

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**



P.D.A. 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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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	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1.	BS	21MA11	Calculus and Linear Algebra	Mathematics	Mathematics	3	-	--	03	50	50	100	3
2.	BS	21 PH12	Engineering Physics	Physics	Physics	3	-	--	03	50	50	100	3
3.	HU	21HU13	Technical English 1	Humanities	Humanities	2	--	--	02	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	21ME15	Computer Aided Engineering and Drawing	Mechanical Engineering	Mechanical Engineering	2	--	2	03	50	50	100	3
6.	ES	21EC17	Basic Electronics	ECE Dept	ECE Dept	3	-	-	03	50	50	100	3
7.	BS	21PHL11	Engineering Physics Laboratory	Physics	Physics Dept	--	--	2	03	50	50	100	1
8.	ES	21EEL12	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	50	50	100	1
9.	AE	21AE19X	Ability Enhancement/Skill Enhancement Course								100	100	1
Total						16	--	06	23	400	500	900	20
Note: BS: Basic Science, ES: Engineering Science, Hu: Humanities													

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	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/Drawing	Duration in hours	SEE Marks	CIE Marks	Total Marks	
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	--	--	2	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	21ME16	Mechanical Engineering Science	Mechanical Engg. Dept.	Mechanical Engineering	2	--	2	03	50	50	100	3
6	ES	21CV17	Engineering Mechanics	Civil Engineering	Civil Engineering	3	--	--	03	50	50	100	3
7	BS	21CHL11	Engineering Chemistry Laboratory	Chemistry	Chemistry Dept.	--	--	2	03	50	50	100	1
8	ES	21CSL12	Computer Programming Laboratory	Computer Science & Engineering	Computer Science & Engineering	--	--	2	03	50	50	100	1
9		21AE19X	Ability Enhancement/Skill Enhancement Course								100	100	1
Total						16	--	06	23	400	500	900	20

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 (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	21 PH22	Engineering Physics	Physics Dept	Physics Dept	3	-	--	03	50	50	100	3
3.	ES	21EE24	Basic Electrical Engineering	E and E Engineering	E and E Engineering	3	-	--	03	50	50	100	3
4.	Hu	21HU23	Technical English-II	Humanities	Humanities	2	--	--	02	50	50	100	2
5.	ES	21ME25	Computer Aided Engineering and Drawing	Mechanical Engineering	Mechanical Engineering	2	--	2	03	50	50	100	3
6.	ES	21EC27	Basic Electronics	ECE Dept	ECE Dept	3	-	-	03	50	50	100	3
7.	BS	21PHL21	Engineering Physics Laboratory	Physics Dept	Physics Dept	--	--	2	03	50	50	100	1
8.	ES	21EEL22	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	50	50	100	1
9.		21AE29X	Ability Enhancement / Skill based course								100	100	1
Total						16	--	06	23	400	500	900	20
Note: BS: Basic Science, ES: Engineering Science, Hu: Humanities													

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 (CHEMISTRYGROUP)

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	
	BS	21MA21	Differential Equations and Laplace Transforms	Mathematics Dept	Mathematics Dept.	3	-	--	03	50	50	100	3
	BS	21CH22	Engineering Chemistry	Chemistry Dept	Chemistry Dept.	3	-	--	03	50	50	100	3
	HU	21HU23	Technical English-II	Humanities	Humanities	2	--	--	2	50	50	100	2
	ES	21CS24	C Programming for Problem Solving	Computer Science & Engineering	Computer Science & Engineering	3	-	--	03	50	50	100	3
	ES	21ME26	Mechanical Engineering Science	Mechanical Engg. Dept.	Mechanical Engineering	2	--	2	03	50	50	100	3
	BS	21CV27	Engineering Mechanics	Civil Engg Dept	Civil Engg. Dept	3	--	--	03	50	50	100	3
	BS	21CHL21	Engineering Chemistry Laboratory	Chemistry Dept	Chemistry Dept.	--	--	2	03	50	50	100	1
	ES	21CSL22	Computer Programming Laboratory	Computer Science & Engineering	Computer Science & Engineering	--	--	2	03	50	50	100	1
		21AE29X	Ability Enhancement/Skill based Course								100	100	1
Total						16	--	06	23	400	500	900	20

PREFACE

Poojya Doddappa Appa College of Engineering, Kalaburagi was established in the year 1958 by Hyderabad Karnataka Education society (HKES), founded by Late Shri Mahadevappa Rampure. The KHE Society runs 48 education institutions.

The College campus is spread over 71 acres of land. The college was started with 50% central assistance and 50% state assistance. The initial intake was 120 with degree offered in three branches of engineering viz, Civil, Mechanical and Electrical Engineering. Now it houses 13 undergraduate courses, 10 post Graduate courses and 13 Research centers. All the courses are affiliated to Visvesvaraya Technological University, Belagavi. At present the total intake at UG level is 980 and at PG level is 193. There are 237 teachers in the College out of which 60 are getting salary from the State Government and rest of them are paid by the College management.

The college receives grant in aid funds from the state government. The National Board of Accreditation, New Delhi, accredited the College in the year 2005 for 09 UG courses out of which 08 courses were accredited for three years and 01 Course for 5 years. Six UG courses were accredited in the year 2009 for 03 years. Now the college has been accredited by NBA for 5 programs the accreditation is valid up to June 2022. Further 5 other program have applied and waiting for inspection by NBA.

The college is one among the 14 colleges selected under TEQIP, sponsored by World Bank. It has received a grant of Rs 10.45 Crores under this scheme for its development. The institution is selected for TEQIP phase II in year 2011 for four years. Institution received a grant of Rs 12.50 Crores under TEQIP phase-II scheme for its development. Further the college is selected for TEQIP phase III scheme and received a grant of Rs. 7 Crores under TEQIP Phase-III.

The College was granted autonomous status by the UGC for six years from 2009-10 to 2014-15. Granted the extension for 2014-15 to 2016-17 and further received the extension for 2017-18 to 2018-19.

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.

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
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam 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 (statements only) and examples. Evaluation of Indeterminate forms.			8 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-Simple problems. 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			9 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.			8 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			9 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's ratio test, Cauchy's root test (without proof)- Illustrative examples.			8 Hours
Text Books: 1.B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43 rd 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://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 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 this course, students are able 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 curves and its applications and expand functions using Taylor's and Mechaurin's series.
	CO2	Apply the partial differentiation to calculate rate of change of multivariate functions and solve the problems related to composite functions and Jacobians
	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 area and volume										
		CO5	Make use of matrix theory for solving system of linear equation and compute Eigen values and Eigen vectors										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	3	1										1	
CO2	3	1										1	
CO3	3	2										1	
CO4	3	1										1	
CO5	3	1										1	
AVG	3	1.2										1	

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
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam 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. Numerical. Construction and working of Nd-YAG and semiconductor lasers. Application of lasers: LIDAR, Industrial, Medical, 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: Endoscopy, Temperature sensor. Numericals

9 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. Numerical. Bragg's law, Braggs X-ray diffractometer and application for determination of wavelength & crystal structure. Crystal imperfection-point, line & planar defects(Qualitative). Numericals.

8 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 of their inter relationships, Poisson's

9Hours

ratio. Bending of beams: Neutral surface and neutral plane, expression for bending moment of a beam (Derivation), Application example: single cantilever (Derivation), I-Shaped grids & twisting couples. Numericals.			
MODULE-IV			
<u>Dielectric properties of materials:</u> 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). Clausius-Mossotti equation. Description of solid, liquid & gaseous dielectrics with one example. Qualitative explanation of application of dielectrics in transformer. Numericals.			8 Hours
MODULE-V			
<u>Conductor and Superconductors:</u> Classification of solids, 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, Types of super conductors, High temperature super conductors, applications of super conductors: Magnetic Levitation. Numerical			8 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. 2. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017 3. A Marikani, “Engineering Physics”, PHI Learning Private Limited Delhi-2013. 4. Wiley Precise Text, “Engineering Physics”, Wiley India Private Ltd, New Delhi. Book Series-2014. 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	Analyze the working principle of laser and optical fibers, explain the construction and working of laser and types of optical fibers, formulate and evaluate 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 moduli 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									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										2
CO2	3	3										2
CO3	3	2										2
CO4	3	3										2
CO5	3	3										2
AVG	3	2.8										2
<p>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.</p> <ul style="list-style-type: none"> • The question paper will have ten full questions carrying 20 marks each. • There will be two full questions (with a maximum of four sub questions) from each module <p>The students will have to answer five full questions selecting one from each module</p>												

<p align="center">TECHNICAL ENGLISH - I (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)</p>				
Course Code	21HU13	CIE Marks	50	
Credits	02	SEE Marks	50	
Contact Hours/Week (L-T-P)	2-0-0	Total Marks	100	
Contact Hours	28	Exam Hours	02	
<p>Course Learning Objectives: To enable the students to obtain the basic knowledge about Communication Skills - I in the following topics:-</p> <ul style="list-style-type: none"> . 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 				
<p align="center">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.</p>				6 Hours
<p align="center">MODULE-II READING AND UNDERSTANDING Reading Comprehension – Reading rate and reading comprehension, Paraphrasing, Interpretations of graphical information, Book reading and summarizing it.</p>				6 Hours
<p align="center">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</p>				5Hours
<p align="center">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</p>				6 Hours
<p align="center">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.</p>				5 Hours
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Scotofer, contemporary business communication, Biztant ra Hardcover – 23 January 1998 2. Chaturvedi P D & Mukesh chaturvedi - Business communication: Concepts, cases & 				

<p>applications- 2/e, 2nd Edition pearson education.</p> <p>3. Essential of Business communication – Rajendra Pal and J.S Korlhall – Sultan Chand & Sons, New Delhi.</p> <p>Reference books:</p> <p>1. 1 Business correspondence & report writing – R.C.Sharma, Krishna Mohan – Tata Megraww Hill Publising Company Ltd, New Delhi.</p> <p>2. Business Communcation – K.K. Sinha – Galgotia Publishing Company, New Delhi.</p> <p>E – BOOKS & ONLINE RESOURCES</p> <p>https://www.skillsyouneed.com/ips/communication-skills.html</p> <p>http://103.5.132.213:8080/jspui/bitstream/123456789/1122/1/Communication%20Skills.pdf</p> <p>https://www.skillsyouneed.com/docs/communication-skills-PV.pdf</p> <p>NPTEL/ SWAMYAM/MOOCs: TECHNICAL ENGLISH FOR ENGINEERS (8 Weeks) Prof AYESHA IQBAL , Department of HSS, IIT MADRAS</p>												
<p>Teaching methodology Teacher/ student -Centered Approach to Learning, ICT Tools, Group Assignment, Case Study</p>												
<p>Course Outcomes: On completion of this course, students are able to:</p>												
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										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2.00		2.00	2.00	3.00		3.00
CO2						2.00		2.00	2.00	3.00		3.00
CO3						2.00		2.00	2.00	3.00		3.00
CO4						2.00		2.00	2.00	3.00		3.00
CO5						2.00		0.00	2.00	3.00		2.00
AVG						2.00		1.60	2.00	3.00		2.80

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
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
Prerequisite: Students should have the knowledge of 1. Ohms Law, Kirchhoff's Current and Voltage Law. 2. Fundamentals of AC and DC Circuits. 3. Basics of Magnetism. Course Learning Objectives: . 1. Understanding the concept and analysis of Single phase and Three phase AC circuits. 2. Study of construction and performance analysis of single phase transformer. 3. Study of construction and working principle of DC machines 4. Study of construction and working principle of Three phase AC Machines. 5. Study of Power Generation stations, Tariff, measuring instruments and electric safety measures.			
MODULE-I AC Circuits: Single Phase Circuits: AC terminologies, Analysis of R,L,C,R-L Series 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.			9 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. (Numerical related to EMF equation and Efficiency)			9 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. (Numerical on Torque & Voltage Equations)			8 Hours
MODULE-IV Three Phase AC Machines: Alternator: Principle of operation, types and constructional features, EMF equation of alternator.(Excluding the winding factors derivation) Numerical on EMF equation. Three phase Induction Motor: Construction, concept of rotating magnetic field, principle of operation, Star – Delta starter.(Numerical on Slip calculations only).			8 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).			7 Hours
Question paper pattern: Total ten questions will be asked, two from each module. The student has to answer five questions, selecting at least one from each module.			
Reference books: <ol style="list-style-type: none"> 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. 4. B L Theraja & A K Theraja "ABC of Electrical Engineering", 2nd edition. 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. 7. R.V. Srinivasa Murthy "Basic Electrical Engineering" Sanguine Technical Publisher 2004. E- 			
Course Outcomes: On completion of this course, students are able to:			
Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:	
	CO1	State, illustrate electric circuits and solving the Networks	
21EE14/24	CO2	State, illustrate magnetic circuit, solving the networks and identify the parts, explain the construction, working and examine the performance of Transformer.	
	CO3	Identify the parts, explain the construction, working and examine 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.	

Computer Aided Engineering Drawing (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21ME15/25	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	2-0-2	Total Marks	100
Contact Hours	28 (THEORY) + 28 (PRACTICAL)	Exam Hours	03
Course Learning Objectives: <ol style="list-style-type: none"> 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.			2 Hours Practical
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 of position method only. (No problems on punched plates and composite plates).			8 Hours Theory+ 6 Hours Practical
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).			8 Hours Theory+ 8 Hours Practical
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).			6 Hours Theory+ 6 Hours Practical

<p align="center">MODULE-V</p> <p>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.</p>		<p>6 Hours Theory+ 6 Hours Practical</p>															
<p>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</p> <p>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.</p> <p>Online resources: NPTEL/SWAYAM/MOOCs:</p>																	
<p>The topic or concept-wise pedagogy (Teaching Methodology) of the curriculum shall be specified in the content.</p> <p>Question paper pattern: 1. Module -1 is only for practice and not for examination. 2. The answer sheets will have to be jointly evaluated by the Internal & External examiners. 3. A maximum of THREE questions will be set as per the following pattern (No mixing of questions from different Modules). 4. Examination can be conducted in parallel batches, if necessary.</p>																	
<table border="1"> <thead> <tr> <th>Q No</th><th>From Chapters</th><th>Marks Alloted (SEE)</th></tr> </thead> <tbody> <tr> <td>1</td><td>Module 2 (Choice between Points+St lines or Planes)</td><td>15</td></tr> <tr> <td>2</td><td>Module 3</td><td>20</td></tr> <tr> <td>3</td><td>Module 4 or Module 5</td><td>15</td></tr> <tr> <td align="right" colspan="2">Total</td><td>50</td></tr> </tbody> </table>			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
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2	Module 3	20															
3	Module 4 or Module 5	15															
Total		50															
<p>Course Outcomes: On completion of this course, students are able to:</p>																	
<table border="1"> <thead> <tr> <th>Course Code</th><th>CO #</th><th>Course Outcome (CO): At the end of the course student will be able to:</th></tr> </thead> <tbody> <tr> <td rowspan="5">21ME15/25</td><td>CO1</td><td>Produce computer generated drawings using CAD software.</td></tr> <tr> <td>CO2</td><td>Apply the knowledge of orthographic projections (Points, St lines and planes).</td></tr> <tr> <td>CO3</td><td>Students will be able to visualize and draw projections of solids.</td></tr> <tr> <td>CO4</td><td>Students will be able to visualize and draw development of Lateral Surfaces of</td></tr> <tr> <td>CO5</td><td>Create isometric drawings of simple objects reading the orthographic project objects 3D drawings.</td></tr> </tbody> </table>			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.	
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	3	2	2		3							2	
CO2	3	2	2		3							2	
CO3	3	2	2		3							2	
CO4	3	2	3		3							3	
CO5	3	2	3		3							3	
AVG	3	2	2		3							2	

BASIC ELECTRONICS (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21EC17/27	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	4-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
Course objectives: This course will enable students to: <ul style="list-style-type: none"> • 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 • Equipped with the knowledge provided in this course can design and develop electronic circuits 			
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.			9Hours
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.			9 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,superhetrodyne AM receiver. Op-Amp Applications: Op-Amp basics, practical op-amp circuit (Inverting , Non Inverting, summer , integrator and Differentiator.)			8 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.			8 Hours
MODULE-V Electronic System: Block diagram of instrumentation system, Transducer: Strain Gauge, LVDT, Oscilloscope (CRO), CRO based measurements, Displays, Signal Generator case study: remote control and PA Systems.			8 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

Question paper pattern:

- The question paper will have ten questions.
 - Each full question consists of 20marks.
 - There will be 2 full questions (with a maximum of four sub questions) from each module.
 - Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Course Outcomes: On completion of this course, students are able to:

Course Code	CO	Course Outcome (CO): At the end of the course student will be able to:
21MA11	CO1	Understand the basics of semiconductor devices and their applications.
	CO2	Analyze biasing technique of JFET and MOSFET and their applications as a s amplifier and oscillator.
	CO3	Understand different modulation techniques and working of receiver circuit. A working of Op amp And it's Applications.
	CO4	To study number base conversion, understand laws of Boolean algebra, working different logic gates.
	CO5	Understand the working of different transducers and use a CRO as a measuring instrument.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3									2
CO2	3	3	2									2
CO3	3	3	2									2
CO4	3	2	2									2
CO5	3	2	2									2
AVG	3	2.4	2.2									2

: 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
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours	28	Exam Hours	03

Course Objectives:

1. Characteristics of diode and conductivity of semiconductor
2. Information of impedance, identify 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 dependence of resistivity.
5. Elastic properties of 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

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

Module

Module 3
Module 3
Module 4
Module 5
Module 1
Module 1
Module 1
Module 1 and
Module 5
General physics
General physics
Module 4
General physics
General physics
Module 3
Module 3

Reference Books:

<u>Sl No</u>	<u>Title</u>	<u>Author/s/ Editor</u>	<u>Publishers</u>
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 equipment and collecting data.
	CO3	Determine the properties on optics, electrical, electronics, modern physics and 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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2							1			2
CO2	3	3							3			
CO3	3	2		2					1			1
CO4	3	2							2			1
CO5	3	3								3		
AVG	3	2.4		2					1.75	3		1.333

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
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours		Exam Hours	03

Sl.No.	List of Experiments
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:
	CO1	Apply Kirchhoff's law for the analysis of DC circuits.
	CO2	Illustrate two ways control lamp and tube light connections.

21EEL12/2 2	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 load.

Course Articulation Matrix for the Academic Year 2021-22

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	3	3				3						1	
CO2	3	3											
CO3	3	3										1	
CO4	3	3				3						1	
CO5	3	3				3						1	
AVG	3	3				3						1	

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
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03

Course Learning Objectives: This course (21MA21) 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.

<p align="center">MODULE-I</p> <p align="center">Ordinary differential equations(ODE's)of first order:-</p> <p>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.</p>	8 Hours
<p align="center">MODULE-II</p> <p align="center">Ordinary Differential Equations (ODE's) of higher order:-</p> <p>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.</p>	9 Hours
<p align="center">MODULE-III</p> <p align="center">Partial Differential Equations(PDE's):-</p> <p>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.</p> <p>Application of Partial Differential Equations(PDE's):-</p> <p>Introduction, derivation of one dimensional wave equation and heat equation, various possible solutions of one dimensional wave equation and heat equation and Laplace equation by the method of separation variables and examples.</p>	9 Hours
<p align="center">MODULE-IV</p> <p align="center">Vector Calculus:-</p> <p>Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; divergence and curl physical interpretation; solenoidal and irrotational vector fields-Illustrative problems.</p> <p>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.</p>	8 Hours
<p align="center">MODULE-V</p> <p align="center">Laplace Transformations:</p> <p>Defination, Transforms of elementary functions. Laplace transform of Derivatives and</p>	8 Hours

integrals and problems, periodic function and Unit step function- Illustrative problems. Inverse Laplace transforms, properties - Illustrative problems, Solution of linear differential equations.	
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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://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 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 this course, students are able 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 exact methods 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, surface and volume integrals.										
	CO5	Apply the knowledge of Laplace transform and inverse Laplace transform to solve differential equations.										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1										1
CO2	3	1										1
CO3	3	2										1
CO4	3	1										1
CO5	3	1										1
AVG	3	1.2										1
Method of Examination: Note:- The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 50. <ul style="list-style-type: none"> The question paper will have ten full questions carrying equal marks. Each full question carries 20marks. There will be two full questions (with a maximum of four sub questions) from each module. Each full question will have sub question covering all the topics under a module. The students will have to answer five full questions, selecting one full question 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
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam 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 correlate 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 Nernst 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-MnO ₂ and Ni – Metal Hydride battery Pedagogy: Chalk and talk method, power point presentation, solar Energy and Fuel cells, Handouts Self-Study Material: Recycling of Lithium-ion batteries			9 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 Nickel Self-Study Material: Electrochemical series, Organic coatings: paint, components of paints and their functions. Varnish, definition, differences between paints and varnishes.			8 Hours
MODULE-III POLYMER TECHNOLOGY			9 Hours

<p>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 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.</p> <p>Pedagogy: Chalk and talk method, power point presentation,</p> <p>Self-Study Material: Importance and disadvantages of non-biodegradable polymers, composites and nanomaterials.</p>	
<p style="text-align: center;">MODULE-IV FUELS & BATTERY TECHNOLOGY</p> <p>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 H₂ – O₂ and Me – alcohol – O₂ (CH₃OH-O₂) cells.</p> <p>Pedagogy: Chalk and talk method, power point presentation, videos on Knocking, Working of fuel cells. Solar cells. Handouts.</p> <p>Self-Study Material: Construction and working of Dry battery.</p>	8 Hours
<p style="text-align: center;">MODULE-V <u>INSTRUMENTAL METHODS, WATER and WASTE MANAGEMENT</u></p> <p>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.</p> <p>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.</p> <p>Pedagogy: Chalk and talk method, power point presentation, Handouts</p> <p>Practical Topic: Conductometric titration of mixture of acids potentiometric estimation of FAS, Colorimetric estimation of copper,</p> <p>Self-Study Material: Principles of titrimetric analysis, requirement of titrimetric analysis, Classification of titrimetric analysis, Instrumental methods of analysis. Definitions of normality, molarity,ppm.</p>	8 Hours
<p>Text Books: Engg.Chemistry by R V Gadag and Nityanand Shetty Engg.Chemistry by J C Kuriacose and J Rajaram</p> <p>Reference books:</p> <ol style="list-style-type: none"> 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 this course, students are able 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 the electrochemical process and apply the concept of electrochemistry in industrial water electrolysis, electrolysis and electrosynthesis.										
	CO2	Detect type of corrosion & apply appropriate method for managing corrosion in industries.										
	CO3	Differentiate modern chemical method of synthesis of polymer and their applications .										
	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 .										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										
CO2	3	2										
CO3	3	2										
CO4	3	2										
CO5	3	2										
AVG	3	2										
Question paper Pattern : 1. Each module will have two questions covering the syllabus 2. Each question consists of sub divisions (maximum four) and maximum marks is 20 3. Students have to answer one full question from each module.												

<p align="center">TECHNICAL ENGLISH - II (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)</p>			
Course Code	21HU23	CIE Marks	50
Credits	02	SEE Marks	50
Contact Hours/Week (L-T-P)	2-0-0	Total Marks	100
Contact Hours	28	Exam Hours	02
<p>Course Learning Objectives: To enable the students to obtain the basic knowledge about oral Communication Skills - II in the following topics:-</p> <ul style="list-style-type: none"> . Meaning, Principles, Barriers and modes of Oral communication. . Developing Presentation skills . Learn Group Communication. . Learn Employment communication.. . Developing interpersonal communication skills 			
<p align="center">MODULE-I ORAL COMMUNICATION:</p> <p>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.</p>			5 Hours
<p align="center">MODULE-II PRESENTATION SKILLS :</p> <p>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</p>			6 Hours
<p align="center">MODULE-III GROUP COMMUNICATION :</p> <p>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.</p>			6 Hours
<p align="center">MODULE-IV EMPLOYMENT COMMUNICATION :</p> <p>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</p>			6 Hours
MODULE-V			

INTERPERSONAL COMMUNICATION SKILLS :												5 Hours																																																																																																		
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.																																																																																																														
Pre requisites: None																																																																																																														
Teacher/ student -Centered Approach to Learning, ICT Tools, Group Assignment, Case Study																																																																																																														
Pattern of question paper																																																																																																														
Solve all five full questions selecting atleast one question from each module																																																																																																														
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																																																																																																														
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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 this course, students are able to:																																																																																																														
<table><tr><td>Course Code</td><td>CO #</td><td colspan="11">Course Outcome (CO): At the end of the course student will be able to:</td></tr><tr><td rowspan="5">21HU23</td><td>CO1</td><td colspan="11">Explain about basic of oral Communication</td></tr><tr><td>CO2</td><td colspan="11">Develop presentation skills.</td></tr><tr><td>CO3</td><td colspan="11">Learn group communication</td></tr><tr><td>CO4</td><td colspan="11">Learn Employment communication</td></tr><tr><td>CO5</td><td colspan="11">Develop interpersonal communication skills</td></tr></table>													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																																		
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12																																																																																																		
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CO2						2.00		2.00	2.00	3.00		3.00																																																																																																		
CO3						2.00		2.00	2.00	3.00		3.00																																																																																																		
CO4						2.00		2.00	2.00	3.00		3.00																																																																																																		
CO5						2.00		2.00	2.00	3.00		2.00																																																																																																		
AVG						2.00		2.00	2.00	3.00		2.80																																																																																																		

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
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
Course Learning Objectives: <ul style="list-style-type: none"> 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.			8 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.			8 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.			9 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.			9 Hours
MODULE-V Structures and Unions: Initialization. Defining a Structures, Declaration of Structure			8 Hours

variables, Accessing Structure Members, Structure Initialization, Copying and comparing 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.		
Question paper pattern: The question paper will have ten questions. There will be 2 questions from each module, covering all the topics from a module. The students will have to answer 5 full questions, selecting one full question from each module. Text Books: 1. E. Balagurusamy, “Programming in ANSI C”, Tata Mcgraw Hill Education Private Limited– V Edition, 2016 Reference books: 1. 1E Balagurusamy, Computing Fundamentals and C Programming, McGraw-Hill Education, Reprint 2 nd 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. E-Books and Online resources:		
Course Outcomes: On completion of this course, students are able to:		
Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:
21CS14/24	CO1	Develop Algorithm and flowcharts and understand the different data types and in C language
	CO2	Identify and use proper decision /control constructs for solving different type 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

MECHANICAL ENGINEERING SCIENCE (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)				
Course Code	21ME16/26	CIE Marks	50	
Credits	03	SEE Marks	50	
Contact Hours/Week (L-T-P)	2-0-2	Total Marks	100	
Contact Hours	(28H.Theory+28H .Practical)	Exam 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 steam 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 thermodynamics: Laws of thermodynamics.				5 Hours Theory
MODULE-II Properties of steam: Formation of steam at constant pressure (temperature enthalpy diagram). Use of steam tables to calculate enthalpy, internal energy etc (simple problems).				8 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.				7 Hours Theory+ 12 Hours 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 milling machine, classification of milling machine.				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. Computer Numerical Control (CNC): Introduction components of CNC,open loop and closed loop systems, advantages of CNC,CNC machining centers and turning centers. Robots: Robot anatomy, joints and links, common robot configurations. Applications of robots in material handling, processing and assembly and inspection.				8 Hours Theory
Text Books:				

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.

Question paper pattern:

1. Total of Ten Questions with two from each MODULE to be set covering the entire syllabus.
2. Five full questions are to be answered choosing at least one from each MODULE.
3. Each question should not have more than 4 sub divisions.

Course Outcomes: On completion of this course, students are able to:

Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:
21ME16/26	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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1					3					2
CO2	3	3										
CO3	3	3	1				3					1
CO4	3	2	2				1					2
CO5	3	2	1				1					2
AVG	3	2.2	1.3				2					1.75

<p align="center">ENGINEERING MECHANICS (Common to all branches) [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)</p>			
Course Code	21CV17/27	CIE Marks	50
Credits	03	SEE Marks	50
Contact Hours/Week (L-T-P)	3-0-0	Total Marks	100
Contact Hours	42	Exam Hours	03
<p>Prerequisite: Physics and Mathematics</p> <p>Course Learning Objectives:</p> <p>To enable the Student to acquire the knowledge in the following topics</p> <ol style="list-style-type: none"> 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			8 Hours
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 of forces, Application based numerical examples			
MODULE-II			9 Hours
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			
MODULE-III			8 Hours
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			
MODULE-IV			9 Hours
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			
MODULE-V			8 Hours
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			

Question paper pattern:

Two questions to be set from each Module by intermixing (in total 10). Students have to answer any five full questions by selecting one question from each module.

Text Books:

1. S.S.Bhavikatti, "Elements of civil engineering", Vikas publishing house 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. Timoshenko and Young, "Engineering Mechanics", McGraw Book Company, New Delhi.
2. Ferdinand P. Beer and E. Russell Johnston Jr., "Mechanics for Engineers: Statics" McGraw Book Company, New Delhi.
3. K.L. Kumar, "Engineering Mechanics", Tata-McGraw-Hill Publishing company, New Delhi.

E-Books 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 this course, students are able to:

Course Code	CO	Course Outcome (CO): At the end of the course student will be able to:											
21CV17/27	CO1	Determine the resultant of coplanar concurrent force system											
	CO2	Determine the resultant of non-concurrent force system and analyze 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											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	3	3										3	
CO2	3	3										3	
CO3	3	3										2	
CO4	3	3										3	
CO5	3	3										3	
AVG	3	3										2.8	

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
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours	28	Exam Hours	03
Course Learning Objectives: To enable the students to obtain the knowledge of Engineering Chemistry Practical in the following topics. <ul style="list-style-type: none"> Hardness Determination Analysis of alloy, metal and cement Determination of COD Estimation of strength of acids 			
<p style="text-align: center;">PART-A</p> <ol style="list-style-type: none"> Determination of total hardness of water using standard EDTA Determination of percentage of copper in brass Determination of iron using internal indicator method Determination of COD of waste water Determination of chloride in water by precipitation method <p style="text-align: center;">PART – B</p> <ol style="list-style-type: none"> Potentiometric method of estimating iron Colorimetric determination of copper Conductometric estimation of acid (HCl) using standard NaOH. Determination of dissociation constant (pKa) of weak acid. 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. 2. Practical's of physical Chemistry by J. B. Yadav			
Examination Pattern : 1. Students have to perform two experiments one from part-A and one from part-B			
Course Outcomes: On completion of this course, students are able 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)	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	3	2											
CO2	3	2											
CO3	3	2											
CO4	3	2											
CO5	3	2											
AVG	3	2											

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
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours	28	Exam Hours	03
Prerequisites: NIL			
<ul style="list-style-type: none"> Course Learning Objectives: Develop C programs using appropriate data type, control / decision statement. Learn the usage files and structures to solve real-life applications. 			
List of Programs			
Part A			
<ol style="list-style-type: none"> Write a C program to print "Hello world" Write a C Program to input integer, float and character values using one scanf() Statement in C <u>printf() examples/variations in C</u> Write a C program to find Sum, difference, product, quotient and remainder of two integer numbers <u>C program to swap two numbers using four different methods</u> Write a C program to print ASCII value of a character Write a C program to calculate area of different shapes like triangle, Rectangle, square. <u>Program to check whether number is EVEN or ODD</u> <u>Program to calculate simple interest</u> <u>Program to find largest number among three numbers</u> <u>C program to convert temperature from Fahrenheit to Celsius and vice versa</u> <u>C program to calculate X^N (X to the power of N) using pow function</u> <u>C program to calculate HCF of two numbers</u> <u>C program to print value in Decimal, Octal, Hexadecimal using printf</u> Write a C program to print all Numbers from 1 to N using goto statement. Write a C program to input an integer value and print with padding by Zeros in C. Write a C program to input individual Characters using scanf() in C. <u>C program to check a given character is an uppercase character or not without using the library function</u> Write a C program to read the content of a file using getc() function Write a C program to declare, initialize an union ,example of union 			
PART B			
<ol style="list-style-type: none"> Write a C program to find the roots of a quadratic equation using if else statement. <ol style="list-style-type: none"> 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. Write a C program to find Fibonacci series using do-while Write a C program to find sum of series (Natural numbers/Factorial of numbers of all natural numbers) from 1 to N using for loop. Series:1/1!+2/2!+3/3!+4/4!.....N/N! 			

<p>4. Write a C program to print following pyramid using for loop</p> <pre> 1 123 12345 1234567 123456789 </pre> <p>5. a. Write a C program to check whether a character is VOWEL or CONSONANT using switch b. Write a C program to calculate area of different shapes like square, rectangle, triangle using switch.</p> <p>6. Write a C program to find a smallest and Largest element in a one dimensional array.</p> <p>7. Write a C program to perform linear search and find position using array.</p> <p>8. Write a C program to read a Matrix, Print diagonal elements and find sum of diagonals.</p> <p>9. Write a C program to count the number of lines, words, character in a given text</p> <p>10. 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</p> <p>11. Write a C program to find largest element using pointers and functions</p> <p>12. Write a C program to pass 2D array to a function and find product of two Matrices</p> <p>13. Write a C program to perform conversion of decimal number to binary number using recursive function.</p> <p>14. Consider the details of N faculty details consisting of Name, Employee Id, Department, address & salary. Create a file to store the above details. Retrieve the contents of file to perform the following details as</p> <p>i) Display the details of the faculty based on salary range entered.</p> <p>ii) Display the details of faculty based on employee id entered.</p> <p>iii) Write a C program to input a Domain name of email id and search for the same in the file, contact.txt, and update the existing email id with new one.</p>		
<p>Note:</p> <p>1. All the programming exercises shall be conducted using C programming language under UBUNTU Operating System.</p> <p>2. Part A programs for Practice.</p> <p>3. Part B Programs for SEE</p>		
Course Outcomes: On completion of this course, students are able 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 control / decision sta given problem
	CO2	Develop C programs to solve computational problems using Strings and Arrays.
	CO3	Develop application using pointer.
	CO4	Implement modular programming and user defined data types
	CO5	Develop solutions for real world problems using file operations

Course Title : 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	21AE191/291	CIE Marks	100	
Credits	01	SEE Marks		
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100	
Contact Hours	14	Exam Hours	03	
Course Learning Objectives: Understand the basic concept and structure of Computer hardware. 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.				3 Hours
MODULE-II 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.				2 Hours
MODULE-III Chipsets Function,Types and Features. Buses- System bus architectureimportance 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 motherboard. 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.				3 Hours
MODULE-IV 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, PCIe. Symptoms of SMPS failure: Common problems from a faulty SMPS, Trouble shooting Power supplies.				3 Hours
MODULE-V Windows 8 /10 OS Installation: 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.				3 Hours

Course Outcomes: On completion of this course, students are able to:		
Course Code	CO	Course Outcome (CO)
21AE191	CO1	Familiarize the Functional components of Motherboard
	CO2	Develop understanding of the I/O devices and Interfaces
	CO3	Identify the various Chipsets, Memory, RAM Technology Mass storage media
	CO4	Understand the features of Power supplies and troubleshoot of SMPS failure
	CO5	Install the Windows 8 /10 OS Installation

<p align="center"> Course Title : 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) </p>			
Course Code	21AE192/292	CIE Marks	100
Credits	01	SEE Marks	
Contact Hours/Week (L-T-P)	0-0-2	Total Marks	100
Contact Hours	14	Exam Hours	
Prerequisite: NIL Course Learning Objectives: : To enable the students to obtain the knowledge of System and Database Administrator in the following topics. <ul style="list-style-type: none"> • 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.			3 Hours
MODULE-II			
Managing the files, maintaining the drive status, and monitoring the disk files.			3 Hours
MODULE-III			
Fundamentals of database: Introduction to database, securing the database.			2 Hours
MODULE-IV			
Microsoft access and Excel, dealing with formulas, maintain and managing the data in table format,			3 Hours
MODULE-V			
Data presentation: Introduction to graphs, presenting the data using power point and web tools.			3 Hours
Question paper pattern: <ol style="list-style-type: none"> 1. The question paper will have TEN questions. 2. There will be TWO questions in each module, covering all the topics. The student need to answer FIVE full questions, selecting ONE full question from each module.			
Text books: 1.Essential System Administration, by by Aeleen Frisch, 3rd Edition			
Reference Books: <ol style="list-style-type: none"> 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 this course, students are able to:			
Course Code	CO	Course Outcome (CO)	
21AE192	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	

Course Title : Electrical Safety (Ability Enhancement Course) Common to all [As per Choice Based Credit System (CBCS) scheme] (From the academic year 2021-22)			
Course Code	21AE193/293	CIE Marks	100
Credits	01	SEE Marks	
Contact Hours/Week (L-T-P)	2-0-0	Total Marks	100
Contact 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 power lines, Never touch big, metal transformer boxes with warning signs, Obey warning signs			3 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.			3 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”. Always be observant of such signs and follow the safety rules established by the electrical code followed by the country you’re in.			3 Hours

6. 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: <ol style="list-style-type: none"> 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. 			3 Hours
MODULE-V Video Presentations on Electrical Safety.			3 Hours
Question paper pattern:: Total ten questions will be asked. Two from each module. The student has to answer five questions, selecting at least one from each module.			
Text books: 1. Essential System Administration, by by Aeleen Frisch, 3rd Edition			
Reference Books: <ol style="list-style-type: none"> 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 this course, students are able to:			
Course Code	CO	Course Outcome (CO)	

21AE193	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

SWAYAM Courses (Ability Enhancement Course) Common to all

Sl No.	Course Title	Course Code	Duration	Credits	Category	Level	Website
1	Innovation by Design	21AE194/294	04 Weeks	01	Multidisciplinary	Undergraduate	https://swayam.gov.in/
2	Leadership	21AE195/295	04 Weeks	01	Management Studies	Undergraduate	https://swayam.gov.in/
3	Awareness Programme on solar water pumping System(Upcoming)	21AE196/296	04 Weeks	01	Agricultural and Food Engineering	Undergraduate	https://swayam.gov.in/

Note:-

1. The students are to be registered to one of these course using the link(<https://swayam.gov.in/>)
As per the schedule
2. The course certificate is to be submitted to the concerned after completion.