Hyderabad Karnataka Education Society's

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING

Aiwan-E-Shahi Area, Kalaburagi-585102, Karnataka
(An Autonomous Institution Affiliated to VTU, Belagavi.)

Grant-in- Aid Institution
(Government of Karnataka) Accredited by NBA, New Delhi.
Approved by AICTE, New Delhi.

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SCHEME & SYLLABUS (1ST YEAR)

BACHELOR DEGREE IN ENGINEERING
(Common to all Branches)

(With effect from 2021 Academic Year)

Out Come Based Education With

Choice Based Credit System

PREFACE

Poojya Doddappa Appa College of Engineering, Kalaburagi is the first institution established by the society in 1958. The college has celebrated its golden jubilee year, setting new standards in the field of education and achieving greater heights.

The college started with 50% central assistance and 50% state assistance, with a desire to impart quality technical education to this part of Karnataka State. The initial intake was 120 with degrees offered in three branches of engineering viz, Civil, Mechanical and Electrical Engineering. Now, it houses 12 undergraduate courses, 10 post Graduate courses and 13 recognized research centres, offering Ph.D. programs. All the courses are affiliated to Visveswaraya Technological University, Belagavi.

At present the total intake at UG level is 930 and PG level 184. The college receives grant in aid funds from state government. A number of projects have been approved by MHRD/AICTE, Govt. of India for Research and Modernization of laboratories. The Karnataka State Council for Science and Technology, Govt. of Karnataka is providing financial assistance regularly for the student's projects.

The National Board of Accreditation, New Delhi, has accredited the College twice once in the year 2004 with 09 UG programs out of which 08 programs were accredited for three years and 01 course was accredited for five years. At present the college is reaccredited by National Board of Accreditation for 05 UG programs.

Recognizing the excellent facilities, faculty, progressive outlook, high academic standards and record performance, the VTU Belagavi reposed abundant confidence in the capabilities of the College and conferred Autonomous Status from the academic year 2007-08, to update its own programme and curriculum, to devise and conduct examinations, and to evaluate student's performance based on a system of continuous assessment. The academic programs are designed and updated by a Board of Studies at the department level and Academic Council at the college level. These statutory bodies are constituted as per the guidelines of the VTU Belagavi. A separate examination section headed by a Controller of Examinations conducts the examinations.

One of the unique features of our college is, it is the first college in Karnataka State to start the Electronics and Communication Engineering branch way back in the year 1967, to join NIT Surathkal and IISc, Bangalore. Also, it is the only college in the state and one among the three colleges across the country, offering a course in Ceramic and Cement Technology. This is the outcome of understanding by faculty and management about the basic need of this region, keeping in view of the available raw material and existing Cement Industries.

PDA College of Engineering is one among the top 25 Institutions at National Level and Top Two Institutions at State Level as per ATAL Ranking of Technical Institutions. The rank is awarded for Innovation activities, Publications of faculty and students, Patents, Start-ups, Incubation Centers, reserving the budget for innovation activities, and involvement of Faculty and Students in Innovative and Skill Enrichment Activities.

Vision of the Institution

To be an institute of excellence in technical education and research to serve the needs of the industry and society at local and global levels.

Mission of the Institution

- To provide a high-quality educational experience for students with values and ethics that enables them to become leaders in their chosen professions.

- To explore, create and develop innovations in engineering and science through research and development activities.

- To provide beneficial service to national and multinational industries and communities through educational, technical and professional activities.

A.   Program Outcomes

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI
Scheme of Teaching and Examination 2021 – 22
Choice Based Credit System (CBCS)
(Effective from the academic year 2021 – 22)
I SEMESTER B.E./B.Tech (PHYSICS GROUP)

Sl. No.		Course and Course Code	Course Title	Teaching Department	Paper Setting Board	Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
1.	BS	21MA11	Calculus and Linear Algebra	Mathematics	Mathematics	3	-	--	03	50	50	100	3
2.	BS	21PH12	Engineering Physics	Physics	Physics	3	-	--	03	50	50	100	3
3.	HU	21HU13	Technical English-I	Humanities	Humanities	2	--	--	1.5	50	50	100	2
4.	ES	21EE14	Basic Electrical Engineering	E and E Engineering	E and E Engineering	3	-	--	03	50	50	100	3
5.	ES	21ME15A	Computer Aided Engineering and Drawing	Mechanical Engineering	Mechanical Engineering	2	--	2	03	50	50	100	3
6.	ES	21EC16	Basic Electronics	ECE Dept	ECE Dept	3	-	-	03	50	50	100	3
7.	AEC	21XXAE17	Ability Enhancement/Skill Enhancement Course					2			50	50	1
8.	BS	21PHL11	Engineering Physics Laboratory	Physics	Physics Dept	--	--	2	03	50	50	100	1
9.	ES	21EEL12	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	50	50	100	1
					Total	16	--	08	22.5	400	450	850	20

Note: BS: Basic Science, ES: Engineering Science, Hu: Humanities

AEC: Ability Enhancement Course : 21CSAE17: Computer Hardware and Maintenance   21ISAE17: System and Database Administration
         21EEAE17: Electrical Safety   21NPAE17: NPTEL online course

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI
Scheme of Teaching and Examination 2021 – 22
Choice Based Credit System (CBCS)
(Effective from the academic year 2021 – 22)
I SEMESTER B.E./B.Tech (CHEMISTRY GROUP)

Sl. No.		Course and Course Code	Course Title	Teaching Department	Paper Setting Board	Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credits
1	BS	21MA11	Calculus and Linear Algebra	Mathematics	Mathematics Dept.	3	-	--	03	50	50	100	3
2	BS	21CH12	Engineering Chemistry	Chemistry	Chemistry Dept.	3	-	--	03	50	50	100	3
3	HU	21HU13	Technical English-I	Humanities	Humanities	2	--	--	1.5	50	50	100	2
4	ES	21CS14	C Programming for Problem Solving	Computer Science & Engineering	Computer Science & Engineering	3	-	--	03	50	50	100	3
5	ES	21ME15B	Mechanical Engineering Science	Mechanical Engg. Dept.	Mechanical Engineering	3	--	-	03	50	50	100	3
6	ES	21CV16	Engineering Mechanics	Civil Engineering	Civil Engineering	3	--	--	03	50	50	100	3
7	AEC	21XXAE17	Ability Enhancement/ Skill Enhancement Course					2			50	50	1
8	BS	21CHL11	Engineering Chemistry Laboratory	Chemistry	Chemistry Dept.	_	--	2	03	50	50	100	1
9	ES	21CSL12	Computer Programming Laboratory	Computer Science & Engineering	Computer Science & Engineering	--	--	2	03	50	50	100	1
					Total	17	--	06	22.5	400	450	850	20

Note: BS: Basic Science, ES: Engineering Science, Hu: Humanities

AEC: Ability Enhancement Course : 21CSAE17: Computer Hardware and Maintenance   21ISAE17: System and Database Administration
         21EEAE17: Electrical Safety   21NPAE17: NPTEL online course

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI
Scheme of Teaching and Examination 2019 – 20
Choice Based Credit System (CBCS)
(Effective from the academic year 19 – 20)
II SEMESTER B.E./B.Tech (CHEMISTRY GROUP)

Sl. No.		Course and Course Code	Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1.	BS	21MA21	Differential Equations and Laplace Transforms	Mathematics Dept	Mathematics Dept	3	-	--	03	50	50	100	3
2.	BS	21 PH22	Engineering Physics	Physics Dept	Physics Dept	3	-	--	03	50	50	100	3
3.	Hu	21HU23	Technical English-II	Humanities	Humanities	2	--	--	1.5	50	50	100	2
4.	ES	21EE24	Basic Electrical Engineering	E and E Engineering	E and E Engineering	3	-	--	03	50	50	100	3
5.	ES	21ME25A	Computer Aided Engineering and Drawing	Mechanical Engineering	Mechanical Engineering	2	--	2	03	50	50	100	3
6.	ES	21EC26	Basic Electronics	ECE Dept	ECE Dept	3	-	-	03	50	50	100	3
7.	AEC	21XXAE27	Ability Enhancement / Skill based course					2			50	50	1
8.	BS	21PHL21	Engineering Physics Laboratory	Physics Dept	Physics Dept	--	--	2	03	50	50	100	1
9.	ES	21EEL22	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	50	50	100	1
			Total			16	--	08	22.5	400	450	850	20

Note: BS: Basic Science, ES: Engineering Science, Hu: Humanities
AEC: Ability Enhancement Course : 21CSAE27: Computer Hardware and Maintenance   21ISAE27: System and Database Administration
21EEAE27: Electrical Safety   21NPAE27: NPTEL online course

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI
Scheme of Teaching and Examination 2021 – 22 - Choice Based Credit System (CBCS)
(Effective from the academic year 2021 – 22)
II SEMESTER B.E./B.Tech (PHYSICS GROUP)

Sl. No.		Course and Course Code	Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1.	BS	21MA21	Differential Equations and Laplace Transforms	Mathematics Dept	Mathematics Dept.	3	-	--	03	50	50	100	3
2.	BS	21CH22	Engineering Chemistry	Chemistry Dept	Chemistry Dept.	3	-	--	03	50	50	100	3
3.	HU	21HU23	Technical English-II	Humanities	Humanities	2	--	--	1.5	50	50	100	2
4.	ES	21CS24	C Programming for Problem Solving	Computer Science & Engineering	Computer Science & Engineering	3	-	--	03	50	50	100	3
5.	ES	21ME25B	Mechanical Engineering Science	Mechanical Engg. Dept.	Mechanical Engineering	3	--	-	03	50	50	100	3
6.	BS	21CV26	Engineering Mechanics	Civil Engg Dept	Civil Engg. Dept.	3	--	--	03	50	50	100	3
7.	AEC	21XXAE27	Ability Enhancement/Skill based Course					2			50	50	1
8.	BS	21CHL21	Engineering Chemistry Laboratory	Chemistry Dept	Chemistry Dept.	--	--	2	03	50	50	100	1
9.	ES	21CSL22	Computer Programming Laboratory	Computer Science & Engineering	Computer Science & Engineering	--	--	2	03	50	50	100	1
			Total			17	--	06	22.5	400	450	850	20

Note: BS: Basic Science, ES: Engineering Science, Hu: Humanities
AEC: Ability Enhancement Course : 21CSAE27: Computer Hardware and Maintenance   21ISAE27: System and Database Administration
21EEAE27: Electrical Safety   21NPAE27: NPTEL online course

CALCULUS AND LINEAR ALGEBRA

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21MA11	CIE Marks	50
Credits	03	SEE Marks	50
Lecture Hours/Week (L-T-P)	3-0-0	Total Marks	100
Total Hours	42	SEE Hours	03

Course Learning Objectives: This course (**21MA11**) will enable students to master the basic tools of differential & integral calculus, differential equations and elementary linear algebra and become skilled for solving problems in science and engineering.

MODULE-I **Differential Calculus-1:** Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature in Cartesian and polar forms and simple examples. Taylor's and Maclaurin's series expansions for one variable (statementsonly)and examples. Evaluation of Indeterminate forms.	**08 Hours**
MODULE-II **Differential Calculus-2:-**Partial differentiation; Definition and simple problems, Euler's theorem (without proof) and examples, Total derivatives, differentiation of composite functions. Jacobians-Simpleproblems. Taylor's theorem for function of two variables (statement only) and simple examples. Maxima and minima for a function of two variables with illustrative examples	**09 Hours**
MODULE-III **Integral Calculus-I**Reduction formulae for the integration of $\sin^n x$, $\cos^n x$, $\tan^n x$ and $\sin^m x \, \cos^n x$ evaluation of these with standard limits- illustrative problems **Tracing of curves:** Cartesian, Parametric and Polar form. Evaluation of arc length, Surface area and Volume.	**08 Hours**
MODULE-IV **Integral Calculus-II Multiple integrals:** Evaluation of double and triple integrals. Evaluation of double integrals by change of order of integration and changing into polar co-ordinates. Applications to find area by double integration and volume by double and triple integration **Beta and Gamma functions:** definitions, Relation between beta and gamma functions and simple problems	**09 Hours**
MODULE-V **Elementary Linear Algebra:** Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method, Gauss –Jordan method. Definition of Eigen values and Eigen vectors and simple examples **Infinite Series:** Convergence and divergence of infinite series**-** P-series test Comparison test, D'Alembert'sratio test, Cauchy's root test (withoutproof)- Illustrative examples.	**08 Hours**

Text Books :1.B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed.,2015.
2.E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10thEd.(Reprint),2016.
Reference books:
1.Early Transcendental Calculus- James Stewart, Thomson Books, 5e 2007
2.N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
3.B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4.Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
5.Thomas G.B. and Finney R.L."Calculus and Analytical Geometry"9th Edition, Pearson,**E-Books and Online resources:** http://.ac.in/courses.php?disciplineID=111

Pedagogy (General Instructions):

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples
3. Support and guide the students for self–study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students for group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways: As an introduction to new topics (pre-lecture activity).
   - As a revision of topics (post-lecture activity).
   - As additional examples (post-lecture activity).
   - As an additional material of challenging topics (pre-and post-lecture activity).
   - As a model solution of some exercises (post-lecture activity).

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21MA11	CO1	Apply the knowledge of calculus to solve problems related to polar curvesand its applications and expand functions using Taylor's and Mechaurin's series.
	CO2	Apply the partial differentiation to calculate rate of change of multivariatefunctions and solve the problems related to composite functions and Jacobeans
	CO3	Apply reduction formulae and solve the problem related to arc length, surface area and volume generated by revolving the curve
	CO4	Apply the concept of multiple integrals and their usage in computing the areaand volume
	CO5	Make use of matrix theory for solving system of linear equation and compute Eigen values and Eigen vectors

Question paper pattern :
- The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
- The question paper will have ten full questions covering all the five modules carrying 20 marks each.
- In each module there will be two full questions (with a maximum of four sub questions)
- The students will have to answer five full questions selecting one from each module

ENGINEERING PHYSICS

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21PH12/22	CIE Marks	50
Credits	03	SEE Marks	50
Lecture Hours/Week (L-T-P)	3-0-0	Total Marks	100
Total Hours	42	SEE Hours	03

Course Learning Objectives:

1. Depreciate the learning of phenomenon of electrical polarization and dielectrics Prescribe the effect of external electrical field on dielectric materials.
2. Develop the implications of Quantum theory on the classical free electron theory and introduces the concept of Fermi energy through the Fermi Dirac statistics.
3. Superconductors and its applications through different effects.
4. Annalyse the basic account of the functioning of laser systems with applications.
5. Explain the propagations of light through the optical fibre and the applications of optical fibres.
6. To familiarize students with the concepts of elasticity and recognize the elastic properties of materials for engg. Applications.

MODULE-I **Applied Optics:** Basic principles of lasers, Requisites of laser system. Condition for laser action. Boltzmann factor. Numericals. Construction and working of Nd-YAG and semiconductor lasers. Application of lasers: LIDAR and Holography: Principle of recording and reconstruction of images.Optical fibers; propagation mechanism. Acceptance angle, numerical aperture. Condition for propagation. Fractional index change, relation between NA and fractional index change, V- number. Types of optical fibers. Attenuation Co-efficient, Application of fiber optics: Temperature sensor. Numericals	**09 Hours**
MODULE-II **Crystallography:** Space lattice, lattice parameters, unit cell. Crystal systems, sketch of Bravias lattice. Miller indices - procedure for finding miller indices. Planes in cubic unit cell. Expression for interplanar distance. Packing factor for SC, BCC and FCC. Crystal structure of NaCl. Numericals. Bragg s law, Braggs X-ray diffractometer and application for determination of wavelength & crystal structure. Crystal imperfection-point, line & planar defects(Qualitative). Numericals.	**08 Hours**
MODULE-III **Elastic Properties Of Materials:**Review of stress, strain, Hooke's law, Elasticity, plasticity, strain hardening, strain softening and failure (fracture/fatigue).Different elastic moduli and derivation between Y, K and η. Relation Between elongation strain, compressive strain and shearing strain, Poisson's ratio. Bending of beams: Neutral surface and neutral plane, expression for bending moment of a beam (Derivation), Application: single cantilever (Derivation), I-Shaped griders & twisting couples. Numericals.	**09 Hours**

MODULE-IV	
Dielectric properties of materials: Dielectric materials: polar and non-polar dielectrics. Dielectric constant and loss. Types of polarization mechanism. Equation for internal field in liquids and solids (1D case & 3D solid). Classius-Mossoti equation. Frequency dependence of Dielectric constant /Polarization. Description of solid, liquid & gaseous dielectrics with one example. Numericals.	**08 Hours**

MODULE-V	
Conductor and Superconductors: Electrical conduction, Classification of conducting materials. Concept of Fermi energy & Fermi level in solids, Expression for density of states. Fermi-Dirac statistics (Qualitative), Temperature dependence of resistivity in super conductors, Meissner effect(Demonstration), Types of super conductors, High temperature super conductors, applications of super conductors: Magnetic Levitation. Numericals	**08 Hours**

Text Books:
1. Engineering physics – S. P. Basavraju, Subhas Stores- 2011 Edition
2. V Rajendran, "Engineering Physics", Tata McGraw Hill Company Ltd, New Delhi-2012

Reference books :1.S Mani Naidu, "Engineering Physics", Pearson India Limited-2014.
1. Engineering Physics-Gaur and Gupta-Dhanpat rai Publications-2017
2. A Marikani, "Engineering Physics", PHI Learning Private Limited Delhi-2013.
3. Wiley Precise Text, "Engineering Physics", Wiley India Private Ltd, New Delhi. Book Series-2014.
4. S. O. Pillai" Solid State Physics" New Age International Sixth Edition.

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21PH12/22	**CO1**	Annalize the working principle of laser and optical fibers, explain the construction and working of laser and types of optical fibers, ,formulate andevaluate the numerical aperture , summarise the application of laser and optical fibers.(PO-1)
	CO2	Classify peculiar properties of crystal structure. Apply them in crystallography using X-ray diffraction technique. (PO-2)
	CO3	Analyze elastic modulii in different cases, understand various types of oscillations and their implications and recognize the elastic properties of materials for engg.Applications.
	CO4	Interpret the fundamental properties of dielectric and ferroelectric materials. Assess internal field for solids, Summarize its applications.
	CO5	Categorize properties of materials on band theory and evaluate the density of states in solids. Discuss the properties of superconductors. Explore technological applications.

Question paper pattern :
- The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
- The question paper will have ten full questions covering all the five modules carrying 20 marks each.
- In each module there will be two full questions (with a maximum of four sub questions)
- The students will have to answer five full questions selecting one from each module

TECHNICAL ENGLISH - I

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21HU13	CIE Marks	50
Credits	02	SEE Marks	50
Lecture Hours/Week (L-T-P)	2-0-0	Total Marks	100
Total Hours	28	SEE Hours	1.5

Course Learning Objectives: To enable the students to obtain the basic knowledge about Communication Skills - I in the following topics:-
.   The Meaning, definition, importance, purpose, process, types, barriers and essential of communication.
.   Develop reading and understanding ability
.   Learn effective writing
.   Learn how to write different types of letter.
.   Case method of learning

MODULE-I INTRODUCTION TO COMMUNICATION:Meaning, Definition, Importance & Purpose of Communication, Process of Communication, Types of Communication, Communication network in an organization, 7c's of communication, Barriers to Communication and Essential of good Communication.	**06 Hours**
MODULE-II READING AND UNDERSTANDING-Reading Comprehension – Reading rate and reading comprehension, Paraphrasing, Interpretations of graphical information, Book reading and summarizing it.	**06 Hours**
MODULE-III EFFECTIVE WRITING.Purpose of Writing, Clarity in Writing, Principle of Effective Writing. Better writing using personal Experiences – Describing a person, situation, memorable events etc	**05 Hours**
MODULE-IV DRAFTING OF LETTERS:Writing different types of letters – writing for employment, joining letter, complaints & follows up, Enquiries, representation etc. Official Communication – e-mail & Social Media	**06 Hours**
MODULE-V CASE METHOD OF LEARNING:Understand Case method of learning, different type of cases, overcoming the difficulties of the case method, analyzing the case. Do's & Don'ts for case preparation.	**05 Hours**

Text Books:
1. Scotofer, contemporary business communication, Biztant ra Hardcover – 23 January 1998
2. Chaturvedi P D & Mukesh chaturvedi - Business communication:Concepts, cases & applications- 2/e, 2nd Edition pearson education.
3. Essential of Business communication – Rajendra Pal and J.S Korlhall – Sultan Chand & Sons, New Delhi.

Reference books:
1. 1 Business correspondence & report writing – R.C.Sharma, Krishna Mohan – Tata Megraww Hill Publising Company Ltd, New Delhi.
2. Business Communcation – K.K. Sinha – Galgotio Publishing Company, New Delhi.

E – BOOKS & ONLINE RESOURCES
https://www.skillsyouneed.com/ips/communication-skills.html
http://103.5.132.213:8080/jspui/bitstream/123456789/1122/1/Communication%20Skills.pdf
https://www.skillsyouneed.com/docs/communication-skills-PV.pdf

NPTEL / SWAMYAM/MOOCS: **TECHNICAL ENGLISH FOR ENGINEERS (8 Weeks)**
Prof AYSHA IQBAL , Department of HSS, IIT MADRAS

Teaching methodology
Teacher/ student -Centered Approach to Learning, ICT Tools, Group Assignment, Case Study

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21HU13	**CO1**	Explain about basic of Communication
	CO2	Develop reading and understanding ability. ,
	CO3	Learn effective writing
	CO4	Learn how to write different types of letter
	CO5	Analyze a Case study and solve

Question paper pattern :

- The SEE question paper will be set for **50 Marks**
- The question paper will have ten full covering all the five modules carrying 10 marks each.
- There will be two full questions from each module. The students will have to answer five full questions selecting one from each module

BASIC ELECTRICAL ENGINEERING

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21EE14/24	CIE Marks	50
Credits	03	SEE Marks	50
Lecture Hours/Week (L-T-P)	3-0-0	Total Marks	100
Total Hours	42	SEE Hours	03

Prerequisite: Students should have the knowledge of
1. Ohm's Law, Kirchhoff's Current and Voltage Law.
2. Fundamentals of AC and DC Circuits.
3. Basics of Magnetism.

Course Learning Objectives: .
1. Understand the concept and analyse the Single phase and Three phase AC circuits.
2. Study the construction and performance analysis of single phase transformer.
3. Study the construction and working principle of DC machines
4. Study the construction and working principle of Three phase AC Machines.
5. Study the Power Generating stations, Tariff, measuring instruments and electric safety measures.

MODULE-I **AC Circuits:Single Phase Circuits:** AC terminologies, Analysis of R,L,C,R-LSeries circuits, Disadvantages of low power factor, Measurement of power by VAW method. **ThreePhase Circuits:** Advantages, types of connections, Relation between phase & line values. 3 - phase power measurement by two-wattmeter method for balanced load.(Numericals)	**09 Hours**
MODULE-II **Electromagnetism and Single Phase Transformer:Electromagnetism:** Faraday Laws of Electromagnetic Induction, Fleming's rules, Lenz's law, types of EMF and numerical. **Transformer:** Principle, construction and working of single phase transformer, types (based on construction), EMF equation, losses, efficiency and Voltage regulation.(Numericals related to EMF equation and Efficiency)	**09 Hours**
MODULE-III **DC Machines**:**DC generator:** Principle, Construction, working, types and EMF equation. (Numerical on EMF equation) **DC Motor:**Principle, Working, back emf and its significance, torque equation, necessity of starter, 3-point starter. (Numericals on Torque & Voltage Equations)	**08 Hours**
MODULE-IV **Three Phase AC Machines:Alternator:** Principle of operation, types and constructional features, EMF equation of alternator.(Excluding the winding factors derivation) Numericals on EMF equation. **Three phase Induction Motor:** Construction, concept of rotating magnetic field, principle of operation, Star – Delta starter.(Numericals on Slip calculations only).	**08 Hours**

MODULE-V	
Generation, Tariff, Measuring Instruments and Electric Safety: Generation of Power: Block schematic representation of hydroelectric, thermal, nuclear and solar power generating stations (Self study component). **Tariff:** Objectives of Tariff, Desirable characteristics of Tariff, Three-part tariff. **Measuring Instruments:** Principle, Construction & working of Dynamometer type wattmeter & Single phase energy meter. **Electric Safety:** Necessity of earthing, plate & pipe earthing, Elementary discussion on Fuse & MCB. **Electric Shock:** Effects, Remedies & Precautions(Self study component).	**08 Hours**

Reference books:
1. J P Tiwari,"Basic Electrical Engineering", New age Publications, 2nd edition, 2011.
2. Rajendra Prasad "Fundamentals of Electrical Engineering", PHI 3rd edition, 2014.
3. B L Theraja& A K Theraja" Electrical Technology", Vol 1 , 2nd edition., S. Chand and Co. New Delhi
4. B L Theraja& A K Theraja" ABC of Electrical Engineering", 2nd edition., S. Chand and Co. New Delhi
5. D.P. Kothari and Nagrath "Theory and Problems in electrical Engineering", PHI edition 2011.
6. V. N. Mittal and Arvind Mittal;, " Basic Electrical Engineering" McGraw Hill, India Pvt. Ltd. New Delhi
7. R.V. Srinivasa Murthy "Basic Electrical Engineering" Sanguine Technical Publisher2004.Blore

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21EE14 / 24	**CO1**	State, illustrate electric circuits and solving them
	CO2	State, illustrate magnetic circuit, solving the networks and identify the parts,explain the construction, working and determine the performance of Transformer.
	CO3	Identify the parts, explain the construction, working and determine the performance of DC Machines.
	CO4	Recognize the parts, give the illustration of construction and compute the performance of AC machines.
	CO5	Outline the Power Generating stations, analyze the tariff, synthesize the safety measures and explain the working of measuring instruments.

Question paper pattern :
- The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
- The question paper will have ten full questions covering all the five modules carrying 20 marks each.
- In each module there will be two full questions (with a maximum of four sub questions)
- The students will have to answer five full questions selecting one from each module

COMPUTER AIDED ENGINEERING DRAWING

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21ME15A/25A	CIE Marks	50
Credits	03	SEE Marks	50
Lecture Hours/Week (L-T-P)	2-0-2	Total Marks	100
Total Hours	28 (THEORY) + 28 (PRACTICAL)	SEE Hours	03

Course Learning Objectives:
1. To understand the fundamentals of orthographic projections of different object in first angle projections method, using BIS standard specifications.
2. To prove that Drawing is the best communication tool.
3. To improve the imaginary skills and logical thinking capabilities.
4. To visualize three dimensions of simple machine components, by drawing Isometric projections.
5. To understand section points, section planes, frustums, truncated solids and to mark their Development.
6. To understand the solid edge software and the connected tool used to mark 2D drawings on a System.
7. To have the basic exposure to solid modeling using 3D solid edge software package.

MODULE-I **Introduction to CAD Software:**Learning the drawing commands such as point, line, arc, circle, ellipse, rectangle, polygons etc. Modify commands such as copy, move, mirror, rotate, pattern, scale etc. Dimensions - linear,aligned, radial, angular etc.	**02 Hours Pratical**
MODULE-II **Orthographic projections**:Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems and midpoint problems).**Projections of Plane Surfaces (First Angle Projection Only) :**Projection of Planes such as triangle, square, rectangle, pentagon, hexagon and circle in simple positions inclined to both the planes; planes in different positions by change ofposition method only. (No problems on punched plates and composite plates).	**08 Hours Theory + 07 Hours Pratical**
MODULE-III **Projections of Solids :**(First angle Projection only)Projection of Solids such as cube, prism, pyramid, cylinder and cone (No problems on tetrahedron,octahedrons, and freely suspended solids). selection criteria area.(No numericals).	**08Hours Theory + 07 Hours Pratical**
MODULE-IV **Development of Lateral Surfaces of Solids:**Introduction, introduction to section planes and sectional views, Development of lateral surfaces of right regular prisms, cylinders,pyramids,cones and their frustums resting with base on HP only. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces).	**06 Hours Theory + 06 Hours Pratical**
MODULE-V **Isometric Projection :**(Using Isometric Scale Only) Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres. Isometric view of combination of two simple solids.	**06 Hours Theory + 06 Hours Pratical**

Text Books:
1) Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48th edition, 2005-Charotar Publishing House, Gujarat.
2) A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum

Reference books:
1. Computer Aided Engineering Drawing - S. Trymbaka Murthy, - I.K.International Publishing House Pvt. Ltd., New   Delhi, 3rd revised edition- 2006.
2. Engineering Graphics - K.R.Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.**E-Books and Online resources:**
NPTEL/SWAYAM/MOOCS:
The topic or concept-wise pedagogy (Teaching Methodology) of the curriculum shall be specified in the content.

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

Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21ME15 / 25	**CO1**	Produce computer generated drawings using CAD software.
	CO2	Apply the knowledge of orthographic projections (Points, St lines and planes).
	CO3	Students will be able to visualize and draw projections of solids.
	CO4	Students will be able to visualize and draw development of Lateral Surfaces of
	CO5	Create isometric drawings of simple objects reading the orthographic project objects 3D drawings.

- Module 1 is only for practice and not for examination.
- The answer sheets will have to be jointly evaluated by the internal and external examiners.
- The maximum of THREE questions will be set as per the following pattern (No mixing of questions from different modules)

Q No	From Chapters	Marks Alloted (SEE)
1	Module 2 (Choice between Points+St lines or Planes)	15
2	Module 3	20
3	Module 4 or Module 5	15
	Total	50

Question paper pattern :
- The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
- The question paper will have ten full questions covering all the five modules carrying 20 marks each.
- In each module there will be two full questions (with a maximum of four sub questions)
- The students will have to answer five full questions selecting one from each module

BASIC ELECTRONICS

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22

Course Code	21EC16/26	CIE Marks	50
Credits	03	SEE Marks	50
Lecture Hours/Week (L-T-P)	3-0-0	Total Marks	100
Total Hours	42	SEE Hours	03

Course objectives: This course will enable students to:
• Study fundamentals of semiconductors devices like diode, transistors and Operational Amplifier.
• Study basics of communication systems and different modulation types.
• Study Fundamentals of digital electronics.
• Study different transducers and using a CRO for the measurement of signal parameters.
• Build mathematical and numerical background for the design of electronic circuits
• Design and develop electronic circuits using the available equipments.

MODULE-I **Semiconductor Devices and applications:**P-N Junction-diode and characteristics,Rectifiers:Halfwave rectifier,fullwave rectifier,capacitor filter, Zener diode characteristics, zener voltage regulator. Bipolar Junction **Transistor:**Transistor biasing and it's needs,transistor currents,configurations,CE characteristics,common emitter amplifier.	**09 Hours**
MODULE-II **Field effect transistors and applications:**JFET,characteristics,DC biasing of JFET DC load line analysis,JFET on an IC chip,advantage of FETs. **MOSFET:**De type mosfet, enhancement mosfet, characteristics of De type mosfet FET as a switch, FET amplifier and oscillators.	**09 Hours**
MODULE-III **Basics of Communication Systems:** Introduction, radio frequency spectrum,need for modulation,radio broadcasting, **Modulation:**amplitude modulation,power relations in AM wave,frequency modulation,superheterodyne AM receiver. **Op-Amp Applications:** Op-Amp basics**,** practical op-amp circuit (Inverting, Non Inverting, summer , integrator and Differentiator.)	**08 Hours**
MODULE-IV **Digital Electronics:** Number system, Number base conversions, Signed arithmetic: Binary addition & subtraction using 2's complement, Logics gates, Half Adder/Subtractor, Full Adder/Subtractor, Boolean algebra, simplification of Boolean expressions, Realization of Boolean expressions using logic gates.	**08 Hours**
MODULE-V **Tranducers and Mesurement:** Classification of transducers, LVDT, piezo electric transducer, strain gauge, carbon microphone and loud speaker, cathode ray oscilloscope: Block diagram of CRO, Working of CRT, measurement of amplituide, frequency and phase, Lissajous figures.	**08 Hours**

Textbook:
1. Basic Electronics by B. L. Theraja, S. Chand Publications
2. Electronic devices and circuit theory by R L Boylestad, Louis N, 6TH edition, PHI.

Reference Books:
1. Digital logic and computer design by M Morris Mano.
2. Electronics devices & circuits by David Bell, 5th Edition, Oxford University Press.
3. Electronic Devices by Thomas L. Floyd, 8th Edition, Pearson Education, Inc., 2007

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

Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21EC16/26	**CO1**	Understand the basics of semiconductor devices and their applications.
	CO2	Analyze biasing technique of JFET and MOSFET and their applications as amplifier and oscillator.
	CO3	Understand different modulation techniques and working of receiver circuit. Analyse working of Op amp and it's Applications.
	CO4	To study number base conversion, understand laws of Boolean algebra, workin different logic gates.
	CO5	Understand the working of different transducers and use a CRO as a measurininstrument.

Question paper pattern :
- The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
- The question paper will have ten full questions covering all the five modules carrying 20 marks each.
- In each module there will be two full questions (with a maximum of four sub questions)
- The students will have to answer five full questions selecting one from each module

COMPUTER HARDWARE AND MAINTENANCE

(Ability Enhancement Course) Common to all branches

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	**21CSAE17/27**	CIE Marks	50
Credits	01	SEE Marks	
Practical Hours/Week (L-T-P)	0-0-2	Total Marks	50
Total Hours	14	SEE Hours	

Course Learning Objectives: i) Understand the basic concept
ii) Identify the existing configuration of the computers & peripherals.

MODULE-I **Mother board** –Functional description of mother board; Specification and variation, **Types and features of Motherboard form factors**-ATX, Micro-ATX, Mini-ITX, Nano-ITX, and Pico-ITX. **Functional components of Motherboard:** CPU and CPU socket-Types of sockets; Overview of micro architecture of INTEL and AMD CPU. **I/O devices and Interfaces** Types of I/O devices and ports on a standard PC for connecting I/O devices. Function of serial port, parallel port, and brief principle of communication through these ports, types of devices that can be connected and interface standards.	**06 Hours**
MODULE-II **Chipsets:** Function, Types and Features. Buses- System bus architecture, importance of POST; UEFI – why is it required, possible configurations through UEFI. **IDE ports:** Methods of adding SCSI drives. CMOS battery: Why? Its specifications. Impact of removing the battery from mother board. **Memory**– Memory Units (B, KB, MB,GB, TB), memory locations **RAM Technology**- SDRAM, DDR, DDR2, DDR3, DDR4. **Mass storage media-** Hard drive, Principle of working, Causes of Hard drive failure; Signs of failure; Backup and recovery of data.	**04 Hours**
MODULE-III **Power supplies:** Need for SMPS, Specifications, Rating of SMPS based on type of motherboard and devices used (AT/ATX, Micro ATX, mini ATX, higher watts PSU for gaming PC), color coding adopted, Types of connectors used- ATX, ATX12V, Molex, SATA, PCI. **Symptoms of SMPS failure:** Common problems from a faulty SMPS, Trouble shooting Power supplies.	**06 Hours**
MODULE-IV **Windows 8 /10 OS Installation and its operation:** Windows versions history, Installation, understanding Windows environment, installation of network, installation of drivers for camera, printers etc. Creating user accounts Installation of MS-Office and other general software. Backup/Restore, Windows partition with the bootable image.	**06 Hours**
MODULE-V **Internet:** Types of network (LAN, MAN, WAN), TCP/IP protocol stack, Internet address classes , UDP , global addresses, sub netting.	**06 Hours**

Activity:

· Study CAT6 UTP EIA/TIA568A/B straight and cross-over cable crimp and test and/verify its connectivity
· Install and configure network devices like hub, switch and router and create a LAN and perform connectivity test.

Study of basic Network configuration commands and utilities to debug the network issues.

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21CSAE17/27	**CO1**	Familiarize the Functional components of Motherboard & I/O devices and Interfaces
	CO2	Identify the various Chipsets, Memory, RAM Technology and Mass storage media
	CO3	Understand the features of Power supplies and troubleshoot of SMPS failure .
	CO4	Understand the features of Power supplies and troubleshot of SMPS failure
	CO5	Describe the concepts of inter networking and illustrate working of internet.

Question paper pattern:

SYSTEM AND DATABASE ADMINISTRATOR
(Ability Enhancement Course) Common to all branches
[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21ISAE17/27	CIE Marks	50
Credits	01	SEE Marks	
Practical Hours/Week (L-T-P)	0-0-2	Total Marks	50
Total Hours	14	SEE Hours	

Prerequisite: NIL

Course Learning Objectives: : To enable the students to obtain the knowledge of System and Database Administrator in the following topics.
- System administrator roles and responsibility.
- Managing the files and monitoring disk files.
- Fundamentals of database.
- Data presentation.

MODULE-I System administration, roles and responsibility of system administrator, configuring the system, security concepts and data backups.	**03 Hours**
MODULE-II Managing the files, maintaining the drive status, and monitoring the disk files.	**03 Hours**
MODULE-III Fundamentals of database: Introduction to database, securing the database.	**02 Hours**
MODULE-IV Microsoft access and Excel, dealing with formulas, maintain and managing the data in table format,	**03 Hours**
MODULE-V Data presentation: Introduction to graphs, presenting the data using power point and web tools.	**03 Hours**

Text books:
1. Essential System Administration, by by Aeleen Frisch, 3rd Edition

Reference Books:
1. Unix Linux System Administration Handbook by Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, and Dan Mackin
2. Database Reliability Engineering by Laine Campbell and Charity Majors

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21ISAE17/27	**CO1**	Understand roles and responsibility of system administrator,
	CO2	Maintaining the drive status, and monitoring the disk files.
	CO3	Understand the fundamentals of database and securing.
	CO4	Understand the uses of Microsoft access and Excel
	CO5	Apply power point and web tools for data representation

Question paper pattern:
1. The question paper will have TWO questions from any of the module.
2. The student need solve and execute both the question.

ELECTRICAL SAFETY

(Ability Enhancement Course) Common to all

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21EEAE17/27	CIE Marks	50
Credits	01	SEE Marks	
Practical Hours/Week (L-T-P)	0-0-2	Total Marks	50
Total Hours	14	Exam Hours	

Prerequisite : NIL

MODULE-I Electrical safety tips:Never put fingers or other objects in an outlet, Keep metal objects out of toasters, Never use anything with a cord or plug around water, Never pull a plug out by its cord, Stay away from substations and power lines, Don't climb on power poles, Never fly kites near power lines, Stay away from broken or fallen power lines, Never touch or climb trees that are near powerlines, Never touch big, metal transformer boxes with warning signs, Obey warning signs.	**03 Hours**
MODULE-II Precautions Against Electric Shocks: Unused wall outlets should be secured. Plastic inserts can be used but they can be pulled off and stuck in the mouth. Consider using safety outlets that prevent foreign objects from being inserted. You can also block outlets with the creative arrangement of furniture. If you're temporarily using extension cords, hide them behind furniture or use a hide-a-cord device. You can also put electrical tape over unused plug holes on cords. Put electrical devices such as DVD players on a shelf out of reach, or behind a barrier. Store bathroom and kitchen electrical appliances – like hair dryers and toasters – out of reach of curious children	**03 Hours**
MODULE-III It's vitally important to take safety precautions when working with electricity. Safety must not be compromised and some ground rules need to be followed first. The basic guidelines regarding the safe handling of electricity documented below will help you while working with electricity. 1. Avoid water at all times when working with electricity. Never touch or try repairing any electrical equipment or circuits with wet hands. It increases the conductivity of the electric current. 2. Never use equipment with frayed cords, damaged insulation or broken plugs. 3. If you are working on any receptacle at your home then always turn off the mains. It is also a good idea to put up a sign on the service panel so that nobody turns the main switch ON by accident. 4. Always use insulated tools while working. 5. Electrical hazards include exposed energized parts and unguarded electrical equipment which may become energized unexpectedly. Such equipment always carries warning signs like "Shock Risk". 6. Always be observant of such signs and follow the safety rules established by the electrical code followed by the country you're in.	**03 Hours**

Always use appropriate insulated rubber gloves and goggles while working on any branch circuit or any other electrical circuit. 7. Never try repairing energized equipment. Always check that it is de-energized first by using a tester. When an electric tester touches a live or hot wire, the bulb inside the tester lights up showing that an electrical current is flowing through the respective wire. Check all the wires, the outer metallic covering of the service panel and any other hanging wires with an electrical tester before proceeding with your work. 8. Never use an aluminum or steel ladder if you are working on any receptacle at height in your home. An electrical surge will ground you and the whole electric current will pass through your body. Use a bamboo, wooden or a fiberglass ladder instead. 9. Know the wire code of your country. 10. Always check all your GFCI's once a month. A GFCI (Ground Fault Circuit Interrupter) is a RCD (Residual Current Device). They have become very common in modern homes, especially damp areas like the bathroom and kitchen, as they help avoid electrical shock hazards. It is designed to disconnect quickly enough to avoid any injury caused by over current or short circuit faults.	
MODULE-IV Protection against Electrical Hazards: 1. Observe the system without touching it. The person may still be in contact with the electrical source. Touching the person may pass the current through you. 2. Call or have someone else call 911 or emergency medical help. 3. Turn off the source of electricity if possible. If not, move the source away from you and the affected person using a non-conducting object made of cardboard, plastic or wood. 4. Once the person is free of the source of electricity, check the person's breathing and pulse. If either has stopped or seems dangerously slow or shallow, begin cardiopulmonary resuscitation (CPR) immediately. 5. If the person is faint or pale or shows other signs of shock, lay him or her down with the head slightly lower than the trunk of the body and the legs elevated. 6. Don't touch burns, break blisters, or remove burned clothing. Electrical shock may cause burns inside the body, so be sure the person is taken to a doctor	**03 Hours**
MODULE-V **Video Presentations on Electrical Safety.**	**02 Hours**
Text books:1. Essential System Administration, by Aeleen Frisch, 3rd Edition **Reference Books:** 1.Electrical Safety Hand book, John Cadick, Mc-Graw Hill Publications, 4th edition. 2.National Electrical Safety Code, David J and Marne, Mc-Graw Hill Publications.	

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21EEAE17/ 27	**CO1**	Learn about Indian electrical safety standards
	CO2	Demonstrate the precautions need to be taken during electrical shock and hazards
	CO3	Learn about electrical safety rules.
	CO4	Understand about the protections against electrical hazards.
	CO5	Understand the safety standard in residential, commercial, and agricultural

NPTEL ONLINE COURSE

SWAYAM Courses (**Ability Enhancement Course) Common to all**

Course Code	**21NPAE17/27**	CIE Marks	
Credits	01	SEE Marks	
Lecture Hours/Week (L-T-P)	0-0-0	Total Marks	
Total Hours	-	SEE Hours	

- The students has to undergo the online NPTEL Course of 4 weeks.
- The students has to register the course by visiting the website :
  https://swayam.gov.in/nc_details/NPTEL
- The students are informed to take the help of their mentors for selection of the course.
- The students has to dowload the lecture videos through the portal and submit the Assignments.
- After completion of the course the students has to make compulsory registration for the examination thorugh the same portal.
- The student must submit the certificate at the end of the semester.

ENGINEERING PHYSICS LABORATORY

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21PHL11/21	CIE Marks	50
Credits	01	SEE Marks	50
Practical Hours/Week (L-T-P)	0-0-2	Total Marks	100
Total Hours	28	SEE Hours	03

Course Objectives:
1. Characteristics of diode and conductivity of semiconductor
2. Information of impedance, identfy passive components and transfer of resistance in electronic circuits.
3. Fundamental properties of light and emission of radiation with temperature along with the behavior of light in the phenomena of interference and diffraction.
4. Information of temperature dependance of resitivity.
5. Elastic proprties a material and Apprehend the concepts of interference of light, diffraction of light and Fermi energy
6. Understand the principles of operations of semiconductor devices such as semiconductor diode, and NPN transistor using simple circuits
7. Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
8. Recognize the resonance concept and its practical applications Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results

List of Experiments	Module
1. Y-by single Cantilever Method	Module 3
2. Co-efficiency of Viscosity by Stoke's method	Module 3
3. Sonometer (Frequency of Ac)	Module 4
4. Determination of Fermi Energy	Module 5
5. Newton s Rings	Module 1
6. Interference of Air wedge	Module 1
7. Diffraction grating by minimum deviation method	Module 1
8. Band Gap of Semiconductor	Module 1 and
9. Transistor Characteristics	Module 5
10. I-V Characteristics of Zener Diode.	General physics
11. Determination of Dielectric Constant using RC circuit.	General physics
12. Frequency response of series and parallel LCR circuit and study of quality factor.	Module 4
13. Verification of Stefan's law.	General physics
14. Torsional pendulum	General physics
15. Fly wheel	Module 3

Reference Books :

Sl. No.	Title	Author/s/ Editor	Publishers
1	Laboratory Manual in Applied Physics	H. Sathyaseelan	New Age International Second Edition

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21PHL11/21	**CO1**	Demonstrate the concept the physics theory course through a series of experiments
	CO2	Share responsibilities in small teams of four to five members for operating equipments and collecting data.
	CO3	Determine the properties on optics, electrical, electronics, modern physics an physics through series of experiments.
	CO4	Analyze the data and interpret the results
	CO5	Write a well organized laboratory report presenting the results on a clear way

Question Paper Pattern

BASIC ELECTRICAL ENGINEERING LAB

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21EEL12/22	CIE Marks	50
Credits	01	SEE Marks	50
Practical Hours/Week (L-T-P)	0-0-2	Total Marks	100
Total Hours	28	SEE Hours	03

Sl. No	List Experiment	
1	Verification of Kirchoff's Laws.	
2	Demonstration of two way control of lamps.	
3	Measurement of Power by three voltmeter method.	
4	Measurement of power in an inductive circuit using two wattmeter.	
5	Calibration of single phase energy meter.	
6	Study of MCB.	
7	Tube light connection.	
8	Measurement of power in a 3 phase circuit using two- wattmeter method.	
9	Load test on single phase transformer.	
10	Brake load test on 3 phase induction motor.	
11	Speed Control of Fan.	

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

Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21EEL12/22	**CO1**	Apply Kirchhoff's law for the analysis of DC circuits.
	CO2	Illustrate two ways control lamp and tube light connections.
	CO3	Measure power in single-phase and three phase circuits and energy using single energy meter.
	CO4	Control load test on single-phase transformer to estimate losses and efficiency.
	CO5	Conduct brake load test on 3-phase induction motor to estimate slip and efficiency.

Question Paper Pattern

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21MA21	CIE Marks	50
Credits	03	SEE Marks	50
Lecture Hours/Week (L-T-P)	3-0-0	Total Marks	100
Total Hours	42	SEE Hours	03

Course Learning Objectives: This course (**21MA21**) will enable students to master the basic tools of differential & integral calculus, differential equations and Laplace Transforms and become skilled for solving problems in science and engineering.

MODULE-I **Ordinary differential equations(ODE's)of first order:-**Linear and reducible to linear differential equation. Exact and reducible to exact differential equations. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L-R circuits. Nonlinear differential equations; introduction to general and singular solutions; solvable for p only; Clairaut's and reducible to Clairaut's equations only.	**08 Hours**
MODULE-II **Ordinary Differential Equations (ODE's) of second and higher order:-** Differential equation of higher order with constant coefficients and examples. Second order linear ODE's with constant coefficients by the method of variation of parameters; Cauchy's and Legendre homogeneous differential equations. Initial and boundary value problems. Applications to oscillations of a spring and L-C-R circuits.	**09 Hours**
MODULE-III **Partial Differential Equations(PDE's):-**Formation of PDE's by elimination of arbitrary constants and arbitrary functions. Solution of non-homogeneous PDE by direct integration method. Homogeneous PDEs involving derivative with respect to one independent variable only. Solution of PDE's by the method of separation of variable. **Application of Partial Differential Equations(PDE's):-**Introduction, derivation of one dimensional wave equation and heat equation, various possible solutions of one dimensional wave equation, heat equation and Laplace equation by the method of separation variables and examples.	**09 Hours**
MODULE-IV **Vector Calculus:- Vector Differentiation:** Scalar and vector fields**.** Gradient, directional derivative; divergence and curl physical interpretation; solenoidal and irrotational vector fields- Illustrative problems. **Vector Integration:** Line integrals, Greens Theorem, Gauss divergence Theorem and Stokes Theorem (Only Statements) Illustrative examples. Applications to work done by a force and flux.	**08 Hours**
MODULE-V **Laplace Transformations**: Defination, Transforms of elementary functions. Laplace transform of derivatives and integrals and problems. Periodic function and Unit step function- Illustrative problems. Inverse Laplace transforms, properties - Illustrative problems, Solution of linear differential equations.	**08 Hours**

Text Books:
1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed.,2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10thEd.(Reprint),2016.

Reference books:
1. Early Transcendental Calculus- James Stewart, Thomson Books, 5e 2007
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
5. Thomas G.B. and Finney R.L."Calculus and Analytical Geometry"9th Edition, Pearson,

E-Books and Online resources:
- http://.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicearth.org/

Pedagogy (General Instructions): These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.2. State the need for Mathematics with Engineering Studies and Provide real-life examples3. Support and guide the students for self–study.4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.5. Encourage the students for group learning to improve their creative and analytical skills.6. Show short related video lectures in the following ways:Ï% As an introduction to new topics (pre-lecture activity).
- As a revision of topics (post-lecture activity).
- As additional examples (post-lecture activity).
- As an additional material of challenging topics (pre-and post-lecture activity).
- As a model solution of some exercises (post-lecture activity).

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21MA21	**CO1**	Explain various physical models through first order and first degree ordinary differential equations and solve them by analytically
	CO2	Explain various physical models through second and higher order ordinary differential equations and solve them analytically
	CO3	Understand a variety of partial differential equations and solution by exactmethods and apply methods of separation of variables to solve heat, wave, laplace equations.
	CO4	Illustrate the applications vector calculus to understand the solenoidal and irrotational vectors and also to exhibit the interdependence of line, surfaceand volume integrals.
	CO5	Apply the knowledge of Laplace transform and inverse Laplace transform to s differential equations.

Question paper pattern :
- The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
- The question paper will have ten full questions covering all the five modules carrying 20 marks each.
- In each module there will be two full questions (with a maximum of four sub questions)
- The students will have to answer five full questions selecting one from each module

ENGINEERING CHEMISTRY

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	**21CH12/22**	CIE Marks	50
Credits	03	SEE Marks	50
Lecture Hours/Week (L-T-P)	3-0-0	Total Marks	100
Total Hours	42	SEE Hours	03

Course Learning Objectives:

• To recognize electrochemical process, evaluate electrodes and cells.

• To introduce the principle of corrosion, common corrosion forms, corrosion control methods and material selection to reduce corrosion cost.

• To provide a broad and fundamental knowledge of the polymer and their chemical and physical behaviour. Emphasis is on the processing technique along with the production of polymer. Towards the end the student is able to corelate structure-processing-properties relationship for polymers.

• To study various types of conventional and non-conventional energy sources including solid liquid and gaseous fuels.

• To provide knowledge of water quality, characteristics of water sources and purification of water

MODULE-I **ELECTROCHEMICAL ENERGY:** Introduction, Electrode potential and EMF– definition, sign-convention., and notations. Standard electrode potential, Measurement of single electrode potential and emf. Electrochemical series table. Derivation of Nearns't equation. Classification of cells- primary, secondary and concentration cells.. Reference electrodes- calomel electrode. Ion-selective electrode-glass electrode, determination of pH using glass electrode. Numerical problems. Modern batteries – Construction working and application of Li-MnO2 and Ni – Metal Hydride battery. **Pedagogy:** Chalk and talk method, power point presentation, solar Energy and Fuel cells,HandoutsSelf-Study Material: Recycling of Lithium-ion batteries	**09 Hours**
MODULE-II **CORROSION SCIENCE & SURFACE COATING:** Definition, chemical and electrochemical mechanism. Types of corrosion – differential metal and differential aeration (pitting and water line), stress corrosion. Factors affecting the rate of corrosion. Corrosion control-Inorganic coating (Anodising and Phosphating) metal coating (Galvanization and tinning). Corrosion Inhibitors.Technological importance of metal finishing. Mechanism and difference between electroplating and electroless plating. Factors effecting electroplating and application of electroplating and electro-less plating. Electroplating of copper and electroless plating of nickel. **Pedagogy:** Chalk and talk method, power point presentation,-vedios Electroplating of coper and electro less plating of NickelSelf-Study Material: Electrochemical series, Organic coatings: paint, components of paintsand their functions. Varnish, definition, differences between paints and varnishes.	**08 Hours**
MODULE-III POLYMER TECHNOLOGY: Definition, classification with examples. Polymerization, types of polymerization (Addition and condensation) Mechanism of polymerization – Free radical with ethylene as an example. Methods of polymerization – Bulk , solution, suspension and emulsion	**09 Hours**

polymerization. Glass transition temperature, factors effecting, structure and property relationship. Synthesis, properties and application of Teflon , Polyethylene HDPE, PMMA, Polyurethane. Elastomer- deficiencies of natural rubber and advantages of synthetic rubber. Synthesis and application of Neoprene, Butyl and Nitrile rubber. Adhesives- Manufacturing and application of epoxy resin. Conducting polymers- definition, Synthesis, mechanism and application of conduction in polyacetylene. Introduction to biodegradable polymers.

Pedagogy: Chalk and talk method, power point presentation,Self-Study Material: Importance and disadvantages of non-biodegradable polymers, composites and nanomaterials.

MODULE-IV FUELS & BATTERY TECHNOLOGY: Introduction , definition, classification, characteristics of fuels, calorific value – definition, gross and net calorific value. Determination of calorific value of a solid / liquid fuels using Bomb Calorimeter. Petroleum cracking – Fluidized catalytic cracking. Reforming of petrol. Power alcohol, Unleaded petrol and Bio-fuels Numerical problems. Fuel cells – Construction and working of $H_2 – O_2$ and Me – alcohol – O_2 (CH_3OH-O_2) cells. **Pedagogy:** Chalk and talk method, power point presentation, videos on Knocking, Working of fuel cells. Solar cells. Handouts.Self-Study Material: Construction and working of Dry battery.	**08 Hours**
MODULE-V INSTRUMENTAL METHODS, WATER and WASTE MANAGEMENT: Instrumentation and application of potentiometry ,conductometry (strong acid and strong base, weak acid and strong base), Colorimetry –theory, Beer_Lambert,s Law and applications in uantitative analysis.Sources and Impurities in water, hardness and their types and Numerical Problems . BOD and COD, and their determination, numerical problems. Potable water- purification using chlorination, and reverse osmosis. Sources, characteristics and disposal methods of Solid waste and biomedical waste. **Pedagogy:** Chalk and talk method, power point presentation, HandoutsPractical Topic: Conductometric titration of mixture of acids potentiometric estimation of FAS, Colorimetric estimation of copper,Self-Study Material: Principles of titrimetric analysis, requirement of titrimetric analysis,Classification of titrimetric analysis, Instrumental methods of analysis. Definitions of normality, molarity,ppm.	**08 Hours**

Text Books:
Engg.Chemistry by R V Gadag and Nityanand Shetty Engg.Chemistry by J C Kuriacose and J Rajaram

Reference books:
1. Text book of Engg., chemistry by Jain and Jain.
2. Text book of Engg., chemistry by M.M Uppal.
3. Text book of Engg., chemistry by O.P Agrawal.
4. Principles of physical chemistry by Puri and Sharma.
5. Text book by polymer science by F.W.BillMeyer.
6. Text book by polymer science by Gouriker.
7. Text book by Instrumental method of analysis by B K Sharma.
e-learning resources: :
http://www.tndte.gov.in/site/wp-content/uploads/2016/08/Engineering- Chemistry.pdf
.http://nptel.ac.in/courses.php
.http://jntuk-coeerd.in/

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21CH12/22	**CO1**	Demonstrate fundamentals of electrochemistry,recognize theelectrochemical process and apply the concept of electrochemistry in industrial water electrolysis, electrolysis and electrosynthesis.
	CO2	Detect type of corrosion & apply appropriate method for managingcorrosion in industries.
	CO3	Differentiate modern chemical method of synthesis of polymer and theirapplications .
	CO4	Interpret the properties of Fuels commonly used and there economics,advantageous and limitations.
	CO5	Evaluate the properties of potable water, solid waste & biomedical waste with the help of instrumental methods .

Question paper pattern :
- The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
- The question paper will have ten full questions covering all the five modules carrying 20 marks each.
- In each module there will be two full questions (with a maximum of four sub questions)
- The students will have to answer five full questions selecting one from each module

TECHNICAL ENGLISH - II

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21HU23	CIE Marks	50
Credits	02	SEE Marks	50
Lecture Hours/Week (L-T-P)	2-0-0	Total Marks	100
Total Hours	28	SEE Hours	1.5

Course Learning Objectives: To enable the students to obtain the basic knowledge about Communication Skills - II in the following topics:-
- Meaning, Principles, Barriers and modes of Oral communication.
- Developing Presentation skills
- Learn Group Communication.
- Learn Employment communication..
- Developing interpersonal communication skills

MODULE-I ORAL COMMUNICATION:Meaning, principles of successful oral communication, barriers to communication. modes of oral communication – listening as a communication skill, Non-verbal communication. Grapevine Communication – Meaning and Types of Grapevine.	**05 Hours**
MODULE-II PRESENTATION SKILLS :What is a presentation – Element of Presentation – Designing and delivering Presentation. Public Speaking, Effective power point presentation, body language , Non- verbal facial expressions, Eye Contact, audience research, questions from the audience, communication of emotional intelligence , creativity in oral communication. Communication through telephonic , videoconference & skype	**06 Hours**
MODULE-III GROUP COMMUNCATION :Group Discussion – Do and Don't in Group discussion, Group Presentation. Debate – Do and Don't in Debate. Group Communication- Meetings, Notice, Planning Meetings, objectives, timing, venue of meetings, leading meetings, Minutes of meeting, press conference.	**06 Hours**
MODULE-IV EMPLOYMENT COMMUNCATION :Writing Curriculum Vitae(CV), Interview – Types of interview, candidates preparation, Interviewers Preparation, time management, grooming and Just A Minute (JAM). Speaking for better communication – Speaking about yourself	**06 Hours**
MODULE-V INTERPERSONAL COMMUNICATION SKILLS : Advantage and Disadvantages of utilizing the team work, Characteristic of Successful teams, Stages of the development of a team, team roles, challenges in team working, forms of Non- Team behavior.Types and source of conflicts, the influence of various cultures on the solving of conflicts.	**05 Hours**

Pre requisites: None

Teaching Methodology: Teacher/ student -Centered Approach to Learning, ICT Tools, Group Assignment, Case Study

Text Books:
1. Murphy – Effective Business Communication – Mc Graw Hill. Publisher : McGraw Hill Education; 7th edition (1 July 2017)

2. Nageshwar Rao and Rajendra Das – Business Skills – January 2010 ,HPH.
3. Advance Business Communcation – Penrose, Rasberry, Myers, 5/e, cengage learning 2004.
   4.Prasad P. Communication Skills, S.K. Kataria & Sons. 4 th edition 2016 , published 2009

Reference Books :
1. Mc Grath – Basic Mangerial Skills – New Delhi – Prentic Hall India learning pvt ltd.
2. Business Communcation – K.K. Sinha – Galgotio Publishing Company, New Delhi.
3. Sen, leena Communication Skills, Prentice Hall of India, New Delhi.

E – BOOKS & ONLINE RESOURCES
https://www.skillsyouneed.com/ips/communication-skills.html
http://103.5.132.213:8080/jspui/bitstream/123456789/1122/1/Communication%20Skills.pdf
https://www.skillsyouneed.com/docs/communication-skills-PV.pdf

NPTEL / SWAMYAM / MOOCS : TECHNICAL ENGLISH FOR ENGINEERS (8 Weeks)
Prof AYSHA IQBAL , Department of HSS, IIT MADRAS

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21HU23	**CO1**	Explain about basic of oral Communication
	CO2	Develop presentation skills.
	CO3	Learn group communication
	CO4	Learn Employment communication
	CO5	Develop interpersonal communication skills

Question paper pattern :
- The SEE question paper will be set for **50 Marks**
- The question paper will have ten full covering all the five modules carrying 10 marks each.
- There will be two full questions from each module. The students will have to answer five full questions selecting one from each module

C PROGRAMMING FOR PROBLEM SOLVING

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21CS14/24	CIE Marks	50
Credits	03	SEE Marks	50
Lecture Hours/Week (L-T-P)	3-0-0	Total Marks	100
Total Hours	42	SEE Hours	03

Course Learning Objectives:
• Learn the concepts of C Language.
• Develop skills to solve computational problems

MODULE-I **Algorithms, Flowcharts and Operators:** Algorithms, Flowcharts, Basic Structure of C Program, Executing a „C program. C tokens, Data types, Declaration of variables. **Expressions, Managing Input/ Output and Operators:** Arithmetic operators, relational operators, logical operators, assignment operators, increment/ decrement operators, conditional operators, bit wise operators, special operators. Evaluation of expression, precedence of arithmetic operators, type conversions in expression, operator precedence and associativity. Unformatted and Formatted Input and Output. Examples & exercises.	**08 Hours**
MODULE-II **Control Statements:** Decision Making with if statement, Simple if statement, the if else and nested if statements, the else if ladder, Switch statement, Unconditional control Statements. **Decision Making and Looping:** While statement, Do-While statement, For statement, jumps in loop. Examples & exercises.	**08 Hours**
MODULE-III **Arrays:** One dimensional Array, declaration, Initialization, Two dimensional Arrays notations and representations, manipulating with arrays, examples and exercises. **Pointers:** Accessing the address of a variable, Declaring pointer variables, Initializing of pointer variables, accessing a variable through its pointer ,pointer expressions, pointer arrays, pointer and character strings, arrays of pointer, pointer as function arguments, function returning pointer ,pointers to function, pointer and structure. Examples & exercises.	**09 Hours**
MODULE-IV **Strings:** Declaring and Initializing String Variables, Reading Strings from Terminal, Writing strings to Screen, Arithmetic Operations on Characters, String-handling functions, examples and exercises. **Functions and Recursion :** Need for User-defined Functions, A multi-function program, Elements of User-defined Functions, Definition of functions, Return value and their types, Function calls, Function declaration, Category of functions, Recursion, examples and exercises.	**09 Hours**
MODULE-V **Structures and Unions:** Initialization. Defining a Structures, Declaration of Structure variables, Accessing Structure Members, Structure Initialization, Copying and comparing	**08 Hours**

structure variables, operations on individual members **Unions**: Union**,** Size of Structures, bit fields , examples & exercises

File Management: Defining and opening a file, closing file, input output operations on files, error handling during I/O operations. Examples & exercises.

Text books :

1. E. Balagurusamy, "Programming in ANSI C", Tata Mcgraw Hill Education Private Limited– V Edition, 2016

Reference Books:

1. E Balagurusamy, Computing Fundamentals and C Programming, McGraw-Hill Education, Reprint 2nd Edition 2008.
2. Herbert Schildt, **"**Complete Reference in C",Fourth Edition, Tata McGraw Hill Publication, 2017
3. Yashwant P. Kanetakar, "Let us C**",** Fifth Edition, BPB Publications, 2016.
4. Brian W Kernighan & Dennis M Ritchie **"** The C Programming Language", Prentice Hall Publisher, Second Edition, 2004.
5. Behrouz A.Forouzan and Richard F.Gilberg,"Computer Program: A structured programming Approach Using C.", Third edition, Thomson Learning, 2005.

Course outcomes:

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

Course Code	CO #	Course Outcome (CO)
21CS14/24	**CO1**	Develop Algorithm and flowcharts and understand the different data types and Operators in C language
	CO2	Identify and use proper decision /control constructs for solving different type of problems
	CO3	Apply arrays and pointers to develop programs for a given problem.
	CO4	Demonstrate the Strings and modular programming concepts
	CO5	Create a solutions for real world problem using Structures and file operations

Question paper pattern :

• The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
• The question paper will have ten full questions covering all the five modules carrying 20 marks each.
• In each module there will be two full questions (with a maximum of four sub questions)
• The students will have to answer five full questions selecting one from each module

MECHANICAL ENGINEERING SCIENCE

(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21ME15B/25B	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	2-0-2	Total Marks	100
Total Hours	(28H.Theory+28H.Practical)	SEE Hours	03

Course Learning Objectives:
1. Learn the fundamental concepts of energy, its source and conversion and basic concepts of thermodynamics.
2. Understand the, properties of stream and use of steam table. 3.Understand the working of IC engines and concepts of refrigeration.
4. Understand the working of conventional machine tools and welding process.
5. Learn the fundamentals of Mechatronics and its applications

MODULE-I **Energy source and basic thermodynamics:**Energy sources like fossil fuels, Hydel, nuclear, solar, wind, environmental issues like global warming and ozone depletion, remedies of global warming. Basic concept of the rmodynamics: Laws of thermodynamics.	**05 Hours Theory**
MODULE-II **Properties of steam:**Formation of steam at constant pressure (temperature enthalpy diagram). Use of stream tables to calculate enthalpy, internal energy etc (simple problems).	**08 Hours Theory**
MODULE-III **IC Engines:** Otto and diesel cycle, 2 stroke and 4stroke, petrol and diesel engines, simple problems.**Refrigeration:** Unit of Refrigeration, C.O.P, vapour compression system and vapour Absorption systems, properties of refrigerants.	**07 Hours Theory 12Hours Practical**
MODULE-IV **Conventional machining:** lathe-principle of working, lathe operations, drilling M/C-principle of operation of radial drilling M/C, drilling operations. Joining process, principle of arc and gas welding. Milling machine, working principle of millingmachine, classification of milling machine. **Computer Numerical Control (CNC):** Introduction components of CNC,open loop and closed loop systems, advantages of CNC,CNC machining centers and turning centers.	**16 Hours Practical**
MODULE-V **Mechatronics:** Definitions, systems of Mechatronics, measurements systems, control systems. Examples of open loop and closed loop control systems, microprocessor based controller.**Robots:** Robot anatomy, joints and links, common robot configurations. Applications of robots in material handling, processing and assembly and inspection.	**08 Hours Theory**

Text Book
1. A Text Book of Elements of Mechanical Engineering – KR Gopalkrishna, Subhash Publishers, Bengaluru.
2. Elements of Workshop Technology, Vol. I & II – SKH Choudrhy, AKH Chowdhary & Nirjar Roy, 11th Edn., Media Promoters & Publishers, Mumbai.

Reference books:
1. A Text Book of Elements of Heat Engines – RC Patel & CJ Karamchandani, Charotar Publishers,
1. A Text Book of Elements of Mechanical Engineering – KR Gopalkrishna, Subhash Publishers, Bengaluru.
2. Elements of Workshop Technology, Vol. I & II – SKH Choudrhy, AKH Chowdhary & Nirjar Roy, 11th Edn., Media Promoters & Publishers, Mumbai.

Reference books:
1. A Text Book of Elements of Heat Engines – RC Patel & CJ Karamchandani, Charotar Publishers, Anand.
E-Books and Online resources:
NPTEL/SWAYAM/MOOCS:

Pedagogy :-The topic or concept-wise pedagogy (Teaching Methodology) of the curriculum shall be specified in the content.

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21ME15B/ 25B	**CO1**	Identify the different sources of energy, their conversion process and thermodynamics.
	CO2	Learn the using steam tables various properties of steam
	CO3	Know the working of IC Engines and concept of refrigeration.
	CO4	Know the working of conventional machine tools and welding process.
	CO5	Understand important of mechatronics and its applications and Describe t manufacturing system.

Question paper pattern :
- The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
- The question paper will have ten full questions covering all the five modules carrying 20 marks each.
- In each module there will be two full questions (with a maximum of four sub questions)
- The students will have to answer five full questions selecting one from each module

ENGINEERNG MECHANICS

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21CV16/26	CIE Marks	50
Credits	03	SEE Marks	50
Lecture Hours/Week (L-T-P)	3-0-0	Total Marks	100
Total Hours	42	SEE Hours	03

Prerequisite: Physics and Mathematics

Course Learning Objectives:

To enable the Student to acquire the knowledge in the following topics

1) Understanding and solving the problems involving forces, loads and reactions, Moments and its applications of concurrent force system.
2) Solving the problems of couples and equilibrium of bodies.
3) To determine support reactions and friction of rigid bodies on horizontal and inclined planes.
4) To determine the center of gravity and moment of inertia of planar sections.
5) To study the concept of work, power &energy.

MODULE-I Introduction to Engineering Mechanics, force Systems, Basic concepts, Particle equilibrium; Rigid Body equilibrium; System of Forces; Coplanar Concurrent Forces, Composition and resolution of force systems, Resultant force, Moment of Forces and its Application; law of transmissibility offorces, Application based numerical examples	**08 Hours**
MODULE-II Varignon's theorem of moments Couple system, equivalent force couple system, composition of coplanar non concurrent force system, Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and conditions of equilibrium law of superposition of forces. Application based Numerical examples	**09 Hours**
MODULE-III Types of supports, types of loads, concept of statically determinate and indeterminate beams, support reactions for statically determinate beams.Friction, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction;Impending motion on horizontal and inclined planes, wedge friction, ladder friction. Application based Numerical examples	**08 Hours**
MODULE-IV Centroid of plane figures, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; locating the centroid of triangle, semicircle, quadrant of a circle and sector of a circle, centroid of the simple built sections & composite sections,Moment of inertia concept, Moment of inertia of plane sections from first principles,Theorems of moment of inertia, Moment of inertia of standard sections and composite sections. Numerical examples	**09 Hours**
MODULE-V Work, Power & Energy, Introduction, Work of a force, Energy of a particle, principle of work &energy for a system of particles, Potential energy and conservative forces, principles of conservation of energy, Power. Application based Numerical example	**08 Hours**

Text Books:
1. S.S.Bhavikatti,"Elementsofcivilengineering",Vikaspublishinghouse Pvt. Ltd., New Delhi
2. Jagadeesh T.R. and Jayaram, "Elements of civil engineering", Sapna Book House,Bangalore.
3. A.K. Tayal, "Engineering mechanics (Statics & Dynamics)", Ninth edition, Umesh publications, New Delhi.

Reference books:
1. TimoshenkoandYoung,EngineeringMechanics",McGrawBookCompany, New Delhi.
2. Ferdinand P. Beer and E. Russel Johnston Jr., "Mechanics for Engineers: Statics" McGraw Book Company, NewDelhi.
3. K.L. Kumar, "Engineering Mechanics", Tata-McGraw-Hill Publishing company, New Delhi

EBooks and Online resources:
E books and online course materials:

www.civilenggebooks.com
Nptel link: https://nptel.ac.in/courses/112/106/112106286/

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21CV16/26	CO1	Determine the resultant of coplanar concurrent force system
	CO2	Determine the resultant of non-concurrentforce system andanalyze the equilibrium of forces
	CO3	Determine support reactions and apply of laws of friction for solving engineering problems
	CO4	Determine the center of gravity and moment of inertia of plane figures
	CO5	Solve the numerical on work, power and energy

Question paper pattern :
- The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.
- The question paper will have ten full questions covering all the five modules carrying 20 marks each.
- In each module there will be two full questions (with a maximum of four sub questions)
- The students will have to answer five full questions selecting one from each module

ENGINEERING CHEMISTRY LABORATORY

(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)

Course Code	21CHL11/21	CIE Marks	50
Credits	01	SEE Marks	50
Lecture Hours/Week (L-T-P)	0-0-2	Total Marks	100
Total Hours	28	SEE Hours	03

Course Learning Objectives: To enable the students to obtain the knowledge of Engineering Chemistry Practical in the following topics.
- Hardness Determination
- Analysis of alloy, metal and cement
- Determination of COD
- Estimation of strength of acids

PART-A

1. Determination of total hardness of water using standard EDTA
2. Determination of percentage of copper in brass
3. Determination of iron using internal indicator method
4. Determination of COD of waste water
5. Determination of chloride in water by precipitation method

PART – B

1. Potentiometric method of estimating iron
2. Colorimetric determination of copper
3. Conductometric estimation of acid (HCl) using standard NaOH.
4. Determination of dissociation constant (pKa) of weak acid.
5. Determination of viscosity of Polymeric solution Ostwald viscometer.

Text Books:
1. Departmental Chemistry Manual.
Reference books:
1. Text book of Quantitative analysis by A. I. Vogel. Practical's of physical Chemistry by J. B. Yadav

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21CHL11/21	**CO1**	Explain the concepts engineering chemistry theory course through series of experiments
	CO2	Share the responsibilities in small batches of 4-5 students in operating the instruments and conduct the experiments
	CO3	Determine the properties by conducting series of experiments.(L3)
	CO4	Analyze the data obtained from the experiments and interpret the results.(L4)
	CO5	Write a well organized laboratory report.(L3)

Question paper pattern :

1. Student has to perfrom one experiement from PART-A and one from PART-B, depending on the examiners choice.

C PROGRAMMING FOR PROBLEM SOLVING LAB

(Common to all branches)

[As per Choice Based Credit System (CBCS) scheme](From the academic year 2021-22)

Course Code	21CSL12/22	CIE Marks	50
Credits	01	SEE Marks	50
Lecture Hours/Week (L-T-P)	0-0-2	Total Marks	100
TotalHours	28	SEE Hours	03

Prerequisites: NIL

Course Learning Objectives:
- Students will be able to use appropriate data type, control / decision statement
- Learn the usage arrays, structures, functions , pointers and files concepts to solve real- life applications.

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                                    PART-A
1. Write a C Program to input integer, float and character values using scanf() Statement and output with printf() in C.
2. Write a C program to find Sum, difference, product, quotient and reminder of two integer numbers
3. Write a C program to swap two numbers.
4. Write a C program to print ASCII value of a character.
5. Program to check whether number is EVEN or ODD
6. Program to find largest number among three numbers
7. C program to convert temperature from Fahrenheit to Celsius and vice versa
8. C program to calculate X^N (X to the power of N) using pow function
9. C program to print value in Decimal, Octal, Hexadecimal using printf
10. Write a C program to print all Numbers from 1 to N using goto statement.
11. C program to check a given character is an uppercase character or not without using the library function
12. Write a C program to read the content of a file using getc() function
13. Write a C program to declare, initialize an union ,example of union

PART B

1. a. Write a C program to find the roots of a quadratic equation using else if statement.

    b. Write a C program to calculate area of different shapes like square,rectangle, triangle using switch.

2. a. Write a C Program to check entered number is ZERO, POSTIVE or NEGATIVE and find sum of positive and negative for given N numbers using While and if statement

    b. Write a C program to find sum of series (Natural numbers/Factorial ofnumbers of all natural

    numbers) from 1 to N using for loop.

    Series:1/1!+2/2!+3/3!+4/4!.   N/N!

3. a. Write a C program to find a smallest and Largest element in a one dimensional array.

    b. Write a C program to perform linear search and find position using array.

4. a. Write a C program to read a Matrix, Print diagonal element and find Sum of diagonals.
   b. Write a C program to find matrix addition and subtraction.

5. a. Write a C program to count the number of lines, words, character in a given text
   b. Write a C program to read two string constants and compare whether they are equal or not.
   If not join them together. Then copy the contents to the third string and display all stings
   constants with their lengths using string handling functions.

6. Write a C Program to compute the monthly pay of N Employees using each employee's name, basic Pay, DA HRA. The DA and HRA 80% and 30% of Basic Pay respectively. Gross salary is computed by adding DA, HRA to Basic Pay, Store all the details in an array of Structures and Print the name and Gross salary of Each employee.

7. Write a program in C to read an array containing n numbers and find standard deviation using user defined function.

8. a. Write a C program to Calculate the value of nCr using function.
   b. Write a C program to perform conversion of decimal number to binarynumber using recursive
      function.

9. a. Write a C program to reverse an array containing n elements using pointer
   b. Write a C program to perform bubble sort of given N numbers using Pointers.

10. Consider the details of N faculty details consisting of Name, employee Id, Department, address & salary. Create a file to store the above details and retrieve the contents of file.

Note:
 1. Part A programs for Practice.
 2. Part B Programs for SEE

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO) : At the end of the course student will be able to:
21CSL12/22	**CO1**	Identify the programming constructs and apply appropriate decision and looping statement for given problem.
	CO2	Illustrate C programs to solve computational problems using one andtwo dimensional Arrays
	CO3	Demonstrate the use of string handling functions and Structure concept in problem solving.
	CO4	Implement modular programming using user defined functions and recursive functions.
	CO5	Develop program with pointers and give solution to real world problems using file operations.

Question paper patt