	14) ನೀರು (ಕತೆ) ಬಸವರಾಜ ಕುಕ್ಕರಹಳ್ಳಿ 15) ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ಸ್ವರೂಪ (ಪರಿಚಯ ಲೇಖನ) ರಹಮತ ತರೀಕೆರೆ 16) ತಂತ್ರಜ್ಞಾನ ಕಲಿಕೆಯಲ್ಲಿ ಭಾಷೆ (ತಂತ್ರಜ್ಞಾನ ಬರಹ) ಎಸ್.ಸುಂದರ್ 17) ಕೊಣವೇಗೌಡ (ಕಾವ್ಯ) ಜಾನಪದ	**06 Hours**

Assessment Details (CIE)

The weightage of Continuous Internal Evaluation (CIE) is 50%. The student has to obtain a minimum of 40% marks in CIE to pass.

Continuous Internal Evaluation: The CIE marks for theory part of I year courses shall be 50.

1. Thirty (30) marks shall be considered to evaluate students in tests. There shall bethree tests generally conducted at the end of fifth, tenth and fifteenth week of each semester. Each test shall be conducted for a maximum of 50 marks and the final test marks shall be the average of three tests, proportionately reduced to a maximum of 30marks.
2. Ten (10) marks shall be prescribed for assignments /written quizzes (one scheduled quiz and one surprize quiz). There shall be at least two assignments and two quizzes. The marks earned in these events shall be averaged to reduce to 10 marks.

3. Ten (10) marks shall be prescribed for open book tests, for self-study or to test problem solving skills. There shall be at least two events. The marks earned in these events shall be averaged to reduce to 10 marks.

ABILITY ENHANCEMENT COURSE II (21AEC48)

Semester IV (Common to all branches)			
No. of Lecture hour/Week	1	CIE Marks	50
No. of Tutorial hours/week	0	SEE Marks	00
Total No. of Lecture hours	16	Exam Hours	00
L: T:P	1:0:0	Credits	01

Modules	Course Content	Teaching Hours
Module 1	**Technical Report Writing:** Introduction to Technical writing process, Understanding of writing process, Introduction to various Technical Report writing.	03 Hours
Module 2	**Art of condensation and Paragraph Writing:** Introduction and importance, Types and principles of condensation. Importance of paragraph writing, Features and its construction styles.	03 Hours
Module 3	**Business Report Writing:** Introduction, Definition and Salient features of Business reports. Significance and types of report writing. (Formal and Informal). Resume building and Types of resumes. (Samples of resumes)	03 Hours
Module 4	**Technical Articles and Proposals:** Nature and significance, Types of technical Articles Journal articles and conference papers. Elements of technical articles. Introduction to technical proposal writing, Purpose, importance, structure and types of technical proposals.	04 Hours
Module 5	**Social media posts and Blog Writing:** Ethics and practices of social media posts, Principles and fundamentals, Guiding principles for composition of articles, some common pitfalls. Maintaining common etiquette. Blogs and Blog writings strategies.	03 Hours

Course Outcomes:

At the end of the course the students will be able to:

- Effectively communicate in technical matters.
- Practice preparation of gist, abstract and notes from a technical article.
- Prepare a business proposals and reports.
- Write and respond in social media and write blogs.

Reference Books:

1. Sanjay Kumar and Pushpalata, „Communication Skills", Oxford University Press. 2018.
2. M. Ashraf Rizvi, „Effective Technical Communication", McGraw Hill, 2018.
3. Gajendra Singh Chauhan and et.al. „Technical Communication", Cengage Publication, 2018.
4. Meenakshi Raman and Sangeeta Sharma, Technical Communication Principles and Practice, Oxford University Press, 2018.

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