Course Structure and Syllabus for

B.Tech.

COMPUTER SCIENCE ANDENGINEERING

(ARTIFICIAL INTELLIGENCE AND

MACHINE LEARNING)

(Applicable for batches admitted from 2023-24)

DepartmentofComputer Science andEngineering

(Artificial Intelligence and Machine Learning)

DHANEKULA INSTITUTE OF ENGINEERING AND TECHNOLOGY

(An Autonomous, NAAC Accredited ISO 9001-2015 Certified Institution)

(ApprovedbyAICTE,AffiliatedtoJNTUK, Kakinada)

Ganguru, Vijayawada, AndhraPradesh-521139,INDIA.

www.diet.ac.in

DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning)

VISION – MISSION – PEOs

Institute Vision	Pioneering Professional Education through Quality
Institute Mission	Providing Quality Education through state-of-art infrastructure, laboratories and committed staff. Moulding Students as proficient, competent, and socially responsible engineering personnel with ingenious intellect. Involving faculty members and students in research and development works for betterment of society.
Department Vision	To empower students of Computer Science and Engineering Department to be technologically adept, innovative, global citizens possessing human values.
Department Mission	To Encourage students to become self-motivated and problem solving individuals. To prepare students for professional career with academic excellence and leadership skills. To Empower the rural youth with computer education. To Create Centre's of excellence in Computer Science and Engineering.
Program Educational Objectives(PEOs)	Graduates of Computer Science & Engineering will: **PEO1:** Excel in Professional career through knowledge in mathematics and engineering principles. **PEO2:** Able to pursue higher education and research. **PEO3:** Communicate effectively, recognize, and incorporate societal needs in their professional endeavors. **PEO4:** Adapt to technological advancements by continuous learning.

DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning)
POs/PSOs

PROGRAM OUTCOMES(PO's)

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

PROGRAM SPECIFIC OUTCOMES(PSO's)

PSO1: Have expertise in algorithms, networking, web applications and software engineering for efficient design of computer-based systems of varying complexity.

PSO2: Qualify in national international level competitive examinations for successful higher studies and employment.

B.Tech (CSE (AI&ML)) -COURSESTRUCTURE–DIET23
(Applicablefromthe academicyear2023-24onwards)

INDUCTIONPROGRAMME

S.No.	CourseName	Category	L-T-P-C
1	Physical Activities -- Sports, Yoga and Meditation,Plantation	MC	0-0-6-0
2	CareerCounselling	MC	2-0-2-0
3	Orientation to all branches -- career options, tools,etc.	MC	3-0-0-0
4	OrientationonadmittedBranch--correspondinglabs,tools and platforms	EC	2-0-3-0
5	ProficiencyModules&ProductivityTools	ES	2-1-2-0
6	Assessmentonbasicaptitudeandmathematicalskills	MC	2-0-3-0
7	RemedialTraininginFoundationCourses	MC	2-1-2-0
8	HumanValues&ProfessionalEthics	MC	3-0-0-0
9	Communication Skills -- focus on Listening,Speaking,Reading, Writing skills	BS	2-1-2-0
10	ConceptsofProgramming	ES	2-0-2-0

B.Tech.–IYearISemester

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Communicative English	2	0	0	2
2	BS&H	Chemistry	3	0	0	3
3	BS&H	Linear Algebra & Calculus	3	0	0	3
4	EngineeringScience	Basic Civil & MechanicalEngineering	3	0	0	3
5	Engineering Science	IntroductiontoProgramming	3	0	0	3
6	BS&H	CommunicativeEnglishLab	0	0	2	1
7	BS&H	ChemistryLab	0	0	2	1
8	Engineering Science	EngineeringWorkshop	0	0	3	1.5
9	EngineeringScience	ComputerProgrammingLab	0	0	3	1.5
10	BS&H	Healthandwellness, YogaandSports	-	-	1	0.5
		Total	**14**	**00**	**11**	**19.5**

B.Tech.–IYearIISemester

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Engineering Physics	3	0	0	3
2	BS & H	Differential Equations & Vector Calculus	3	0	0	3
3	Engineering Science	Basic Electrical and Electronics Engineering	3	0	0	3
4	Engineering Science	Engineering Graphics	1	0	4	3
5	Engineering Science	IT Workshop	0	0	2	1
6	Professional Core	Data Structures	3	0	0	3
7	BS&H	Engineering Physics Lab	0	0	2	1
8	Engineering Science	Electrical and Electronics Engineering Workshop	0	0	3	1.5
9	Professional Core	Data Structures Lab	0	0	3	1.5
10		NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
		Total	13	00	15	20.5

<h1 style="text-align:center; color:red;">COMMUNICATIVE ENGLISH</h1>

Course Category:	**BS**	Credits: 2		
Course Type:	**Theory**	Lecture-Tutorial-Practice:	2 0	0
Prerequisites	Basic reading skills	Continuous Evaluation		30M
		Semester End Evaluation		70M
		Total Marks		**100M**

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Employ suitable strategies for skimming and scanning to get a general idea of a text and locate specific information	Affective
CO2	Apply grammar rules to form sentences effectively	Affective
CO3	Use correct word forms to communicate effectively with enriching vocabulary	Affective
CO4	Recognize the theme of the given text and summarize and interpret the information	Affective
CO5	Report the information effectively in different formats using good writability	Affective

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								3	3	3				3
CO2								3	3	3				3
CO3								3	3	3				3
CO4								3	3	3				3
CO5								3	3	3				3

COURSE CONTENT:

UNIT-1: Lesson: **HUMAN VALUES: Gift of Magi** (Short Story)

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT-2: Lesson: **NATURE: The Brook** by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks. Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

UNIT-3: Lesson: **BIOGRAPHY: Elon Musk**

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs - tenses; subject-verb agreement; Compound words,

Collocations

Vocabulary: Compound words, Collocations

UNIT-4: Lesson: **INSPIRATION: The Toys of Peace by Saki**

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resume,E-mailwriting,Coverletter,SOP

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons

UNIT-5: Lesson: **MOTIVATION: The Power of Intrapersonal Communication** (An Essay)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension. Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargons

TEXT BOOKS:

1. Pathfinder: Communicative English for Undergraduate Students, 1 st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)
    1. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

REFERENCE BOOKS:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
    Bailey, Stephen. Academic writing: A Handbook for International   Students. Routledge, 2014.
2. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019
3. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:
    1. www.bbc.co.uk/learningenglish
    2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
    4. https://www.learngrammar.net/
    5. https://english4today.com/english-grammar-online-with-quizzes/
    6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

    1. https://www.youtube.com/c/DailyVideoVocabulary/videos
    2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

CHEMISTRY

Course Category:		BS	Credits: 3			
Course Type:	**Theory** / Tutorial /Practical		Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basic concepts of chemistry		Continuous Evaluation	30M		
			Semester End Evaluation	70M		
			Total Marks	100M		

Course Outcomes:

After Successful Completion of course,the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Illustrate Schrodinger wave equation to particle in a box and the molecular orbital energy level diagram of different molecular species	Applying
CO2	Explicate characteristics, preparation methods and applications of advanced materials (Semiconductors, Super conductors, supercapacitors and nano materials)	Applying
CO3	Describe the titrations, electrochemical sensors ,construction of cells and emf of cell	Applying
CO4	Elucidate polymerization techniques and identify suitable polymer material for a given engineering application.	Applying
CO5	Acquaint about principles, applications of analytical techniques(spectroscopy and chromatography)	Applying

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3													
CO3	3													
CO4	3													
CO5	3													

COURSE CONTENT:

UNIT-1: Structure and Bonding Models:

Fundamentals of Quantum mechanics, Schrodinger Wave equation, (without derivation) significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbital's of butadiene and benzene, calculation of bond order.

UNIT-2: Modern Engineering materials

Semiconductors – Introduction, basic concept (preparation semiconductors-Distillation, zone refining, czochralski crystal pulling method, ion implantation and cutting into chips), application

Super conductors-Introduction, basic concept (classification-type-I, type-II), applications.

Supercapacitors: Introduction, Basic Concept-Classification – Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nanoparticles

UNIT-3: Electrochemistry and Applications

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- Potentiometry titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygenfuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT-4: Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

UNIT-5: Instrumental Methods and Applications

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

TEXT BOOKS:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.

2.Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

REFERENCE BOOKS:

1.Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008

3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

E-RESOURCES/DIGITAL MATERIAL:

   (a) *https://moodle.net*

               https://libguides.reading.ac.uk/chemistry/e-resources

LINEAR ALGEBRA AND CALCULUS

Course Category:	BS		Credits: 3			
Course Type:	Theory / Tutorial		Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basics of Matrices, Differentiation & Integration. Convergence of a Series.		Continuous Evaluation	30M		
			Semester End Evaluation	70M		
			Total Marks	100M		

Course Objectives: To equip the students with standard concepts and tools at an intermediate to advancedlevel mathematics to develop the confidence and ability among the students to handlevariousreal-world problems and theirapplications.

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Test the Linear system's consistency and determine its solution.	4-Analyzing
CO2	Apply eigen values and eigen vectors to reduce a quadratic form to its canonical form.	3-Applying
CO3	Apply mean value theorems to obtain series expansions of single variable functions.	3-Applying
CO4	Utilize partial differentiation in optimizing multi variable functions.	3-Applying
CO5	Evaluate multiple integrals and find area / volume of bounded regions.	5-Evaluating

Note: K-Level is defined From Blooms Taxonomy

COURSE CONTENT:

UNIT-1:Matrices:

Rank of a matrix by echelon form, normal form.Cauchy–Binet formula (without proof).InverseofNon-singularmatricesbyGauss-Jordanmethod,Systemoflinearequations:Solvingsystem of Homogeneous and Non-Homogeneous equations by Gauss elimination method,Jacobiand Gauss Seidel Iteration Methods.

UNIT-2: Eigen values, Eigen Vectors and Orthogonal Transformation:

Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamiltontheorem(withoutproof),findinginverseandpowerofamatrixbyCayley-HamiltonTheorem, Quadratic forms andNatureoftheQuadraticForms,ReductionofQuadraticformtocanonicalformsby Orthogonal transformation.

UNIT-3: Calculus

MeanValueTheorems:Rolle'sTheorem,Lagrange'smeanvaluetheoremwiththeirgeometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin's theoremswithremainders(withoutproof), Problemsand applicationson theabovetheorems.

UNIT-4: PartialdifferentiationandApplications(MultivariableCalculus):

Functionsofseveralvariables:ContinuityandDifferentiability,Partialderivatives,totalderivatives,chainrule ,Taylor'sandMaclaurin'sseriesexpansionoffunctionsoftwovariables.Jacobians,Functionaldependence,m aximaandminimaoffunctionsoftwo variables,methodofLagrangemultipliers.

UNIT-5: Multipleintegrals (Multi variable Calculus):

Double integrals, triple integrals, change of order of integration, change of variables to polar,cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (bydoubleintegrals andtripleintegrals).

TEXT BOOKS:

[1] HigherEngineeringMathematics,B.S.Grewal,KhannaPublishers,2017, 44th Edition
[2] AdvancedEngineeringMathematics,ErwinKreyszig,JohnWiley&Sons,2018,10thEdition.

REFERENCE BOOKS:

(i) Engineering Mathematics-I (Linear Algebra and Calculus) by T.K.V. Iyengar et.al., S Chand and Company Ltd
(ii) ThomasCalculus,GeorgeB.Thomas,MauriceD.WeirandJoelHass,PearsonPublishers, 2018, 14thEdition.
(iii)AdvancedEngineeringMathematics,DennisG.ZillandWarrenS.Wright,JonesandBartlett,2018.
(iv)AdvancedModernEngineeringMathematics,GlynJames,Pearsonpublishers,2018,5thEdition.
(v) AdvancedEngineeringMathematics,MichaelGreenberg,Pearsonpublishers,9thedition.

(vi) HigherEngineeringMathematics,H.KDas,Er.RajnishVerma,S.Chand   Publications,   2014,   Third
   Edition (Reprint 2021)

E-RESOURCES/DIGITAL MATERIAL:

(a) http://www.nptelvideos.com/mathematics/

(b) https://digimat.in/cgi-bin/search.cgi

BASIC CIVIL & MECHANICAL ENGINEERING

Course Category:	**Engineering Science (ES)**	Credits : 3		
Course Type:	**Theory**	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	-	Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	100M	

Course Outcomes:

	After successful completion of course, the student will be able to:	
CO No:	Course Outcome Description	K - Level
CO1	Understand various disciplines of Civil Engineering including the basic construction materials and building elements.	K-2
CO2	Interpret the basic concepts of surveying and types and applications of soils, foundations and geosynthetics.	K-2
CO3	Realize the importance of Transportation in nation's economy and that of Water Storage and its conservation.	K-2
CO4	Identify the scope and importance of Mechanical Engineering in different sectors and industries	K-2
CO5	Understand the different manufacturing processes and explain the basics of thermal engineering and its applications	K-2
CO6	Describe the working of different mechanical power transmission systems and power plants and basics of robotics and its applications.	K-2

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

CO No.	PO1	PO	PO	PO4	PO	PO6	PO7	PO	PO	PO	PO	PO	PSO	PSO
CO1	3	-	-	-	-	2	-	2	-	-	-	-	2	2
CO2	3	2	-	-	-	2	-	2	-	-	-	-	2	2
CO3	3	-	-	-	-	3	2	2	-	-	-	-	2	2
CO4	3	2	-	-	-	-	-	-	-	-	-	2	3	2
CO5	3	2	-	-	-	-	-	-	-	-	-	2	3	2
CO6	3	2	-	-	-	-	-	-	-	-	-	2	3	2

COURSE CONTENT:

UNIT-1:

Basics of Civil Engineering: Role of Civil Engineers in society- Various disciplines of Civil Engineering- Structural Engineering, Geotechnical Engineering, Transportation Engineering, Hydraulics and Water Resources Engineering, Environmental Engineering (Scope of each discipline) - Building Construction and Planning: Construction Materials–Cement, Aggregates, Bricks, Cement concrete and Steel (physical properties, classification, and uses/applications only) – list of building elements.

UNIT-2:

Surveying: Objectives of Surveying - Horizontal Measurements - Angular Measurements- Introduction to Bearings - Levelling instruments used for levelling - Contour mapping.

Geotechnical Engineering: Soils (types, origin and distribution) - Foundations and Geosynthetics (types and their applications).

UNIT-3:

Transportation Engineering Importance of Transportation in Nation's economic development - Types of Highway Pavements - difference between Flexible and Rigid Pavements. Introduction to Harbours, Tunnels, Airports, and Railways (functions and components only)

Water Resources and Environmental Engineering: Introduction, Sources of water - Quality of water - Specifications - Introduction to Hydrology – Rainwater Harvesting - Water Storage and Conveyance Structures (introduction to Dams and Reservoirs - purpose and classification according to use).

UNIT-4:

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT-5:

Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – Working principle of a boiler IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT-6:

Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants.
Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.
Introduction to Robotics - Joints & links, configurations, and applications of robotics.
(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.)

TEXT BOOKS:

[1]. Basic Civil Engineering, M.S. Palanisamy, Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.

[2]. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:

1. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.

2. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

3. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.

4. Geotechnical Engineering, C. Venkataramaiah, New Age Publishers, 2021, 7th Edition.

5. Irrigation and Water Power Engineering - Dr. B. C. Punmia, Dr. Pande B.B. Lal, Er. A.K. Jain, Laxmi Publications, 2021, 17th Edition.

6. Highway Engineering, S.K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.

7. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

8. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.

9. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications

10. AppuuKuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I

11. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.

12. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

13. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.

14. A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.

E-RESOURCES/DIGITAL MATERIAL:

   a) https://archive.nptel.ac.in/courses/105/106/105106201/

   b) https://onlinecourses.nptel.ac.in/noc23_ce80/preview

INTRODUCTION TO PROGRAMMING

Course Category:	**Engineering Science (ES)**	Credits: 3			
Course Type:	**Theory**	Lecture-Tutorial-Practice:	3	0	0
Prerequisites:	Basics Mathematics, Logical thinking and basics of Computers	Continuous Evaluation		30M	
		Semester End Evaluation		70M	
		Total Marks		100M	

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Illustrate basics of computers, problem solving techniques and introduction to C programming	2
CO2	Develop C programs using control statements	3
CO3	Apply concepts like arrays and strings in C	3
CO4	Analyze pointer concepts, structures, unions in C	4
CO5	Examine functions and concepts of File I/O in C	4

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO3	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO4	-	3	-	-	-	-	-	-	-	-	-	-	3	3
CO5	-	3	-	-	-	-	-	-	-	-	-	-	3	3

COURSE CONTENT:

UNIT-1:

Introduction to Programming Languages, Basics of a Computer Program-Algorithms, flowcharts (Using DiaTool), pseudo code, Introduction to Compilation and Execution, Primitive Data Types, Variables and Constants, Basic Input and Output, Operators, Type Conversion and Casting, formatted IO,

Problem solving techniques: Algorithmic approach, Characteristics of algorithm, Example Programs

UNIT-2:

Control Structures: Simple sequential programs, Conditional Statements (if, if-else, if else ladder, Nested if, switch), Nesting, Loops (for, while, do-while), Break and Continue, Example Programs.

UNIT-3:

Arrays and Strings: Arrays indexing, Array Declaration and Initialization, programs with array of integers, two dimensional arrays, Introduction to Strings, String handling functions, Example Programs.

UNIT-4:

Pointers &User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, Dynamic Memory Allocation functions, User-defined data types-Structures and Unions, Example Programs.

UNIT-5:

Functions &File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, Recursion, modifying parameters inside functions using pointers, Arrays and Structures as parameters. Storage Class Modifiers, File Handling- Creation, Opening Modes, File IO

Textbooks:

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rdedition, 2011.
2. "The C Programming Language", Brian W.Kernighan and Dennis M.Ritchie, Prentice-Hall,

2015.

3. Schism's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996.

4. Let us C ,YaswanthKanetkar, 16th Edition, BPB Publication, 2020.

5. Programming in ANSI C, McGraw Hill, seventh edition by E.Balagurusamy .2017

Reference Books:

1.Programming in C, Reema The raja, Oxford,2016,2nd edition

2. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication, 2013

3. Problem solving using C , K Venugopal,3'd Edition, TMG Publication,2015

4. Anil B. Chaudhuri, "Flowchart and Algorithm Basics: The Art of Programming", Mercury Learning & Information, 2020.

5. Paul J. Dietel and Harvey M. Deitel, "C: How to Program", Prentice Hall, 8th edition (Jan 19, 2021)

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs01/preview

Websites:

- http://www.c4learn.com/
- http://www.geeksforgeeks.org/c/
- http://nptel.ac.in/courses/122104019/
- http://www.learn-c.org/
- https://www.tutorialspoint.com/cprogramming/

COMMUNICATIVE ENGLISH LAB

Course Category:	**BS**	Credits: 1		
Course Type:	**Lab**	Lecture-Tutorial-Practice:	0 0	2
Prerequisites	Basic understanding of LSRW Skills	Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	**100M**	

Course Outcomes:

	After Successful Completion of course, the student will be able to:	
CO No:	Course Outcome Description	K - Level
CO1	Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet	Cognitive
CO2	Speak fluently by practicing accent, rhythm, and intonation	Affective
CO3	Interact with others confidently on the phone or in person by using appropriate expressions	Psychomotor
CO4	Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction.	Psychomotor

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

CO		PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO1	PSO2
CO1								3	3	3				3
CO2								3	3	3				3
CO3								3	3	3				3
CO4								3	3	3				3

COURSE CONTENT:

1Vowels & Consonants

2. Neutralization/Accent Rules

3. Communication Skills & JAM

4. Role Play or Conversational Practice

5. Self-Introduction, Introducing others, Non-verbal communication

6. Group Discussions-methods & practice

7. Debates - Methods & Practice

8. PPT Presentations

9. Poster Presentation

 10. Interviews Skills

Suggested Software: • Walden Infotec

• Young India Films

Reference Books:
1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.

2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 2016

3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.

4. J. Sethi& P.V. Dhamija. A Course in Phonetics and Spoken English,

   (2nd Ed), Kindle, 2013

Web Resources: Spoken English:
1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1.   https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

CHEMISTRY LAB

Course Category:	BS/ES/PC/PE/OE/MC/SC	Credits :1.5			
Course Type:	Theory / Tutorial /Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Basic concepts of chemistry	Continuous Evaluation		30M	
		Semester End Evaluation		70M	
		Total Marks		100M	

Course Outcomes:

	After Successful Completion of course, the student will be able to:	
CO No:	Course Outcome Description	K - Level
CO1	Handle Conductivity meter, Colorimeter, Potentiometer, PH meter, and different types of spectrophotometers for analysis of materials using small quantities involved for quick and accurate results.	Applying
CO2	Carry out acid-base, complexometric, and redox titrations.	Applying
CO3	Prepare advanced materials like Bakelite, nanomaterials	Applying

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO1	PSO2
CO1	3								3					
CO2	3								3					
CO3	3								3					
CO4	3								3					
CO5	3								3					

COURSE CONTENT:

1. Measurement of 10Dq by spectrophotometric method
2. Conductometric titration of strong acid vs. strong base
3. Conductometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite
8. Verify Lambert-Beer's law
9. Wavelength measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of nanomaterials by precipitation method.
12. Estimation of Ferrous Iron by Dichrometry.
13. Determination of alkalinity of a sample containing Na_2CO_3 and $NaOH$.
14. Determination of temporary and permanent hardness of water using standard EDTA solution.
15. Estimation of calcium carbonate content in toothpaste.
16. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).
17. Determination of the concentration of acid in soft drinks (pH-metry method).

Note: Of the above experiments at-least 10 assessment experiments should be completed in a semester.

TEXT BOOKS:

[1]A Textbook of Quantitative Analysis, Arthur J. Vogel.

ENGINEERING WORKSHOP

CourseCategory:	**Engineering Science (ES)**	Credits: 1.5		
Course Type:	**Practical**	Lecture-Tutorial-Practice:	0 0 3	
Prerequisites	-	Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	100M	

Course Outcomes:

	After Successful Completion of course, the student will be able to:	
CO No:	Course Outcome Description	K - Level
CO1	Perform operations in carpentry, fitting, plumbing with appropriate tools	3
CO2	Develop prototypes with sheet metals	3
CO3	Perform electrical connections required for house wiring	3
CO4	design the patterns and core boxes for metal casting processes	3
CO5	Understand Arc Welding and Gas welding equipment for the fabrication of welded joints	3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-
CO2	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-
CO3	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-
CO4	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-
CO5	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-

COURSE CONTENT:

1. **Demonstration**: Safety practices and precautions to be observed in workshop.

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a. Half – Lap joint
   b. Mortise and Tenon joint
   c. Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a. Tapered tray
   b. Conical funnel

      c.   Elbow pipe

      d.   Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.

      a.   V-fit

      b.   Dovetail fit

      c.   Semi-circular fit

      d.   Bicycle tire puncture and change of two-wheeler tyre

5. **Electrical Wiring:** Familiarity with different types of basic electrical circuits and make the following connections.

      a.   Parallel and series

      b.   Two-way switch

      c.   Godown lighting

      d.   Tube light

      e.   Three phase motor

      f.   Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop:** Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

9. Basic repairs of Two-wheeler vehicle – Demonstration of working of two-wheeler vehicle and its repairs.

10. **3D Printing** - Demonstration on 3D Printing

Textbooks:

[1]. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.

[2]. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition

2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.

3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

E-Resources:

1.   https://archive.nptel.ac.in/courses/112/107/112107219/

COMPUTER PROGRAMMING LAB

Course Category:	**Engineering Science (ES)**	Credits: 1.5		
Course Type:	Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Basics Mathematics, Logical thinking and basics of Computers	Continuous Evaluation		30M
		Semester End Evaluation		70M
		Total Marks		100M

Course Outcomes:

	After Successful Completion of course, the student will be able to:	
CO No:	Course Outcome Description	K - Level
CO1	Solve simple programs using basic C programming concepts	3
CO2	Develop simple programs using control statements	3
CO3	Build program solutions using arrays and strings	3
CO4	Apply pointers concepts in programming	3
CO5	Apply structure and union, files concepts to use memory in programs.	3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	3	-	-	-	3	-	-	3	3	3
CO2	3	-	-	-	3	-	-	-	3	-	-	3	3	3
CO3	3	-	-	-	3	-	-	-	3	-	-	3	3	3
CO4	3	-	-	-	3	-	-	-	3	-	-	3	3	3
CO5	3	-	-	-	3	-	-	-	3	-	-	3	3	3

COURSE CONTENT:

Exercise 1: Familiarization with programming environment

 i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.

 ii) Exposure to Turbo C, gcc

 iii) Writing simple programs using printf(),scanf()

Exercise 2: Converting algorithms/flowcharts into C Source code.

 i) Sum and average of 3numbers

 ii) Conversion of Fahrenheit to Celsius and vice versa

iii) Simple interest calculation

Exercise 3: Simple computational problems using arithmetic expressions.

    i) Finding the square root of a given number

    ii) Finding compound interest

    iii) Area of a triangle using heron's formulae

    iv) Distance travelled by an object.

Exercise 4: Simple computational problems using the operator' precedence and associativity.

    i) Evaluate the following expressions.

        a. A+B*C+(D*E)+F*G

        b. A/B*C-B+A*D/3

        c. A+++B---A

        d. J= (i++) +(++i)

    ii) Find the maximum of three numbers using conditional operator.

    iii) Take marks of 5 subjects in integers, and find the total, average in float.

Exercise 5: Problems using control statements.

    i) Write a C program to find the max and min of four numbers using if-else.

    ii) Write a C program to generate electricity bill.

    iii) Find the roots of the quadratic equation.

    iv) Write a C program to simulate a calculator using switch case.

    v) Write a C program to find the given year is a leap year or not.

Exercise 6: Problems using control statements.

    i) Find the factorial of given number using any loop.

    ii) Find the given number is a prime or not.

    iii) Compute sine and cos series

    iv) Checking a number palindrome

    v) Construct a pyramid of numbers.

Exercise 7: Using arrays.

    i) Find the min and max ofa1-D integer array.

    ii) Perform linear search on 1D array.

    iii) The reverse of a1D integer array

    iv) Find 2's complement of the given binary number.

    v) Eliminate duplicate elements in an array.

Exercise 8: arrays and strings

    i) Addition of two matrices

    ii) Multiplication two matrices

iii) Sort array elements using bubble sort.

iv) Concatenate two strings without built-in functions.

v) Reverse a string using built-in and without built-in string functions.

Exercise 9: Pointers

i) Demonstrate dynamic memory allocation functions with example program.

Exercise 10: Structures and union

i) Write a C program to find the total, average of n students using structures.

ii) Write a C program to illustrate Union.

Exercise 11: Using functions.

i) Write a C function to calculate NCR value.

ii) Write a C function to find the length of a string.

iii) Write a C function to transpose of a matrix.

Exercise 12: Using Recursion Function

i) Write a recursive function to generate Fibonacci series.

ii) Write a recursive function to find the LCM of two numbers.

iii) Write a recursive function to find the factorial of a number.

Exercise 13: Simple functions using Call by reference, Dangling pointers.

i) Write a C program to swap two numbers using call by reference.

ii) Demonstrate Dangling pointer problem using a C program.

iii) Write a C program to copy one string into another using pointer.

iv) Write a C program to find no of lowercase, upper case, digits, and other characters using pointers.

Exercise 14: File handling

i) Write a C program to write and read text into a file.

ii) Copy the contents of one file to another file.

iii) Find no. of lines, words, and characters in a file.

TEXT BOOKS:

1. Programming in ANSI C, McGrawHill, seventh edition by E.Balagurusamy, 2017

2. Programming in C, Reema Thareja, Second Edition, OXFORD, 2016.

3. How to solve it by Computer, R. G. Dromey, and Pearson Education.

4. Let us C, YaswanthKanetkar, 17th Edition, BPB Publication,2020.

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India,

Second Edition, Pearson Education, 2015.

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE,2011

3. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication,2013

4. Problem solving using C, K Venugopal,3'd Edition, TMG Publication,2015

5. Anil B. Chaudhuri, "Flowchart and Algorithm Basics: The Art of Programming", Mercury Learning & Information, 2020.

6. Paul J. Dietel and Harvey M. Deitel, "C: How to Program", Prentice Hall, 8th edition (Jan 19, 2021)

E-RESOURCES/DIGITAL MATERIAL:

1. https://www.geeksforgeeks.org/c-programming-examples/
2. https://www.studytonight.com/c/programs/
3. http://www.w3schools.com/
4. http://www.learn-c.org/
5. https://www.tutorialsyoint.com/cprogramming/
6. https://www.hackerrank.com/
7. https://www.codechef.com/
8. https://www.topcoder.com/

HEALTH AND WELLNESS, YOGA AND SPORTS

Lecture – Tutorial:	0	Internal Marks:	10
Credits:	0.5	External Marks:	90

Prerequisites:

Course Objectives : The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

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

CO1	Understand the importance of yoga and sports for Physical fitness and sound health.
CO2	Demonstrate an understanding of health-related fitness components.
CO3	Compare and contrast various activities that help enhance their health.
CO4	Assess current personal fitness levels.
CO5	Develop Positive Personality.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1												
CO2												
CO3												
CO4												
CO5												

UNIT –I : Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:
   i) Organizing health awareness programmes in community
   ii) Preparation of health profile
Preparation of chart for balance diet for all age groups

UNIT –II : Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT- III : Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:
  i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
  Practicing general and specific warm up, aerobics
  ii) Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:
  1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
  2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
  3. Archie J. Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
  4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
  5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014

ENGINEERING PHYSICS

Course Category:	BS		Credits: 3			
Course Type:	Theory		Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basic concepts of Physics		Continuous Evaluation		30M	
			Semester End Evaluation		70M	
			Total Marks		**100M**	

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Distinguish the phenomena of Interference, Diffraction, Polarization and determine the wavelength of given light using these phenomena.	Analyzing
CO2	Analyze the crystalline structure by Bragg's X-ray diffractometer	Analyzing
CO3	Classify the magnetic materials and apply the magnetic, dielectric materials for given engineering applications	Analyzing
CO4	Calculate the energy of quantum particle at different energy levels.	Applying
CO5	Classify the semiconductors and identify the type of semiconductor using Hall effect	Analyzing

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3												
CO2	3	3												
CO3	3	3												
CO4	3	2												
CO5	3	3												

COURSE CONTENT:

UNIT-1: Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings, Determination of wavelength and refractive index. Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT-2: Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT-3: Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - Frequency dependence of polarization – General applications of dielectric materials

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro &Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT-4: Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical

conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT-5: Semiconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

TEXT BOOKS:

[1] A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.

[2] Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

[3] Applied Physics- Dr. D. Tirupathi Naidu, M. Veeranjaneyulu- VGS Techno Series, 2021.

REFERENCE BOOKS:

 (i) Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.

 (ii) Engineering Physics-P. K. Palanisamy, SCITECH publications, 2014.

 (iii) Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.

 (iv) Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010.

 (v)   Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

E-RESOURCES/DIGITAL MATERIAL:

    https://www.loc.gov/rr/scitech/selected-internet/physics.html

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Course Category:	BS	Credits: 3		
Course Type:	Theory / Tutorial	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basics of Differentiation, Integration& Vector Algebra	Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	100M	

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariablecalculus.
- Tofurnishthelearnerswithbasicconceptsandtechniquesatplustwoleveltoleadthemintoadvanced level by handlingvariousreal-world applications.

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Solve differential equations of first order and first degree and apply to various engineering fields.	3-Applying
CO2	Solve linear differential equations of higher order with constant coefficients and apply to various engineering fields.	3-Applying
CO3	Solve linear partial differential equations.	3-Applying
CO4	Find gradient, divergence and curl of point functions and apply gradient to find directional derivative.	3-Applying
CO5	Apply vector integral theorems to find work done and flux.	3-Applying

Note: K-Level is defined From Blooms Taxonomy

COURSE CONTENT:

UNIT-1: Differentialequationsoffirstorderandfirstdegree

Linear differential equations – Bernoulli's equations- Exact equations and equations reducibleto exact form.

Applications:Newton's Law of cooling – Law of natural growth and decay-Electricalcircuits.

UNIT-2: Linear differentialequationsofhigher order (Constant coefficients)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral (of $e^{ax}, sinax, cosax, x^m, e^{ax}V(x)$), Wronskian, Method of variation of parameters.

Simultaneous   linear   equations.
Applications: L-C-R Circuit, Simple Harmonic motion.

UNIT-3: Partial differential equations

IntroductionandformationofPartialDifferentialEquationsbyeliminationofarbitraryconstants   and
arbitrary   functions,   solutions   of   first   order   linear   equations   using
Lagrange'smethod.HomogeneousLinear Partialdifferentialequationswith constantcoefficients with the
RHS of the forms $e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n$.

UNIT-4: Vector differentiation

Scalar and vector point functions, vector operator Del, Del applied to scalar point functions - Gradient
- Applications of Gradient - Directional derivative, Del applied to vector point functions -Divergence
and Curl,vectoridentities.

UNIT-5: Vector integration

 Line   integral-circulation-workdone,Surfaceintegral-
flux,Green'stheoremintheplane(withoutproof),Stoke'stheorem(withoutproof),Volumeintegral,Divergen
cetheorem(withoutproof) andrelated problems.

TEXT BOOKS:

[1] HigherEngineeringMathematics,B.S.Grewal,KhannaPublishers,2017,44thEdition.

[2] AdvancedEngineeringMathematics,ErwinKreyszig,JohnWiley&Sons,2018,10thEdition.

REFERENCE BOOKS:

(vii)   Engineering Mathematics-II (Differential Equations and Vector Calculus) by T.K.V. Iyengar
      et.al., S Chand and Company Ltd.

(viii)   ThomasCalculus,GeorgeB.Thomas,MauriceD.WeirandJoelHass,PearsonPublishers,2018,   14th
      Edition.

(ix)AdvancedEngineeringMathematics,DennisG.ZillandWarrenS.Wright,JonesandBartlett,2018.

(x) AdvancedModernEngineeringMathematics,GlynJames,Pearsonpublishers,2018,5th Edition.

(xi)AdvancedEngineeringMathematics,R.K.JainandS.R.K.Iyengar,AlphaScienceInternationalLtd.,
      20215thEdition (9th reprint).

(xii)   HigherEngineeringMathematics,B.V.Ramana,McGraw HillEducation,2017.

E-RESOURCES/DIGITAL MATERIAL:

(a) http://www.nptelvideos.com/mathematics/

(b) https://digimat.in/cgi-bin/search.cgi

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Course Objectives

To expose to the field of electrical & electronics engineering, laws and principles of electrical/electronic engineering and to acquire fundamental knowledge in the relevant field.

Course Outcomes: After the completion of the course students will be able to

CO1. Describe fundamental laws, operating principles of motors/generators, MC/MI instruments (L2)

CO2. Demonstrate the working of electrical machines, measuring instruments and power generation stations. (L2)

CO3. Apply mathematical tools and fundamental concepts to derive various equations related to electrical circuits and machines. (L3)

CO4. Calculate electrical load and electricity bill of residential and commercial buildings. (L4)

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3												
CO2	3	3												
CO3	3	3												
CO4	3	2												
CO5	3	3												

COURSE CONTENT:

UNIT I DC & AC Circuits
DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.
AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period,frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peakfactor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Conceptof Impedance, Active power, reactive power and apparent power, Concept of power factor(Simple Numerical problems).

UNIT II Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT III Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops,Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricitytariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition

2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013

3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition

2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020

3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017

4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

Web Resources:

1. https://nptel.ac.in/courses/108105053

2. https://nptel.ac.in/courses/108108076

PART B: BASIC ELECTRONICS ENGINEERING

COURSE OBJECTIVES:

• To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

UNIT I SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator.

Amplifiers: Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND,and XOR.

Simple combinational circuits–Half and Full Adders. Introduction to sequential circuits, Flip flops.

Textbooks:

1. R. L. Boylestad& Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.

2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.

2. SantiramKal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.

3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version,

Pearson Education,2009.

End examination pattern:

i) Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.

ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.

iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

ENGINEERING GRAPHICS

Course Category:	**Engineering Science (ES)**	Credits : 3			
Course Type:	**Theory**	Lecture-Tutorial-Practice:	1	0	4
Prerequisites	Basic mathematics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Understand the principles of engineering drawing, including engineering curves, scales.	3
CO2	Draw orthographic projections of the points and projections of lines inclined to one principal plane & inclined to both the planes	3
CO3	Draw Orthographic projections of planes, solids (simple position and inclined to both the planes)	3
CO4	Explain principles behind development of surfaces and Sections of solids in simple position only.	3
CO5	Draw orthographic and isometric views of different parts.	3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	2	2	-	-	-	-	-	-	3	-	2	2	2	2
CO2	3	2	2	-	-	-	-	-	-	3	-	2	2	2	2
CO3	3	2	2	-	-	-	-	-	-	3	-	2	2	2	2
CO4	3	2	2	-	-	-	-	-	-	3	-	2	2	2	2
CO5	3	2	2	-	3	-	-	-	-	3	-	2	2	2	2

COURSE CONTENT:

UNIT I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general method, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

UNIT II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane, Projection of Solids with axis inclined to one reference plane.

UNIT IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT V

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views for simple solids.

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (*Not for end examination*).

TEXT BOOKS:

[1].N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

E-RESOURCES/DIGITAL MATERIAL:

a) https://nptel.ac.in/courses/112103019

b) https://archive.nptel.ac.in/courses/112/102/112102304/

Course Category:	**Engineering Science (ES)**	Credits: 1		
Course Type:	**Practical**	Lecture-Tutorial-Practice:	0	0	2
Prerequisites		Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	100M	

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Identify, assemble the components of a computer	3
CO2	Configure, evaluate, and select hardware platforms for the implementation and execution of computer applications, services and systems	3
CO3	Make use of tools for converting pdf to word and vice versa	3
CO4	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, FOSS, LaTeX	3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate,**3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO3	-	3	-	-	3	-	-	-	-	-	-	-	3	3
CO4	-	3	-	-	3	-	-	-	-	-	-	-	3	3

COURSE CONTENT:

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also, students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with Aviva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMware) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

Task5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMware) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva.

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally, students should demonstrate, to the instructor, how to access the websites and email. If there are no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task2: Web Browsers, Surfing the Web: Students customize their web browsers with the Leprosy settings, bookmarks, search toolbars and popup blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task3: Search Engines& Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active downloads to avoid viruses and/or worms.

Latex and Word

Task 1 – Word Orientation: The mentor needs to give an overview of Latex and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of Latex and MS office equivalents (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word– Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered: -Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered: -Formatting Styles, inserting table, Bullets and

Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task4: Creating a Newsletter: Features to be covered: -Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

Excel Orientation: The mentor needs stately the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel–Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, autofill, Formatting Text

Task 2: Calculating GPA -. Features to be covered: - Cell Referencing, Formulae in excel –average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

POWERPOINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, WordArt, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotted, notes etc.), and Inserting–Background, textures, Design Templates, Hidden slides.

AITOOLS –ChatGPT

Task1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing in complete sentences to see how the model completes them.

- Ex: Prompt: "Your area knowledge able AI. Please answer the following question: What is the capital of France?"

Task2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of ascend, and let the model generate their list of the content. This can be a fun way to brainstorm creative ideas.

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating up wards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'

TEXTBOOKS:

1. Computer Fundamentals, Anita Goal, Pearson India Education,2017
2. Introduction to PC Hardware Trouble Shooting Made Easy, Mike Meyers, McGraw Hill Education, 2017

REFERENCE BOOKS:

1. Comdex Information Technology course toolkit, VikasGupta, WILEY Dreamtech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dreamtech,2013,3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education,2012, 2nd edition.
4. PC Hardware-A Handbook, Kate J.Chase, PHI(Microsoft), 2004
5. LaTeX Companion, Leslie Lamport, PHI/Pearson. 2nd Edition.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfinsen and Ken Quamme. – CISCO Press, Pearson Education,3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan–CISCO Press, Pearson Education,3rd edition

<h1 style="text-align:center;color:red;">DATA STRUCTURES</h1>

Year & Semester: I- II

Course Category:	**Professional Core (PC)**	Credits: 3		
Course Type:	**Theory**	Lecture-Tutorial-Practice:	3 0 0	
Prerequisites	Introduction to Computers	Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	100M	

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.	2
CO2	Apply linked lists for dynamic data storage, demonstrating understanding of memory allocation	3
CO3	Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.	3
CO4	Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges	3
CO5	Develop novel solutions to small scale programming challenges involving data structures such as Trees. Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.	3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	2	2	-	-	-	-	-	-	-	-	2	2
CO2	-	-	3	3	-	-	-	-	-	-	-	-	3	3
CO3	-	-	3	3	-	-	-	-	-	-	-	-	3	3
CO4	-	-	3	3	-	-	-	-	-	-	-	-	3	3
CO5	-	-	3	3	-	-	-	-	-	-	-	-	3	3

COURSE CONTENT:

UNIT-1:

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort.

UNIT-2:

Linked Lists: Singly linked lists: representation and operations, doubly inked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists – Polynomial addition, multiplication, Sparse Matrix

UNIT-3:

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT-4:

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Circular Queues, Applications of Queue – FCFS Scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications

UNIT-5:

Trees: Introduction to Trees, Binary Search Tree–Insertion, Deletion & Traversal, Heap Tree, Heap Sort

Graphs: Introduction to Graphs, Graph Terminology, Graph Representation, Adjacency Matrix, linked list Representation.

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc

TEXT BOOKS:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2ndEdition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Shane, Susan Anderson-Freed, Silicon Press, 2008

REFERENCE BOOKS:

1. Algorithms and Data Structures: The Basic Tool box by Kurt Mehl horn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V.Aho, Jeffrey D.Ullman, and John E.Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivets, and Clifford Stein
5. Algorithms in C, Parts 15 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgwick

ENGINEERING PHYSICS LAB

Course Category:	**BS**	Credits: 1		
Course Type:	**Practical**	Lecture-Tutorial-Practice:	0 0	2
Prerequisites	Basic concepts of Physics and units of physical parameters	Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	100M	

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Examine the physical properties of light using interference, diffraction and polarization phenomena.	Applying
CO2	Determine the acceleration due to gravity and rigidity modulus of the material by pendulum methods.	Applying
CO3	Measure the frequency response by resonance using electrical method.	Applying
CO4	Demonstrate the magnetic and dielectric behaviour of materials	Applying
CO5	Analyze the characteristics of semiconducting materials	Applying

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3				3					
CO2	3				3				3					
CO3	3				3				3					
CO4	3				3				3					
CO5	3				3				3					

COURSE CONTENT:

List of Engineering Physics Experiments

1. Determination of radius of curvature of given plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Determination of acceleration due to gravity and radius of gyration by using compound pendulum.
4. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
5. Determination of frequency of electrically maintained tuning fork by Melde's experiment.
6. Determination of dielectric constant using charging and discharging method.
7. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
8. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
9. Determination of energy gap of a semiconductor using p-n junction diode
10. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

Additional Experiments:

11. Study frequency response of a LCR series resonance circuit.
12. Study the V-I characteristics of P-N junction diode.

References:

- A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

E-RESOURCES/DIGITAL MATERIAL

Web Resources

• www.vlab.co.in

•https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

Course Category:	**Engineering Science (ES)**	Credits : 1.5		
Course Type:	**Practical**	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Practical	Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	100M	

Course Objectives:

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Measure voltage, current and power in an electrical circuit. (L3)	
CO2	Measure of Resistance using Wheat stone bridge (L4)	
CO3	Discover critical field resistance and critical speed of DC shunt generators. (L4)	
CO4	Investigate the effect of reactive power and power factor in electrical loads. (L5)	

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3														
CO4														
CO5														

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc. Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter. Provide some exercises so that measuring instruments are learned to be used by the students.

Components:

2. Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.

2. Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of KCL and KVL

2. Verification of Superposition theorem

3. Measurement of Resistance using Wheat stone bridge

4. Magnetization Characteristics of DC shunt Generator

5. Measurement of Power and Power factor using Single-phase wattmeter

6. Measurement of Earth Resistance using Megger

7. Calculation of Electrical Energy for Domestic Premises

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition

2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013

3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Note: Minimum Six Experiments to be performed.

DATA STUCTURES LAB

Year & Semester: I- II

Course Category:	**Professional Core (PC)**	Credits: 1.5		
Course Type:	**Practical**	Lecture-Tutorial-Practice:	0 0 3	
Prerequisites	C Programming	Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	100M	

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	**Course Outcome Description**	**K - Level**
CO1	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.	**2**
CO2	Implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.	**3**
CO3	Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.	**3**
CO4	Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.	**3**
CO5	Develop scenarios where hashing is advantageous, and design hash-based solutions for specific problems.	**3**

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (**1**- Low, **2** – Moderate, **3** – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	3	-	-	-	-	-	-	-	-	3	3
CO2	-	-	3	3	-	-	-	-	-	-	-	-	3	3
CO3	-	-	3	3	-	-	-	-	-	-	-	-	3	3
CO4	-	-	3	3	-	-	-	-	-	-	-	-	3	3
CO5	-	-	3	3	-	-	-	-	-	-	-	-	3	3

List of Experiments:

Exercise1: Array Manipulation

i) Write a program to reverse an array.

ii) C Programs to implement the Searching Techniques– Linear & Binary Search

iii) C Programs to implement Sorting Techniques–Bubble, Selection, Insertion, Quick, Merge Sort

Exercise2: Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.

ii) Develop a program to reverse a linked list iteratively and recursively.

Exercise3: Linked List Applications

i) Create a program to detect and remove duplicates from a linked list.

ii) Implement a linked list to represent polynomials and perform addition.

iii) Implement a double-ended queue (Deque) with essential operations.

Exercise4: Double Linked List Implementation

i) Implement a doubly linked list and perform various operations to understand its properties and applications.

ii) Implement a circular linked list and perform insertion, deletion, and traversal

Exercise5: Stack Operations

i) Implement a stack using arrays and linked lists.

ii) Write a program to evaluate a postfix expression using a stack.

iii) Implement a program to check for balanced parentheses using a stack.

Exercise6: Queue Operations

i) Implement a queue using arrays and linked lists.

ii) Solve problems involving circular queues.

Exercise7: Stack and Queue Applications

i) Use a stack to evaluate an infix expression and convert it to postfix.

ii) Create a program to determine whether a given string is a palindrome or not.

Exercise8: Binary Search Tree

i) Implementing a BST using Linked List.

ii) Traversing of BST.

Exercise9: Hashing

i) Implement a hash table with collision resolution techniques.

ii) Write a program to implement a simple cache using hashing.

TEXTBOOKS:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2ndEdition.

2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Shane, Susan Anderson-Freed, Silicon Press, 2008

REFERENCE BOOKS:

1. Algorithms and Data Structures: The Basic Tool box by Kurt Mehlhorn and Peter Sanders

2. C Data Structures and Algorithms by Alfred V.Aho, Jeffrey D.Ullman, and John E.Hopcroft

3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum

4. Introduction to Algorithms by Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, and Clifford Stein

5. Algorithms in C, Parts15 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgwick

NSS/NCC/ Scouts & Guides/Community Service

Lecture – Tutorial:	0	Internal Marks:	10
Credits:	0.5	External Marks:	90
Prerequisites:			

Course Objectives: The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

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

CO1	Understand the importance of discipline, character and service motto.
CO2	Solve some societal issues by applying acquired knowledge, facts, and techniques.
CO3	Explore human relationships by analyzing social problems.
CO4	Determine to extend their help for the fellow beings and downtrodden people.
CO5	Develop leadership skills and civic responsibilities.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2-Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1												
CO2												
CO3												
CO4												
CO5												

UNIT –I : Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills

ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc.

iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.

iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT –II : Nature &

Care Activities:

i) Best out of waste competition.

ii) Poster and signs making competition to spread environmental awareness.

iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

UNIT- III : Community
Service Activities:

i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media- authorities- experts-etc.

ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
v) Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. Nirmalya Kumar Sinha &Surajit Majumder, *A Text Book of National Service Scheme* Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.