University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus

Institute of Engineering & Management, New Town Campus

University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Index:

B.Tech. 1st Year Course Structure : 2025-2026 – Odd Semester									
Semester 1 (Group – A)									
Sl. No.	**Type of Course**	**Subject code**	**Subject name**	**L**	**T**	**P**	**S**	**Total Contact Hours**	**Credit Points**
THEORY									
1	Basic Science Course	BSCPH101	Physics	3	1	0	0	4	4
2	Basic Science Course	BSCM103A	Mathematics - Calculus	3	1	0	0	4	4
3	Basic Science Course	BSCBE104	Biology for Engineers	2	1	0	0	3	3
4	Engineering Science Course	ESCEE101	Basic Electrical Engineering	3	1	0	0	4	4
5	Engineering Science Course	ESCME102A	Engineering Mechanics - Principles	1	1	0	0	2	2
6	Engineering Science Course	ESCCS101	Introduction to AI and Data Science using Python	2	1	0	0	3	3
7	Humanities and social sciences including	ESP101A	Essential Studies for Career Development - I	2	0	0	0	2	0.5
PRACTICAL									
8	Basic Science Course	BSCPH191	Physics Laboratory	0	0	3	0	3	1.5
9	Engineering Science Course	ESCEE191	Basic Electrical Engineering Laboratory	0	0	2	0	2	1
10	Engineering Science Course	ESCME192	Engineering Graphics & Design	1	0	4	0	5	3
11	Engineering Science Course	ESCCS191	Introduction to AI and Data Science Laboratory using Python	0	0	4	0	4	2
SESSIONAL									
12	Humanities and social sciences including	SDP181A	Competitive Aptitude Training - I	0	0	0	1	1	0.5
Mandatory Industry and Value Added Courses (IVC)									
13	Mandatory Industry and Value Added Courses (IVC)	IVC181A	Design Thinking and Innovation - Ideation & Research	0	0	0	1	1	0
14	Mandatory Industry and Value Added Courses (IVC)	IVC182A	Economics and Business Models	0	0	0	1	1	0
15	Mandatory Co-curricular Courses	MCC181A	Co-Curricular Subjects	0	0	0	1	1	0
Total Credit Points of Semester				**17**	**6**	**13**	**4**	**40**	**28.5**
Co-curricular Subjects: 1. Foreign Language, 2. Physical Education, 3. Soft Skill									

B.Tech. 1st Year Course Structure : 2025-2026 – Odd Semester									
Semester 1 (Group – B)									
Sl. No.	**Type of Course**	**Subject code**	**Subject name**	**L**	**T**	**P**	**S**	**Total Contact Hours**	**Credit Points**
THEORY									
1	Basic Science Course	BSCCH102	Chemistry	3	1	0	0	4	4
2	Basic Science Course	BSCM103B	Mathematics and Basic Statistics	3	1	0	0	4	4
3	Humanities and social sciences including Management	HSMC101	English	2	0	0	0	2	2
4	Engineering Science Course	ESCEC101	Basic Electronics Engineering	3	1	0	0	4	4
5	Engineering Science Course	ESCME102B	Engineering Mechanics - Essentials	1	1	0	0	2	2
6	Engineering Science Course	ESCCS102	Programming for Problem Solving using C	2	1	0	0	3	3
7	Humanities and social sciences including Management	ESP101B	Essential Studies for Professionals - I	1	0	0	0	1	0.5
PRACTICAL									
8	Basic Science Course	BSCCH192	Chenistry Laboratory	0	0	3	0	3	1.5
9	Engineering Science Course	ESCEC191	Basic Electronics Engineering Laboratory	0	0	2	0	2	1
10	Engineering Science Course	ESCME193	Workshop/ Manufacturing Practices	1	0	4	0	5	3
11	Engineering Science Course	ESCCS192	Programming for Problem Solving Laboratory using C	0	0	4	0	4	2
12	Humanities and social sciences including Management	HSMC191	Language Laboratory	0	0	2	0	2	1
SESSIONAL									
13	Humanities and social sciences including Management	SDP181B	Skill Development for Professionals - I	0	0	0	1	1	0.5
Mandatory Industry and Value Added Courses (IVC)									
14	Mandatory Industry and Value Added Courses (IVC)	IVC181B	Design Thinking and Innovation - Creativity and IPR	0	0	0	1	1	0
15	Mandatory Industry and Value Added Courses (IVC)	IVC182B	Finance and Venture Design	0	0	0	1	1	0
16	Mandatory Co-curricular Courses	MCC181B	Co - Curricular Subjects	0	0	0	1	1	0
Total Credit Points of Semester				**16**	**5**	**15**	**4**	**40**	**28.5**
Co-curricular Subjects: 1. Foreign Language, 2. Physical Education									

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Physics **Credit: 4** **Lecture Hours: 42**

Subject Code: BSCPH101 / BSCPH201

Pre-requisite: Physics of Higher Secondary Standard

Relevant Links:

Study Material Coursera NPTEL Linkedin Learning

COURSE OBJECTIVES:

1. To train the students to grasp the concepts of different areas of physics, appropriate for applications indifferent branches of engineering.
2. To expand their knowledge of Physics, which will be suitable for different engineering streams.
3. Learn to apply the different theories of physics in real life problems.
4. Try to think new problems of physics for applications in engineering.

COURSE OUTCOMES:

CO 1: Develop an understanding of the fundamental theories of physics such as optics, electromagnetic theory, classical mechanics, quantum mechanics and statistical mechanics for engineering applications in societal and environmental contexts.

CO 2: Study the wave nature of light by means of phenomena like interference, diffraction and LASER and to study the Maxwell's equations to understand the concepts of electromagnetic theory.

CO 3: Using the concepts of classical mechanics to study the motion of particles and systems, learning the postulates of quantum mechanics to analyze the behavior of particles in quantum levels and understanding the behavior of physical systems by statistical Methods.

CO 4: Develop an ability to analyze and solve theoretical problems of physics

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Text Book Mapping	Corresponding Lab Assignment
1	**Mechanics**	**Part A: Vector Calculus** Representation of a vector, Some Important Definitions about Vectors, Resolution of a Vector into Components, Product of Two Vectors, Triple Product, Scalar and Vector Fields, Partial Derivative of Vectors, Gradient of Scalar Field, Divergence of Vector Field, Curl of a Vector Field, Curl in the Context of Rotational Motion **Part B: Classical Mechanics** Inertial and Non-Inertial Frame of references, Friction, Problems including constraints and Friction, conservation Laws, Rigid Body, Angular Velocity Vector, Moment of Inertia, Acceleration of a Rigid Body Rolling Down an Inclined plane	***International Academia:*** **https://catalog.mit.edu/subjects/8/** ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf ***Industry Mapping: Matlab software***	8	***Engineering Physics,*** Sujay Kumar Bhattacharya, Mc Graw Hill Education, Chapter 1	❖ To determine the Rigidity modulus of the Material of a wire by Dynamic Method ❖ To determine the Rigidity modulus of the Material of a wire by Static Method ❖ To determine the Acceleration due to Gravity using Bar Pendulum

2	**Oscillations**	**Oscillations:** Introduction, Relation of Simple Harmonic Motion with Circular Motion, Differential Equation of Simple Harmonic Motion, Various Characteristics of SHM, Energy of a Particle Executing SHM and Law of Conservation of Energy, Differential Equation of Free or Undamped Vibrations, Damped vibrations, Solution of the Equation of a Damped Oscillator and its Analysis, Electrical Analogy of SHM and Damped vibration, Analysis of Forced Vibration, Resonance, Energy of a Forced Vibrator, Sharpness of Resonance, Quality Factor, Forced Vibration in an LCR Circuit	***International Academia:*** **https://catalog.mit.edu/subjects/8/** ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf ***Industry Mapping:*** ***Matlab software***	5	***Engineering Physics***, Sujay Kumar Bhattacharya, Mc Graw Hill Education, Chapter 2.	❖ To generate parametric scillations in a string using Melde's experimental set-up.
3	**Optics**	**Interference :** Interference of light, Young's experiment, Resultant intensity due to superposition of two interfering waves, Interference and conservation of energy, Determination of fringe width in Young's experiment, Shape of interference fringes, conditions for interference of light, coherent sources, production of coherent sources, Fresnel's biprism, displacement of fringes, phase change on reflection, interference due to thin films, interference due to wedge shaped thin films, formation of Newton's ring. **Diffraction:** Different types of diffraction phenomena, difference between interference and diffraction, Fraunhofer diffraction due to a single slit, Fraunhofer diffraction due to a double slit, difference between single slit and a double slit diffraction pattern, diffraction due to plane diffraction grating, Rayleigh's criteria on resolution, resolving power of a grating, application of diffraction grating.	***International Academia:*** https://catalog.mit.edu/subjects/8/ ***AICTE-prescribedsyllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf ***Industry Mapping:*** ***Matlab software***	10	***Physics,*** B.K.Pandey, Monoj K Harbola et. al., Cengage, Chapter 2. ***Engineering Physics***, Sujay Kumar Bhattacharya, Mc Graw Hill Education, Chapter 3.	❖ To determine the radius of curvature of a Plano convex lens by formation of Newton's ring method. ❖ To determine the wavelengths of a given light source by diffraction grating method.

		Laser: Characteristics of laser, Absorption and emission of radiations by matter, working principle of laser, population inversion in laser, basic components of laser system, optical resonator and Q value, threshold condition for sustaining of laser action, typical lasers, application of lasers.			***Engineering Physics***, Sujay Kumar Bhattacharya, Mc Graw Hill Education, Chapter 5.	
4	**Introduction to Electromagnetic Theory**	**Maxwell's equations:** Magnetic flux, Faraday's law of electromagnetic induction, electromotive force, Integral form of Faraday's law, displacement current, Ampere's Circuital law, Modified Ampere's law, Continuity property of current, Maxwell's Equations	***International Standards*** : https://catalog.mit.edu/subjects/8/ ***AICTE prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf***	6	***Engineering Physics***, Sujay Kumar Bhattacharya, Mc Graw Hill Education, Chapter 7.	❖ Determination of electron charge to mass ratio (*e/m*) ❖ Determination of Hall coefficient. ❖ Conversion of vibration to voltage using piezoelectric materials
5	**Quantum Mechanics**	**Quantum Mechanics :** Introduction, Wave function and its physical Significance, Normalization of wave functions and Orthogonality of wave functions, Operators in Quantum Mechanics, Fundamental postulates of Quantum mechanics, Time-dependent Schrodinger's equation, Time-independent Schrodinger's wave equation, Application of Schrodinger's equation, Quantum harmonic oscillator, The Hydrogen atom	***International Standards:*** ***https://catalog.mit.edu/subjects/8/*** ***AICTE-prescribedsyllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf***	7	***Engineering Physics***, Sujay Kumar Bhattacharya, Mc Graw Hill	❖ Determination of Planck's constant by photoelectric emission process ❖ Determination the excitation potential of a given gas by Franck-Hertz experiment ❖ Determination of Planck's Constant using LED ❖ Determination of the band-gap of a semiconductor by measuring the resistivity at different Temperatures by four-probe method

			IndustryMapping: ***Matlab software***		Education, Chapter 10.	❖ To study the different characteristics of a solar cell
6	**Statistical Mechanics**	**Statistical Mechanics** : Introduction, Concept of Phase Space, Concept of Energy levels and Energy states, Macrostate and Microstate, Thermodynamic Probability and Entropy, Equilibrium Macrostate, MB, BE and FD statistics, Maxwell-Boltzmann (MB) Statistics, Bose-Einstein (BE) Statistics, Fermi-Dirac (FD) Statistics, Classical Statistics as a special case of Quantum Statistics, Density of states or Quantum states in energy range between ε and ε+dε, Fermi distribution at zero and non-zero temperature, Derivation of plank's law of Radiation from BE Statistics, Comparative study of three Statistical Distribution functions	***International Standards:*** ***https://catalog.mit.edu/subjects/8/*** ***AICTE-prescribedsyllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf	6	***Engineering Physics***, Sujay Kumar Bhattacharya, Mc Graw Hill Education, Chapter 11.	

Study Material:

https://drive.google.com/file/d/1XEqDWZnaywZ9ifVfIovqLxidCLMgn2cH/view?usp=sharing

MATLAB Project :

1. **Probability distribution of 1D quantum harmonic oscillator**

Link : https://in.mathworks.com/matlabcentral/fileexchange/83163-probability-distribution-of-1d-quantum-harmonic-oscillator?s_tid=srchtitle

2. **Schrodinger's equation in the 1-dimensional potential well**

Link : https://in.mathworks.com/matlabcentral/fileexchange/75495-schrodinger-s-equation-in-the-1-dimensional-potential-well?s_tid=srchtitle_site_search_1_schrodinger%20equation

LINKEDIN Courses :

1. **Introduction to Quantum Cryptography**

Link : https://www.linkedin.com/learning/introduction-to-quantum-cryptography/what-is-quantum-physics

2. **Physics and rigid bodies**

Link : https://www.linkedin.com/learning/unity-2023-essential-training/physics-and-rigid-bodies

COURSERA Courses :

1. Electrodynamics: Electric and Magnetic Fields

Link : https://www.coursera.org/learn/electrodynamics-electric-magnetic-fields

2. Electrodynamics: In-depth Solutions for Maxwell's Equations

Link : https://www.coursera.org/learn/electrodynamics-solutions-maxwells-equations

3. Quantum Mechanics for Engineers Specialization

Link : https://www.coursera.org/specializations/quantum-mechanics-for-engineers

4. Mechanics: Motion, Forces, Energy and Gravity, from Particles to Planets

Link : https://www.coursera.org/learn/mechanics-particles-planets

5. Quantum Mechanics

Link : https://www.coursera.org/learn/quantum-mechanics

6. Vector Calculus for Engineers

Link : https://www.coursera.org/learn/vector-calculus-engineers

7. Physics of Oscillators and Waves

Link : https://www.coursera.org/learn/oscillators-waves

8. Exploring Quantum Physics

Link : https://www.coursera.org/learn/quantum-physics

TEXT BOOKS:

1. Engineering Physics by Sujay Kumar Bhattacharya, McGraw Hill Education

REFERENCE BOOKS:

1. Theory and problems of Theoretical Mechanics by Murray R. Spiegel SI (Metric) edition

2. Advanced Acoustics by Dr.D.P.Raychaudhuri, The new book stall, Revised Ninth Edition, 2009

3. A textbook on Optics, B.Ghosh and K.G.Majumder, Sreedhar Publishers, fifth edition

4. Introduction to Electrodynamics by David J.Griffiths 3rd Edition

5. Concepts of Modern Physics (Sixth Edition) by Arthur Beiser (PublishedbyMcGraw-Hill)

1st Semester Syllabus for B.Tech Batch 2025-2029

Subject Name: Biology for Engineers **Credit: 3** **Lecture Hours: 36**

Subject Code: BSCBE204

Pre-requisite: Basic knowledge of Physics, Chemistry and Mathematics

Course Objective:

1. To introduce the fundamental differences between science and engineering
2. To impart knowledge on how biological observations of the 18th Century led to major discoveries
3. To impart knowledge on enzymes and their varied properties and functions
4. To impart knowledge on DNA as genetic material

Course Outcomes:

The concepts developed in this course will help the students in their higher studies. The course will enable the student to:

CO1: Identify the major biological discoveries that revolutionized science like the classification of organisms based on criteria such as morphology and ecology. Highlighting the identification and classification of microorganisms.
CO2: Convey that all forms of life have the same building blocks and yet the manifestations areas diverse as the classification of enzymes and their varied properties and functions which distinguish one from the other.
CO3: Analyze biological processes at the reductionist level and apply thermodynamic principles to biological systems.
CO4: Identify DNA as genetic material in the molecular basis of information transfer, impart the concept of recessiveness and dominance during the passage of genetic material from parent to offspring.

Relevant Links:

Study Material	Coursera	NPTEL	Infosys SpringBoard

Detailed Syllabus:

Module number	Topic	Sub-topics	Text Book Mapping	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Introduction**	Fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why do we need to study biology? Discuss how biological observations of the 18th Century lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics refer to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry.	Biology for Engineers **Chapter:1**	**No corresponding material**	**2**	**There are no corresponding labs.**
2	**Classification**	Hierarchy of life forms at the phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b)ultrastructure- prokaryotes or	Biology for Engineers **Chapter:1**	**International standard** https://ocw.mit.edu/courses/7-014-introductory-biology-spring-2005/resources/17-carbon-and-	**3**	**There are no corresponding labs.**

		eukaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S. cerevisiae, D. elanogaster, C. elegance, A. thaliana, M. musculus		energy-metabolism/ ***AICTE prescribedsyllabus:***(***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf***) ***IndustryMapping: NIL***		
3	**Genetics**	To convey that "Genetics is to biology what Newton's laws are to Physical Sciences"Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using	Campbell Biology: Campbell,N.A.;Reece,J.B.;Urry,Lisa;Cain,M,L.;Wasserman,S.A.;Minorsky,P.V.;Jackson. 12th Edition **Chapter: 14**	**International standard (**https://ocw.mit.edu/courses/7-01sc-fundamentals-of-biology-fall-2011/pages/genetics/**)** **(**https://pll.harvard.edu/course/principles-genetics**)** ***AICTE prescribedsyllabus:***(***https://www.aicte-india.org/sites/***	**4**	**There are no corresponding labs.**

		human genetics.		***default/files /Model_Curriculum/Final_ECE .pdf*)** ***IndustryMapping:*** **(**https://www.global-engage.com/life-science/8-free-tools-genetic-engineering-molecular-synthetic-biology/**)** **(**https://web.stanford.edu/group/pritchardlab/structure.html**)**		
.4	**Biomolecules**	**Molecules of life**: In this context discuss monomeric units and polymeric structures. Discuss sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids	Biochemistry:Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto, 5th Edition. WH Freeman & Co **Chapter: 3,5,11,12**	***International Standards:*** ***(****https://ocw.mit.edu/courses/7-01sc-fundamentals-of-biology-fall-2011/pages/resource-index/****)*** ***(****https://harvard.simplesyllabus.com/en-US/doc/sy2y033op****)*** ***AICTE prescribedsylla***	**4**	**There are no corresponding labs**

				bus:(***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf***) ***IndustryMapping:*** *https://guides.lib.byu.edu/c.php?g=216337&p=1428369* *https://www.computabio.com/applications-of-pymol-software.html* *https://phd.leeds.ac.uk/project/173-computer-simulations-of-biological-macromolecules* *https://spdbv.unil.ch/*		
5.	**Enzymes**	**Enzymology:** How to monitor Enzyme catalysed reactions. How does an enzyme catalyse reactions? Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic parameters. Why	Biochemistry:Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto, 5th Edition. WH Freeman & Co	***International Standards:*** (https://ocw.mit.edu/search/?q=Enzymes&type=resourcefile) ***(****https://harvard.simplesyllabus.*	**5**	**There are no corresponding labs.**

		should we know these parameters to understand biology? RNA catalysis	**Chapter: 8**	*com/en-US/doc/sy2y033op)* - ***AICTE prescribedsyllabus:(https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf)*** ***IndustryMapping:(https://kintekcorp.com/software)(https://bio.tools/icekat)***		
6.	**Information Transfer**	The molecular basis coding and decoding genetic information is the universal Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single-strandedto double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination. Mutation, The DNA Technology (Use and Application)	Campbell Biology:Campbell,N.A.;Reece,J.B.;Urry,Lisa;Cain, M,L.;Wasserman, S.A.;Minorsky,P. V.;Jackson. 12th Edition **Chapter 16,17**	***International Standards:(https://ocw.mit.edu/courses/7-01sc-fundamentals-of-biology-fall-2011/pages/molecular-biology/dna-structure-classic-experiments/)(https://ocw.mit.edu/courses/7-01sc-fundamentals-of-***	**5**	**There are no corresponding labs.**

				biology-fall-2011/pages/molecular-biology/dna-replication/) (https://ocw.mit.edu/courses/7-01sc-fundamentals-of-biology-fall-2011/pages/molecular-biology/transcription-translation/) ***-AICTE prescribedsyllabus:(https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf)*** ***IndustryMapping:(https://web.expasy.org/translate/)(https://blast.ncbi.nlm.nih.gov/Blast.cgi)***		
7.	**Macromolecular analysis**	Examining biological processes at the reductionist level involves a comprehensive analysis of proteins, with a particular focus on their structure and function. This investigation encompasses the hierarchical organization of	Biochemistry:Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto,	***International Standards:(https://ocw.mit.edu/courses/7-01sc-fundamentals-of-biology-fall-***	**4**	**There are no corresponding labs.**

		protein structures, spanning primary, secondary, tertiary, and quaternary levels. Additionally, proteins are explored in various roles, serving as enzymes, transporters, receptors, and essential structural elements within biological systems.	5th Edition. WH Freeman & Co. **Chapter:3,13**	*2011/pages/biochemistry/proteins-levels-of-structure-non-covalent-forces/)* ***AICTE prescribed syllabus:***(***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf*** ***IndustryMapping:*** ***(****https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3090454/****)*** ***(https://nmr.science.oregonstate.edu/macromolecular-analysis)*** ***(****https://moduler.aau.dk/course/2019-2020/K-KEM-K2-48?lang=en-GB****)***		

8.	**Metabolism**	**Thermodynamics as applied to biological systems**. Exothermic and endothermic versus endergonic and exergonic reactions. Gibb's energy. Concept of Keq and its relation to standard free energy. Spontaneity, Energy yielding and energy consuming reactions. Concept of Energy charge **Respiration:** Breakdown of glucose to CO_2 + H_2O (Glycolysis and Gluconeogenesis and Krebs cycle). Electron transport chain and Oxidative phosphorylation **Photosynthesis:** Synthesis of glucose from $CO_2$and H_2O. Cyclic and non-cyclic photophosphorylation. Calvin cycle. CAM cycle.	Biochemistry:Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto, 5th Edition. WH Freeman **Chapter: 16,17,18,19,20**	***International Standards:*** ***(****https://ocw.mit.edu/courses/7-01sc-fundamentals-of-biology-fall-2011/pages/resource-index/****)*** ***(****https://ocw.mit.edu/courses/20-10j-thermodynamics-of-biomolecular-systems-fall-2005/pages/lecture-notes****)*** ***(****https://ocw.mit.edu/courses/7-01sc-fundamentals-of-biology-fall-2011/pages/biochemistry/respiration-and-fermentation/****)*** ***(****https://ocw.mit.edu/courses/7-01sc-fundamentals-of-biology-fall-2011/pages/biochemistry/chemiosmotic-*	**5**	**There are no corresponding labs.**

				principle-photosynthesis/) *(https://harvard.simplesyllabus.com/en-US/doc/sy2y033op)* ***AICTE prescribedsyllabus:*** (***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf***) ***IndustryMapping:*** (https://www.genome.jp/kegg/pathway.html)		

9.	**Microbiology**	**Concept of single celled organisms.** Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.	Biology for Engineers. **Chapter: 9**	***International Standards:*** *https://ocw.mit.edu/courses/20-106j-systems-microbiology-fall-2006/pages/readings/* ***AICTE prescribed syllabus:*** *https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf* ***IndustryMapping:*** *https://pages.primuslabs.com/primuslabs-new-client-usa.html?gclid=CjwKCAiA9ourBhAVEiwA3L5RFieYQ2c6mskEkqLg0_vaDlTGFqq7Ah5YAt_vHdeawcqIhQ3ItsjM3BoChLIQAvD_BwE*	4	**There are no corresponding labs.**

Text Books:

1. Biology for Engineers.Wiley and Sons
2. Campbell Biology: Campbell,N.A.;Reece,J.B.;Urry,Lisa;Cain,M,L.;Wasserman,S.A.;Minorsky,P.V.;Jackson. 12th Edition
3. Biochemistry: Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto, 5th Edition. WH Freeman & Co

Reference Books:

1. Molecular Genetics (Second edition), Stent,G.S and Calendar R.W.H.Freeman and company,Distributed by Satish Kumar Jain for CBS Publisher
2. Microbiology,Prescott,L.MJ.P.Harley and C.A.Klein1995.2nd editionWmC. Brown Publishers
3. Principles of Biochemistry (VEdition),By Nelson,D. L.;and Cox,M.M.W.H.Freeman nd Company
4. Outlines of Biochemistry,Conn,E.E;Stumpf,P.K;Bruening,G;Doi,R.H.JohnWileyand Sons

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Chemistry **Credit: 4** **Lecture Hours: 48**

Subject Code: BSCCH202

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

Pre-requisite: Basic knowledge of Chemistry in Class- XI and XII level

Relevant Links:

A. STUDY MATERIAL

B. Coursera

C. NPTEL

D. IEM Learning

COURSE OBJECTIVES:

1. To acquaint the students with the basic phenomenon/concepts of chemistry, the student faces during course of their study in the Industry and Engineering field.

2. The student with the knowledge of the basic chemistry will understand and explain scientifically the various chemistry related

problems in the industry/engineering field.
3. The student will be able to understand the new developments and breakthroughs efficiently in engineering and technology.

4. The introduction of the latest (R&D oriented) topics will make the engineering student upgraded with the new technologies

COURSE OUTCOMES:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the (10+2) levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. The course will enable the student to:

CO1: Analyze nano- structures, intermolecular forces and microscopic properties in terms of orbital concept of hydrogen atoms and bands of solid extending to Crystal field of transition metal ions using quantum mechanical approach.

CO2: Rationalize bulk properties using thermodynamic considerations and equilibrium conditions predicting the interactions in different systems.

CO3: Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels and its subsequent applications.

CO4: Able to apply stereo chemical approach for structure prediction and drug design in fundamental organic reactions.

Detailed Syllabus:

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Books
1	**Atomic and molecular structure**	Schrödinger equation. Particle in a box solution and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.	***International Academia:*** MIT- https://ocw.mit.edu/courses/5-111sc-principles-of-chemical-science-fall-2014/pages/unit-i-the-atom/ https://ocw.mit.edu/courses/5-111sc-principles-of-chemical-science-fall-2014/pages/unit-ii-chemical-bonding-structure/lecture-13/ Stanford University- https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=&academicYear=&q=crystal+field+theory&collapse= ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/file	7	1. Estimation of Hardness of water sample by Complexometric titration. 2. Synthesis of Nanoparticles	Chemistry- I, Second Edition, Gourkrishna Dasmohapatra, chapter- 1

			s/Untitled_1-min.pdf ***Industry Mapping:*** A Python Program for Solving Schrödinger's Equation in Undergraduate Physical Chemistry | Journal of Chemical Education (acs.org) https://in.mathworks.com/matlabcentral/fileexchange/125425-matlab-support-package-for-quantum-computing			
2	**Spectroscopic techniques and applications**	Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.	***International Academia:*** ***https://ocw.mit.edu/courses/5-80-small-molecule-spectroscopy-and-dynamics-fall-2008/*** ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/AICTE%20-%20UG%20CSE.pdf ***Industry Mapping:*** HORIBA Scientific's Lab Spec 6 Spectroscopy Suite	6	1. Estimation of metal ions using UV-vis spectroscopy. 2. Studies on the synthesis of Nanoparticles using UV-vis spectroscopy.	Chemistry- I, Second Edition, Gourkrishna Dasmohapatra, chapter- 2

			provides an intuitive, powerful software platform for imaging and spectroscopy by Raman, photoluminescence (PL), cathodoluminescence (CL) and AFM-Raman. ***https://www.horiba.com/int/scientific/products/detail/action/show/Product/labspec-6-spectroscopy-suite-software-1843/***			
3	**Intermolecular forces and potential energy surfaces**	Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.	***International Academia:*** *MIT*- Unit III: Thermodynamics & Chemical Equilibrium | Principles of Chemical Science | Chemistry | MIT Open Course Ware *Stanford University*- Stanford University Explore Courses ***AICTE Syllabus*:** Final_ECE.pdf (aicte-india.org) ***Industry Mapping:*** The equations of state for gases are essential in various engineering applications, including the	3	1. Determination of surface tension of liquids using Stalagmometer Instrument 2. Determination of viscosity of liquids using Ostwald Viscometer.	Chemistry- I, Second Edition, Gourkrishna Dasmohapatra, chapter- 3

			design and ***operation of chemical processes, HVAC systems,*** and the petroleum industry.			
4	**Use of free energy in chemical equilibria**	Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.	***International Academia:*** *MIT-* ***https://ocw.mit.edu/courses/5-60-thermodynamics-kinetics-spring-2008/resources/lecture-13-gibbs-free-energy/*** ***https://ocw.mit.edu/courses/5-111sc-principles-of-chemical-science-fall-2014/pages/unit-iii-thermodynamics-chemical-equilibrium/lecture-16/*** ***https://ocw.mit.edu/courses/5-60-thermodynamics-kinetics-spring-2008/pages/lecture-notes/*** ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Untitled_1-min.pdf	9	1. Acid base titration (Colorimetric) 2. Acid base titration (Conductometric) 3. Acid base titration (pH metric) 4. Potentiometric Titration 5. Determination of the partition coefficient of a substance between two immiscible liquids (Heterogeneous Equilibrium). 6. Determination of hardness of water sample 7. Determination of alkalinity of water sample	Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co.17th edition, chapter 5, 6, 7, 18

			Industry Mapping: Energy, entropy and free energy concepts come from thermodynamics and are applicable to all fields of science and engineering. Instruments Used in Industries: **Potentiometer, Conductivity meter, pH-meter** Gibbs Energy Minimization Software for Geochemical Modeling: https://www.bing.com/ck/a?!&&p=c92d076e6c36cf3aJmltdHM9MTcwMTEyOTYwMCZpZ3VpZD0xNjY1NGQ4Yy03NDMzLTYyMDAtMDE0Yi01YzcwNzU5ZTYzNWUmaW5zaWQ9NTIxMQ&ptn=3&ver=2&hsh=3&fclid=16654d8c-7433-6200-014b-5c70759e635e&psq=gibbs+free+energy+software&u=a1aHR0cDovL2dlbXMud2ViLnBzaS5jaC8&ntb=1 Materials analysis applying			

			thermodynamic (MAAT) software: A friendly and free tool to analyze the formation of solid solutions, amorphous phases and intermetallic compounds - ScienceDirect https://github.com/MathWorks-Teaching-Resources/Thermodynamics			
5	**Periodic properties**	Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Untitled_1-min.pdf ***International Standards***: https://ocw.mit.edu/courses/5-111sc-principles-of-chemical-science-fall-2014/pages/unit-ii-chemical-bonding-structure/lecture-9/ ***Industry Mapping:*** Stanford AI recreates chemistry's periodic table of elements https://news.stanford.edu/press-releases/2018/06/25/ai-recreates-chemistrys-periodic-table-elements/	3	**Periodic table and Graph** *Part-1*: study the structure of the Periodic Table of Elements and use it to find information about elements. *Part-2*: create a graph on excel or on the graph paper out of the given data sets. https://www.coursehero.com/file/179637355/Lab-3-	Chemistry- I, Second Edition, Gourkrishna Das mohapatra, chapter- 5

					Periodic-Table-Graph-2pdf	
6	**Stereochemistry**	Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds	**International Standards** :(https://ocw.mit.edu/courses/5-12-organic-chemistry-i-spring-2003/resources/5_12_outline_1st_half/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Untitled_1-min.pdf) **Industry Mapping:** Chem Draw software	3		Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co.17th edition, chapter 27
7	**Organic reactions and synthesis of a drug molecule**	Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.	***International Academia:*** https://ocw.mit.edu/courses/5-12-organic-chemistry-i-spring-2003/resources/5_12_outline_1st_half/ https://explorecourses.stanford.edu/m_search?page=0&q=CHEM&filter-coursestatus-Active=on&filter-catalognumber-	7	Determination of the rate constant of an organic reaction Thin layer chromatography https://vlab.amrita.edu/?sub=3&brch=63&sim=154&cnt=2	Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co.17th edition, chapter 26

			CHEM=on https://catalog.mit.edu/subjects/5/ ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Untitled_1-min.pdf) **Industry Mapping:** Chem Draw software, Chem3D software Drug Design and Lead Molecule Discovery using Structure Based Virtual Screening and Molecular Docking. Introduction to Generative Chemistry- Application of Generative AI in Chemistry. ***Industry Tool:*** Screening of drug molecules using Popular Industrial Software using			

			AutoDock, AutoDock Vina, Open Babel, Biovia Discovery Studio			

Text Books:

1. Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co.17th edition
2. Chemistry- I, Second Edition, Gourkrishna Das mohapatra

Reference Books:

1. Physical Chemistry, P.C. Rakshit, Sarat Book distributors, Calcutta, 7th Edition

2. Physical Chemistry, G.W. Castellan, Narosa Publishing House, 3rd Edition

3. Fundamentals of Molecular Spectroscopy by C. N. Banwell & E.M. McCash, McGraw Hill Education India Publishers, 5th Edition

4. A Guide Book to Mechanism in Organic Chemistry by Peter Sykes, Pearson Publishers, 6th Edition

5. Inorganic Chemistry, Part- I & II, R.L Dutta, The New Book Stall Publishing House

****

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: English **Credit: 2** **Lecture Hours: 24**

Subject Code: HSMC101

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

Pre-requisite: Basic English Proficiency, Listening and Speaking Skills, Reading and Writing Skills, Academic and Social Contexts, and Familiarity with Corporate Ethics.

COURSE OBJECTIVES:

1. Demonstrate the ability to apply grammar, syntax, and vocabulary fundamentals in written and spoken communication.
2. Communicate effectively in both academic and social contexts by adapting language skills to different situations.
3. Apply language skills in professional settings, showcasing readiness for the industry, and demonstrate an understanding of corporate ethics in communication and decision-making.
4. Demonstrate basic proficiency in English by reading, listening, comprehending, writing, and speaking effectively in various contexts.

COURSE OUTCOMES:

CO1. Achieve competence in grammar, syntax, and vocabulary fundamentals.
CO2. Effectively communicate in academic and social contexts.
CO3. Develop readiness for the industry and understand corporate ethics.
CO4. Acquire basic proficiency in English encompassing reading, listening, comprehension, writing, and speaking skills.

Relevant Links:

A. **STUDY MATERIAL**

B. **Coursera**

C. **NPTEL**

D. **IEM Learning**

Detailed Syllabus:

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment	Books
1.	**Vocabulary Building**	1.1 The concept of vocabulary and word formation (Ch-1.1, page 3) 1.2 Root Words from foreign languages (Ch-1.2, page 2) 1.3 Acquaintance with Prefixes and Suffixes (Ch-1.3, page 11) 1.4 Synonyms, antonyms, and Standard abbreviations (Ch-1.4, page 15)	***International Academia:*** https://ocw.mit.edu/courses/21g-232- advanced-speaking- and-critical-listening- skills-els-spring- 2007/ https://ocw.mit.edu/courses/24-901-language-and-its-structure-i-phonology-fall-2010/ ***AICTE Prescribed Syllabus:*** https://www.aicte-india.org/sites/default/files/ Untitled_1-min.pdf ***Industry Mapping:*** Business writing and corporate documents.	**3**	Activities on vocabulary building and Lexigraphy games. Exercises involving creating and using industry-specific vocabulary and understanding jargon.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
2.	**Basic Writing Skills**	2.1 Sentence Structures (Ch-2.1, page 54) 2.2 Use of phrases (Ch-2.2, page 66) 2.3 Importance of proper punctuation (Ch- 2.3, page	***International Academia*** https://ocw.mit.edu/courses/21w-011- writing-and-rhetoric- rhetoric-and- contemporary-issues- fall-2015/	**4**	Presentation activities and interactive activities with punctuation.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

		62) 2.4 Creating coherence (Ch-2.4, page 65) 2.5 Organizing principles of paragraphs in documents (Ch-2.5, page 68) 2.6 Techniques for writing precisely (Ch-2.6, page71)	***AICTE Prescribed Syllabus:*** https://www.aicte-india.org/sites/default/files/ Untitled_1-min.pdf ***Industry Mapping:*** Formal business Correspondence, project, and business writing.			
3.	**Identifying Common Errors in Writing**	3.1-Subject – Verb agreement (Ch-3.1, page- 85) 3.2- Noun-Pronoun Agreement (Ch-3.2, page 89) 3.3- Misplaced modifiers (Ch-3.3, page 93) 3.4- Articles and Prepositions (Ch-3.4, 97) 3.5-Redundancies and Clichés (Ch-3.5, page 102)	***International Academia:*** https://ocw.mit.edu/courses/24-900-introduction-to-linguistics-spring-2022/ ***AICTE Prescribe d Syllabus:*** https://www.aicte-india.org/sites/default/files/ Untitled_1-min.pdf ***Industry Mapping:*** Formal business Correspondence.	**4**	Presentation skills on grammar and related topics on modifiers and redundancies.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
4.	**Nature and Style of Sensible**	4.1- Describing, Defining and Classifying (Ch- 4.1, page- 123)	***International Academia*:** https://ocw.mit.edu/c	**3**	Creative writing skills on descriptive essay,	Das Biswas, Samapika & Riya Barui.

	Writing	4.2- Providing examples or evidence (Ch-4.2, page- 125) 4.3- Writing introduction and conclusion (Ch- 4.3, page- 129)	ourses/21w-794-graduate-technical-writing-workshop-january-iap-2019/ ***AICTE Prescribe d Syllabus:*** https://www.aicte-india.org/sites/default/files/ Untitled_1-min.pdf ***Industry Mapping:*** Email writing and writing other relevant corporate documents.		expository writing, persuasive writing, and Narrative writing.	*Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
5.	**Writing Practices**	5.1- Comprehension (Ch-5.1, page- 142) 5.2- Precis Writing (Ch-5.2, page- 149) 5.3- Essay Writing (Ch-5.5, page- 152) 5.4 Business Correspondence (Letter Writing, Business Letter, Cover Letter, Memos, Email) (Ch- 5.5, page- 156) 5.5- CV Writing (Ch-5.5, page- 166)	***International Academia:*** https://ocw.mit.edu/courses/21g-225-advanced-workshop-in-writing-for-science-and-engineering- els-spring- 2016/ ***AICTE Prescribed Syllabus:*** https://www.aicte-india.org/sites/defau lt /files/	**5**	Activities on reading comprehension and creative writing skills and assignments on concise writing.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

			Untitled_1-min.pdf ***Industry Mapping*:** Project writing and documentation			
6.	**Listening and Speaking Practices**	6.1- Listening Comprehension (Ch-6.1, page-182) 6.2- Pronunciation, intonation, Stress, and rhythm (Ch-6.2, page-182) 6.3- Common everyday situation: Conversations and dialogues (Ch- 6.3, page- 184) 6.4-Communication at Workplace (Ch- 6.4, page-188) 6.5- Interviews & Group Discussions (Ch- 6.5, page- 188) 6.6- Formal Presentations (Ch-6.6, page- 188)	***International Academia:*** https://ocw.mit.edu/courses/21g-223- listening-speaking-and-pronunciation-fall-2004/ https://ocw.mit.edu/courses/21g-232-advanced-speaking- and-critical-listening- skills-els-spring-2007/ https://online.stanford.edu/courses/gsb- x0011-sharpen-your-communication-skills ***AICTE Prescribed Syllabus:*** https://www.aicte-india.org/sites/default/files/ Untitled_1-min.pdf ***Industry Mapping:*** Campus Interviews and recruitment drives.	**5**	Interactive Practice sessions in language lab.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

Tools Used:

Generative AI: Chatgpt, Gemini, Meta AI

Image generator: Dall-E, Nvidia, Canva

Plagiarism checker: GptZero, Ithenticate

ATS Resume Checker

Lesson Plan:

Module 1: Vocabulary Building (Prof. Riya Barui, Prof. Susmita Bhakat, Prof. Deboleena Chakraborty)

Sl. No.	Day	Description	Recommended books for the topic
1	Day-1	Syllabus Discussion, Previously Acquired Subject Knowledge Assessment, Discussing Necessity and Scope of Subject 1.1 The concept of vocabulary and word formation	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
2	Day-2	1.2 Root words from foreign languages Activity: Root word exploration and mapping 1.3 Acquaintance with prefixes and suffixes Activity: Prefixes and suffixes matching exercise	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
3	Day-3	1.4 Synonyms, antonyms, and standard abbreviations Activity: Synonym-antonym identification exercises	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

Module 2: Basic Writing Skills (Prof. Bonani Chakraborty, Prof. Mrittika Ghosh)

Sl. No.	Day	Description	Recommended books for the topic
4	Day-4	2.1 Sentence Structures Activity: Sentence analysis and creation 2.2 Use of phrases Activity: Combining phrases into well-formed sentences	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
5	Day-5	2.3 Importance of Proper Punctuation Activity: Punctuation exercises to clarify meaning	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024.

			Publisher(s): Aryan Publishing House
6	Day-6	2.4 Creating Coherence Activity: Coherence-building exercises in paragraphs	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
7	Day-7	2.5 Organizing Principles of Paragraphs in Documents Activity: Identifying paragraph structures in different writing samples	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

Module 3: Identifying Common Errors in Writing (Prof. Riya Barui, Prof. Bonani Chakraborty, Prof. Mrittika Ghosh)

Sl. No.	Day	Description	Recommended books for the topic
8	Day-8	3.1 Subject-Verb Agreement Activity: Correcting subject-verb agreement in sentences 3.2 Noun-Pronoun Agreement Activity: Practice exercises on noun-pronoun agreement	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
9	Day-9	3.3 Misplaced Modifiers Activity: Identifying and correcting misplaced modifiers	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
10	Day-10	3.4 Articles and Prepositions Activity: Articles and prepositions exercises	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
11	Day-11	3.5 Redundancies and Clichés Activity: Discuss and identify redundancies and clichés in sentences	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

Module 4: Nature and Style of Sensible Writing (Prof. Deboleena Chakraborty, Prof. Bonani Chakraborty, Prof. Mrittika Ghosh)

Sl. No.	Day	Description	Recommended books for the topic
12	Day-12	4.1 Describing, Defining, and Classifying Activity: Examples and analysis several kinds of writing	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
13	Day-13	4.2 Providing Examples or Evidence Activity: Collecting and presenting examples or evidence for topics	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
14	Day-14	4.3 Writing Introduction and Conclusion Activity: Writing a well-structured introduction and conclusion for a given topic	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

Module 5: Writing Practices (Prof. Riya Barui, Prof. Susmita Bhakat, Prof. Samapika Das Biswas)

Sl. No.	Day	Description	Recommended books for the topic
15	Day-15	5.1 Comprehension Activity: Reading comprehension exercise with question analysis	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
16	Day-16	5.2 Precis Writing Activity: Paraphrasing a passage and summarizing its essence	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
17	Day-17	5.3 Essay Writing Activity: Brainstorming, outlining an essay, and writing a memo and mail.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
18	Day-18	5.4 Business Correspondence Activity: Lecture and workshops on how to draft memos, mail, business letters.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

19	Day-19	5.5 Writing CV Activity: Creating CV using Canva and writing cover letter.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

Module 6: Listening and Speaking Practices (Prof. Riya Barui and Prof. Dr. Samapika Das Biswas, Prof. Deboleena Chakraborty)

Sl. No.	Day	Description	Recommended books for the topic
20	Day-20	6.1 Listening Comprehension Activity: Interactive practice sessions in the language lab.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
21	Day-21	6.2 Pronunciation, stress, intonation and rhythm. Activity: Demonstrative Lecture on alteration of meaning with change in stressed words. Practice sessions.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
22	Day-22	6.3 Common everyday situations: Conversations and dialogues Activity: Dialogue writing on everyday situations.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
23	Day-23	6.4 Communication at workplace Activity: Interactive practice sessions in the language lab. 6.5 Interviews and group discussions Activity: Simulated practice sessions at the Language Lab.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House
24	Day-24	6.6 Formal presentations Activity: Lecture on how to create presentations and deliver them. Simulated practice sessions in lab.	Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House

TEXT BOOKS:

1. Das Biswas, Samapika & Riya Barui. *Mastering the Art of English*.2024. Publisher(s): Aryan Publishing House.
2. Raman, Meenakshi. *Technical Communication Principles*. Oxford University Press.
3. Prasad, P. *Universal English in the Twenty-First Century*. Katson Books, Published by S.K. Kataria and Sons. AICTE Approved.

REFERENCE BOOKS:

1. Rizvi, M. Ashraf. *Effective Technical Communication*. Publishers: McGraw Hill, Education.
2. Kumar, Sanjay & Pushp Lata. *Communication Skills*. Oxford University Press.
3. Chauhan, Gajendra Singh, Smita Kashiramka, and L. Thimmesha. *Functional English*. Published by Cengage Learning India Private Limited.

QUESTION PAPER PATTERN AND DATES

EXAMINATION	Dates	PART – A	PART – B	PART – C	TOTAL MARKS
Mid Term 1	**August 11, 2025 to August 22, 2025**	Attempt 5 out of 10 questions; Each question carries 2 marks (2 × 5)	Attempt 2 out of 4 questions; Each question carries 5 marks (5 × 2)	Attempt 1 out of 2 questions; Each question carries 10 marks (10 × 1)	**30**
Mid Term 2	**October 7, 2025 to October 17, 2025**	Attempt 5 out of 10 questions; Each question carries 2 marks (2 × 5)	Attempt 2 out of 4 questions; Each question carries 5 marks (5 × 2)	Attempt 1 out of 2 questions; Each question carries 10 marks (10 × 1)	**30**
End Semester Examination	**November 17, 2025 to December 2, 2025**	Attempt 10 out of 15 questions; Each question carries 2 marks (2 × 10)	Attempt 6 out of 9 questions; Each question carries 5 marks (5 × 6)	Attempt 5 out of 8 questions; Each question carries 10 marks (10 × 5)	**100**

Examination Rules & Regulations:

https://iemcollege-my.sharepoint.com/:b:/g/personal/iemcoe_office_iem_edu_in/EXrcoe3d6oxIogHKO074XeUBC9qm3XNaf_qUeSiVTNh5OQ?e=MMQn40

****

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Mathematics-Calculus **Credit: 4** **Lecture Hours: 48**

Subject Code: BSCM103A

Pre-requisite: High School Mathematics

Relevant Links:

Study Material Coursera Coursera NPTEL NPTEL NPTEL Linkedin Learning Infosys Springboard

COURSE OBJECTIVES:

1. **To give an exposure to some advanced concepts related to differential and integral calculus for functions of single variable, sequence and series and also lay the concept of multivariable differentiation and integration to the students enrolled in the first year of B.Tech. program.**
2. **To lay the foundation of various applications of mathematics in their further course of study.**
3. **To solve and analyze various situations of interest in engineering.**
4. **To imbibe the idea of mathematical modeling with application to real life problems.**

COURSE OUTCOMES:

CO 1: Demonstrate the domain of applications of mean value theorems and apply the concepts and techniques of differential and integral calculus to determine curvature and evaluate different types of improper integrals.

CO 2: Develop the knowledge for addressing real-life problems that comprise several variables or attributes and identify extremum points of different surfaces of higher dimensions.

CO 3: Recognize the methods for evaluating multiple integrals and apply to different physical problems.

CO 4: Use the tools of power series to analyze engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.

Module number	Topic	Sub-topics	Mapping with Textbooks	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Calculus (Differentiation)**	Rolle's Theorem, Mean Value Theorems, Taylor's and Maclaurin's Theorems with Remainders; Taylor's Series, Series for Exponential, Trigonometric and Logarithm Functions; Indeterminate forms and L' Hospital's Rule; Maxima and Minima; Evolutes and Involutes.	**T1: Chapter 4,** Secs. 4.3 - 4.5, 4.10 – 4.12, 4.14, 4.15	***International Academia:*** **https://ocw.mit.edu/courses/18-01-Calculus-I-Single-Variable-Calculus** **https://ocw.mit.edu/courses/18-01-Single-Variable-Calculus** ***AICTE-prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping & Simulation:*** MATLAB/Mathematica https://in.mathworks.com/ https://www.wolfram.com/mathematica/ ***MATLAB File Exchange:***	8	1. Plotting of the following special graphs: • Sketch the graph of sine and cosine functions in $[-2\pi, 2\pi]$ • Plot a graph for e^{3x} on **R** • Draw [x], the greatest integer function in the interval [0, 5]. 2. Draw the graph of the evolute of a parabola.

				Cleve_Lab: A Mathematical Exportium https://in.mathworks.com/matlabcentral/fileexchange/59085-cleve_lab?s_tid=srchtitle ***Drawing Code for Mathematical Benchmark Functions*** https://in.mathworks.com/matlabcentral/fileexchange/125645-drawing-code-for-mathematical-benchmark-functions?s_tid=srchtitle ***Generative AI:*** Photomath		

2	**Calculus (Integration)**	Evaluation of Definite and Improper Integrals; Beta and Gamma Functions and their properties; Applications of Definite Integrals to evaluate surface area and volume of revolutions.	**T1: Chapter 6,** Secs. 6.8 – 6.13 **Chapter 7,** Secs. 7.14 – 7.16	**International Academia:** **https://ocw.mit.edu/courses/18-01-Calculus-I-Single-Variable-Calculus** **https://ocw.mit.edu/courses/18-01-Single-Variable-Calculus** ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping & Simulation :*** MATLAB/Mathematica https://in.mathworks.com/ https://www.wolfram.com/mathematica/ ***MATLAB File Exchange:*** ***Cleve_Lab: A Mathematical Exportium*** https://in.mathworks.com/matlabcentral/fileexchange/59085-cleve_lab?s_tid=srchtitle ***Drawing Code for Mathematical Benchmark Functions*** https://in.mathworks.com/matlabcentral/fileexchange/125645-drawing-code-for-mathematical-benchmark-functions?s_tid=srchtitle ***Generative AI:*** Photomath	6	1. Evaluate definite integrals.

3	**Multivariable Calculus (Differentiation)**	Limit, Continuity and Partial Derivatives; Homogeneous Functions, Euler's Theorem of first and second order (Statement only); Change of variables, Composite function, Derivative of implicit functions, Total Derivative; Jacobian; Maxima, Minima and Saddle points; Method of Lagrange multipliers; Gradient, Directional Derivatives, Tangent Plane and Normal Line, Curl and Divergence.	**T1: Chapter 5** Secs. 5.1 – 5.8, 5.11, 5.12 **Chapter 8,** Secs. 8.4 – 8.9	***International Academia:*** Syllabus | Calculus of Several Variables | Mathematics | MIT OpenCourseWare Linear Algebra, Calculus, & Applications I Stanford Online ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping & Simulation:*** MATLAB/Mathematica https://in.mathworks.com/ https://www.wolfram.com/mathematica/ ***MATLAB File Exchange:*** ***Cleve_Lab: A Mathematical Exportium*** https://in.mathworks.com/matlabcentral/fileexchange/59085-cleve_lab?s_tid=srchtitle ***Drawing Code for Mathematical Benchmark Functions*** https://in.mathworks.com/matlabcentral/fileexchange/125645-drawing-code-for-mathematical-benchmark-functions?s_tid=srchtitle ***Generative AI:*** Photomath	12	1. Find partial differentiation of any function of two or three variables. 2. Find gradient, divergence and curl of any vector valued function. 3. Find the directional derivative of any vector. 4. Write a code to find the tangent plane and draw the surface.

4	**Multivariate Calculus (Integration)**	Multiple Integration: Double Integrals (Cartesian), Change of Order of Integration in Double Integrals, Change of Variables (Cartesian to Polar), Applications: Areas and Volumes, Centre of Mass and Gravity (constant and variable densities); Triple Integrals (Cartesian), Orthogonal Curvilinear Coordinates, Simple applications involving cubes, sphere and rectangular parallelepiped; Scalar Line Integrals, Vector Line Integrals, Scalar Surface Integrals, Vector Surface Integrals, Theorems of Green, Gauss and Stokes.	**T1: Chapter 7** Secs. 7.1 – 7.13 **Chapter 8** Secs. 8.10 - 8.17	***International Academia:*** Syllabus | Calculus of Several Variables | Mathematics | MIT OpenCourseWare **Linear Algebra, Calculus, & Applications I Stanford Online** ***AICTE-prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping:*** MATLAB	12	1. Evaluate double integral of any multivariate function. 2. Evaluate triple integral of any multivariate function.
5	**Sequences and Series**	Basic ideas on Sequence; Concept of Monotonic and Bounded sequence; Convergence and Divergence of Sequence; Algebra of Sequences (Statement only). Basic idea of an Infinite Series; Notion of Convergence and Divergence; Series of Positive Terms - Convergence of infinite G.P. series and p-series (Statement only); Tests of Convergence [Statement only] – Comparison Test, Integral Test,	**T2: Chapter 18**	***International Academia:*** **https://ocw.mit.edu/courses/18-01-Calculus-I-Single-Variable-Calculus** ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping& Simulation:*** MATLAB/Mathematica https://in.mathworks.com/ https://www.wolfram.com/mathematica/	10	1. To evaluate the sum of an infinite series. 2. To check the convergence or divergence of an infinite series.

		D'Alembert's Ratio Test, Raabe's Test and Cauchy's Root test. Alternating Series - Leibnitz's test [Statement only], Absolute and Conditional Convergence.				

Digital Twins:

- ***MATLAB/Simulink***
  Provides a range of tools for modeling, simulation, and analysis of dynamic systems using mathematical methods.
  https://www.mathworks.com/
- **GAMS (General Algebraic Modeling System):**
  A high-level modeling system for mathematical programming and optimization.
  https://gams.com/

Text Books:

T1: B. S. Grewal, "Higher Engineering Mathematics", 44th Edition (2021), Khanna Publishers.

T2: B. K. Pal & K. Das, "Engineering Mathematics" - Vol. 1, 10th Edition (2021), U. N. Dhur & Sons.

Reference Books:

1. **Biswadip Basu Mallik & Krishanu Deyasi,** "Engineering Mathematics" – Vol. 1A, 2B, 1st Edition (2020), Cengage Learning.
2. **Erwin Kreyszig,** "Advanced Engineering Mathematics", 10th Edition (2017), John Wiley & Sons.
3. **R. K. Jain and S. R. K. Iyengar,** "Advanced Engineering Mathematics", 5th Edition (2016), Narosa Publication House
4. **B. V. Ramana,** "Higher Engineering Mathematics", 11th Reprint (2017), Tata McGraw Hill.

5. **Amos Gilat,** "Matlab: An Introduction with Applications", 6th Edition (2016), John Wiley & Sons.

6. **Rudra Pratap,** "Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers", 7th Edition (2019), Oxford University Press.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	3	-	-	-	1	1	2	1
CO2	2	3	3	2	3	-	-	-	1	1	2	1
CO3	2	3	3	2	3	-	-	-	1	1	2	1
CO4	2	3	3	2	3	-	-	-	1	1	2	1

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Mathematics and Basic Statistics **Credit: 4** **Lecture Hours: 48**

Subject Code: BSCM103B

Pre-requisite: High School Mathematics

Relevant Links:

Study Material Coursera NPTEL NPTEL NPTEL NPTEL Linkedin Learning Infosys Springboard

COURSE OBJECTIVES:

1. **To give an exposure of basic concepts related to matrices, ordinary differential equations, vector space as well as basic statistics to the students enrolled in the first year of B.Tech. program.**
2. **To lay the foundation of various applications of mathematics in their further course of study.**
3. **To solve and analyze various situations of interest in engineering.**
4. **To imbibe the idea of mathematical modelling with application to real life problems.**

COURSE OUTCOMES:

CO 1: Identify different types of matrices and relate the concept of rank for solving linear system of equations and apply the concept of eigenvalues, eigenvectors, and diagonalization of matrices.

CO 2: Appraise the idea of vector space and inner product spaces and orthogonalization for understanding physical and engineering problems.

CO 3: Appraise different techniques to solve first and second order ordinary differential equations with its formulation to address the modeling of systems and problems of engineering sciences.

CO 4: Explain the concept of Basic Statistics with their properties and applications in physical and engineering environment.

Module number	Topic	Sub-topics	Mapping with Textbooks	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Matrices**	Linear Systems of Equations, Rank of a Matrix. Eigenvalues and Eigenvectors; Eigenvalues of some special matrices; Cayley-Hamilton Theorem; Similarity Matrix, Diagonalization of matrices.	**T1: Chapter 2** Secs. 2.7, 2.9, 2.10, 2.13 – 2.16	***International Academia:*** Syllabus | Engineering Math: Differential Equations and Linear Algebra | Mechanical Engineering | MIT OpenCourseWare Part III: Linear Algebra | Calculus Revisited: Complex Variables, Differential Equations, and Linear Algebra | Supplemental Resources | MIT OpenCourseWare Linear Algebra, Calculus, &	10	1. Write a function that takes a matrix, a row number and a column number. Beginning with the row number passed to the function, scroll down the column passed to the function and return the row number that contains the

				Applications I Stanford Online ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping & Simulation:*** MATLAB/Mathematica https://in.mathworks.com/ https://www.wolfram.com/mathematica/ ***Generative AI:*** Microsoft Math Solver https://math.microsoft.com/en		largest absolute value in the column. 2. Using MATLAB, find the determinant and rank of a matrix. 3. Compute eigenvalues and eigenvectors of a matrix $A \in \mathbf{R}^{n\times n}$. 4. Solve a linear system of equations.

2	**Vector Space**	Vector Space, Vector Subspace, Linear Independence and Dependence of Vectors, Basis, Dimension; Linear Transformations (maps), Range and Kernel of a Linear Map, Rank and Nullity, Inverse of a Linear Transformation, Rank Nullity Theorem, Composition of Linear Maps, Matrix associated with a Linear Map; Inner Product Spaces, Gram-Schmidt Orthogonalization.	**T2: Chapter 15, 25 & 27** l	***International Academia:*** Linear Algebra, Calculus, & Applications I Stanford Online Part III: Linear Algebra | Calculus Revisited: Complex Variables, Differential Equations, and Linear Algebra | Supplemental Resources | MIT OpenCourseWare Syllabus | Engineering Math: Differential Equations and Linear Algebra | Mechanical Engineering | MIT OpenCourseWare ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping:*** MATLAB	14	1. Write a program of check the independence of any three vectors in $\mathbf{R^3}$. 2. Find the inner product of any two vectors of $\mathbf{R}^3$. 3. Using Gram-Schmidt Orthogonalization, find the orthonormal vectors for any three vectors in $\mathbf{R^3}$.

3	**Ordinary Differential Equations**	First order first degree equations: Exact equations, Rules for finding Integrating Factors, Linear and Bernoulli's equations. Equations of first order but not of first degree: Equations solvable for p, Equations solvable for x, Equations solvable for y and Clairaut's type. Second Order Linear Differential Equations with constant coefficients, D-operator Method, Method of Variation of Parameters; Cauchy-Euler Equation; Power Series Solutions, Frobenius method.	**T1: Chapter 11** Secs. All **Chapter 11** Secs. All **Chapter 16** Secs. 16.1 – 16.4	**International Academia:** Syllabus | Engineering Math: Differential Equations and Linear Algebra | Mechanical Engineering | MIT OpenCourseWare Part III: Linear Algebra | Calculus Revisited: Complex Variables, Differential Equations, and Linear Algebra | Supplemental Resources | MIT OpenCourseWare ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping:*** MATLAB	14	1. Solve any initial valued ordinary differential equation. 2. Solve any boundary valued ordinary differential equation

4	**Basic Statistics**	Measures of Central Tendency- Mean, Median & Mode; Measures of Dispersion – Variance and Standard Deviation; Moments, Skewness, Kurtosis; Correlation & Regression, Rank Correlation.	**T1: Chapter 25**	***International Academia:*** **Theory of Probability Course I Stanford Online** Statistical Methods in Engineering & Physical Sciences I Stanford Online) ***AICTE prescribed syllabus:*** Untitled_1-min.pdf (aicte-india.org) ***Industry Mapping:*** MATLAB	10	1. Plot Scatter diagram, Histogram, Frequency Polygon, Ogive (two types) for any given data. 2. Find mean, median, mode for ungrouped data. 3. Find the correlation and rank correlation between two variables. 4. Find the regression line between two variables.

Text Book:

T1: B. S. Grewal, "Higher Engineering Mathematics", 44th Edition (2021), Khanna Publishers.

T2: B. K. Pal & K. Das, "Engineering Mathematics" - Vol. 1, 10th Edition (2021), U. N. Dhur & Sons.

Reference Books:

1. **Biswadip Basu Mallik & Krishanu Deyasi,** "Engineering Mathematics" – Vol. 1A, 2B, 1st Edition (2020), Cengage Learning.
2. **Erwin Kreyszig,** "Advanced Engineering Mathematics", 10th Edition (2017), John Wiley & Sons.
3. **R. K. Jain and S. R. K. Iyengar,** "Advanced Engineering Mathematics", 5th Edition (2016), Narosa Publication House.

4. **B. V. Ramana,** "Higher Engineering Mathematics", 11th Reprint (2017), Tata McGraw Hill.

5. **Amos Gilat,** "Matlab: An Introduction with Applications", 6th Edition (2016), John Wiley & Sons.

6. **Rudra Pratap,** "Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers", 7th Edition (2019), Oxford University Press.

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2	3	-	-	-	1	1	2	1
CO2	3	3	3	2	3	-	-	-	1	1	2	1
CO3	3	3	3	2	3	-	-	-	1	1	2	1
CO4	3	3	3	2	3	-	-	-	1	1	2	1

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Programming for Problem Solving **Credit: 3** **Lecture Hours: 36**

Subject Code: ESCCS101/ESCCS201

Lecture Notes Coursera NPTEL LinkedIn Learning Infosys Springboard

Course Objectives:

Upon successful completion of this course, students will be able to:

- Understand core programming principles and the C programming language.
- Develop C programs to solve computational problems.
- Utilize C libraries for common programming tasks.
- Employ effective programming practices.
- Gain a foundation for further computer science studies.
- Appreciate C programming's industry relevance.

Course Outcomes:

CO1: Impart the fundamental concepts of problem-solving approaches and algorithmic thinking

CO2: Provide comprehensive knowledge of the C programming language, including character sets, expressions, and operators

CO3: Demonstrate control over program flow and logic using input/output operations, control structures, and program organization

CO4: Enable students to solve real-world challenges by applying advanced concepts such as functions, arrays, pointers, data structures and file handling in building end-to-end applications

Module	Topic	Sub-topics	Mapping with Industryand International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Introduction to C**	**Introduction:** • The Von-Neuman Architecture, • Hardware and Software, • Phases of a program execution, • Compiler vs Interpreter, • Phases of a C Program Compilation • Execution of a C Program **Structure of C Program:** • The first C Program: Hello World • Preprocessor Directives • Header Files • The MAIN function • Keywords &Identifiers • Statements • Punctuations and Various Brackets	**MIT OCW** – LINK **AICTE** – LINK **Industry Mapping** – Understanding File systems, command line interfaces and programming practices **Platforms & IDEs:** GitHub, VSCode, GCC **Competitive Coding:** HackerRank, Leetcode, Codevita	4	• Write a C program that prints "Hello, World!" and your name on separate lines. Add comments explaining each part. • Write a simple C program and conceptually explain the preprocessor, compiler, assembler, and linker phases. Compile and execute it. Introduce an error and observe the compiler message. • List five C keywords with their purposes. Provide five valid and five invalid identifiers with explanations. Write a short program using at least three keywords and three valid identifiers.
2	**Data Representation, I/O and Operators**	**Datatypes** – • Binary Representation, Allocation Size, Range. • Console I/O - printf() & scanf() • Formatted Strings • Format Specifiers • Escape Sequences. **Operators -** • Operands and Expressions • Unary, Binary, Ternary	**MIT OCW** – LINK **AICTE** – LINK **Industry Mapping** – Understanding the concept of memory representation of data **Platforms & IDEs:** GitHub, VSCode, GCC **Competitive Coding:** HackerRank, Leetcode, Codevita	4	• Write a C program to print the size and range of int, char, float, double, short int, long int, and long double using sizeof(). Experiment with out-of-range values. • Write a program to get user input for name and age and print it back using printf() with appropriate format specifiers. Format the output neatly. Explore different format specifiers. • Write a program that takes two integers and performs addition, subtraction, multiplication, integer division, and modulus, printing the results. • Write a program demonstrating prefix and postfix increment and decrement operators, explaining their

		Operators • Arithmetic, Logical, Assignment, Relational, Bitwise, Increment, Decrement, Conditional Operators • Operator Precedence			difference. • Write a program using logical operators (&&, ||, !) to evaluate a simple condition based on user input. • Write a program using bitwise operators (&, |, ^, ~, <<, >>) on two integers and print the binary results (helper function might be needed). • Write a program with an expression involving multiple operators of different precedence levels. Predict and verify the output.
3	**Control Flow**	**Conditions**: • If, Else, Else if • Nested Conditions • Switch-case • Goto. **Iterations:** • While loop, • Do-while loop, • For loop, • Break and continue, • Nested loops	**MIT OCW** – LINK **AICTE** – LINK **Industry Mapping** Learning to build Flowcharts **Platforms & IDEs:** GitHub, VSCode, GCC **Competitive Coding:** HackerRank, Leetcode, Codevita	6	• Write a program to check if an input integer is positive, negative, or zero. • Write a program to find the largest of three input integers using nested if-else. • Write a program that takes a character and uses switch-case to identify it as a vowel or consonant (case-insensitive), including a default case. • (Optional) Demonstrate a simple use of goto and explain why it should be used cautiously. • Write a program using a while loop to print the first n natural numbers (n is user input). • Write a program using a do-while loop to repeatedly ask for a positive number until one is entered. • Write a program using a for loop to calculate the sum of even numbers from 1 to 100. • Write a program with a nested loop to print a simple pattern of asterisks. • Write a program with a for loop from 1 to 10. Use break to exit when the number is 5, printing preceding numbers. • Write a program with a for loop from 1 to 10. Use continue to skip even numbers and print only odd numbers.
4	**Arrays and Strings**	**Arrays:** • Declaration and Initialization, • Indexing • Memory Layout • Multidimensional Arrays	**MIT OCW** – LINK **AICTE** – LINK **Industry Mapping:** Exploring the foundations of structured data	5	• Declare and initialize an integer array of size 5. Print all elements with their indices. • Write a program to find the sum and average of elements in an integer array. • Write a program to find the largest and smallest element in an integer array.

		Strings: • Character arrays vs strings • Declaring and initializing strings, • String Input and Output • String library functions	representation and manipulation. **Platforms & IDEs:** GitHub, VSCode, GCC **Competitive Coding:** HackerRank, Leetcode, Codevita		• Declare and initialize a 2x3 integer matrix. Print all elements in row-major order. • Write a program to add two 2x2 matrices and print the resulting matrix. • Declare a character array and initialize it with a string literal. Print the string by iterating until the null terminator. • Declare a string using a string literal directly and print it using printf() with %s. • Write a program to get a string input from the user and print it back using scanf() (be aware of buffer overflow) and printf(). • Repeat the above using fgets() for safer string input. • Write a program that takes two strings and uses strlen(), strcpy(), strcat(), and strcmp() from <string.h> to demonstrate their functionalities. •
5	**Function and Recursion**	• Declaration, Definition, & Calling • Formal vs Actual parameters • Return type • Recursion • Scope: local vs global variables • Storage classes: auto, static, extern, register	**MIT OCW** – LINK **AICTE** – LINK **Industry Mapping:** Understanding the foundation of procedural programming, code reusability **Platforms & IDEs:** GitHub, VSCode, GCC **Competitive Coding:** HackerRank, Leetcode, Codevita	4	• Write a function add (int a, int b) that returns the sum. Call it from main with sample values and print the result. • Write a function is Even(int num) that returns 1 if even, 0 otherwise. Call it from main and print a message based on the return value. • Write a function square (int x). In main, pass a variable to square (call by value) and show the original variable remains unchanged. Explain formal vs. actual parameters. • Write a recursive function factorial (int n). Call it from main and print the result. • Write an iterative function factorial_iterative (int n). Compare it with the recursive version. • Write a program demonstrating local and global variables with the same name, showing which is accessed within a function. • Write a program using a static local variable in a function to show its value persists across calls.
6	**Pointers**	• Concept of memory address, • Declaring and using pointers, • & and * operators.	**MIT OCW** – LINK **AICTE** – LINK **Industry Mapping:**	6	• Declare an integer and a pointer to an integer. Assign the integer's address to the pointer. Print the integer's value directly and indirectly, and print the address and pointer value.

		• Call by value vs Call by Reference, • Pointers and arrays, • Pointers with strings, • Pointers to pointers, • Dynamic memory allocation • Command-line arguments.	Explore direct memory manipulation capabilities of C. **Platforms & IDEs:** GitHub, VSCode, GCC **Competitive Coding:** HackerRank, Leetcode, Codevita		• Demonstrate the use of & (address-of) and * (dereference) operators. • Write swap_value(int a, int b) that doesn't swap original values in main (call by value). Explain why. • Write swap_reference(int *a, int *b) that swaps original values using pointers (call by reference). • Declare an integer array and a pointer to its first element. Iterate using pointer arithmetic and print each element. Show the array name acts as a pointer. • Declare a string literal and assign its address to a character pointer. Iterate and print each character until the null terminator. • Declare an integer, a pointer to an integer, and a pointer to a pointer. Demonstrate accessing the original value using the double pointer. • Write a program to get the size of an integer array from the user and use malloc() to allocate memory. Read values, print them, and then free() the memory. • Repeat the dynamic allocation using calloc() and observe the initialization difference. • Write a program to dynamically resize an array using realloc() after initial allocation. • Write a program that takes two command-line arguments (numbers) and prints their sum.
7	**Structures & Unions**	**Structures**: • Defining and declaring structures, • Accessing members • User-defined data types - typedef • Passing structures to functions, • Arrays of structures, • Nested structures **Unions**: • Syntax & memory layout of	**MIT OCW** – LINK **AICTE** – LINK **Industry Mapping:** Learning to construct user-defined datatypes. **Platforms & IDEs:** GitHub, VSCode, GCC **Competitive Coding:** HackerRank, Leetcode, Codevita	4	• Define a Student structure (name, roll_no, marks). Declare and initialize a Student variable. Print its information using the dot operator. • Use typedef to create an alias for the Student structure. Declare and initialize a variable of the new type. • Write a function displayStudent(struct Student s) to print student info (pass by value). Call it from main. • Write a function updateMarks(struct Student *s, float new_marks) to update marks (pass by reference). Call it from main. • Declare an array of three Student structures, initialize them, and print the information of all

		unions • Struct vs. union • Enum definition and use in switch-case • Enum vs #define constants			students. • Define an Address structure (street, city, zipcode). Modify Student to include an Address member. Declare, initialize, and print a Student with address details. • Define a Data union (int or float). Declare a variable, assign an int and print, then assign a float and print. Observe the output. • Write a short explanation comparing and contrasting structures and unions. • Define an enum DayOfWeek. Write a program that takes an integer input and uses a switch-case with the enum to print the day name. • Explain the advantages of using enums over #define constants for related integer constants.
8	**File Handling**	• The file pointer • Opening & closing a file • Reading and Writing Files • Formatted: fprintf and fscanf • Character: fputc and fgetc • String: fputs and fgets • File Modes • ftell,fseek,rewind,feof	**MIT OCW** – LINK **AICTE** – LINK **Industry Mapping** Learning to build advanced project with database integration **Platforms & IDEs:** GitHub, VSCode, GCC **Competitive Coding:** HackerRank, Leetcode, Codevita	3	• Write a program to open "my_file.txt" in write mode, write a few lines, and close it. Then, open it in read mode and print each line until EOF. • Create a Product structure (name, price). Write a program to write info for three products into a file using fprintf(). Write another program to read this data back using fscanf() and print it. • Write a program to open a file in write mode and use fputc() to write a string character by character. Write another program to read it back using fgetc() until EOF. • Write a program to open a file in write mode and use fputs() to write a few strings (one per line). Write another program to read them back using fgets() until NULL. • Experiment with different file modes ("r", "w", "a", "r+", "w+", "a+") with small programs to understand their behavior. • Write a program to open a file, write data, use ftell() to get the position, fseek() to go to the beginning and read, and rewind() to go to the beginning and read again. • Write a program that reads a file character by character using fgetc() and uses feof() to detect the end and stop reading.

Text Books:

1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
2. Reema Thareja, Computer Fundamentals and programming in C, Oxford University Press
3. Yashavant Kanetkar, Let Us C, BPB Publications,13th Edition

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

Alternate Courses:

NPTEL – Introduction to programming in C, Satyadev Nandakumar, IIT Kanpur - https://nptel.ac.in/courses/106104128
COURSERA – Introductory C Programming Specialization- Andrew D. Hilton- https://www.coursera.org/specializations/c-programming

Lesson Plan:

Week	Module	Topics
1	Module 1: Introduction to C	• History, structure of C programs • Compilation phases: Preprocessor, Compiler, Linker • main(), header files, keywords, identifiers
2	Module 2: Data Representation, I/O and Operators	• Data types, memory representation • printf(), scanf(), format specifiers • Arithmetic, Logical, Relational, Bitwise, Assignment operators
3	Module 3: Control Flow – Conditions	• if, else, else if, nested conditions • switch-case, goto (with caution)
4	Module 3: Control Flow – Loops	• while, do-while, for loops • break, continue, nested loops • Pattern printing and number-based logic
5	Module 4: Arrays	• Declaration, initialization, traversal • Sum, average, max/min in array • Introduction to 2D arrays and matrix operations
6	Module 4: Strings	• Character arrays and string literals • Input/output using scanf, gets, fgets • String library functions: strlen, strcpy, strcat, strcmp
7	Module 5: Functions	• Function declaration, definition, and calling • Return values, parameters (call by value) • Scope and storage classes
8	Module 5: Recursion	• Recursive vs iterative logic • Recursive programs: factorial, GCD, Fibonacci
9	Module 6: Pointers – Basics	• Address-of and dereference operators • Pointer arithmetic, arrays and pointers • Call by reference
10	Module 6: Pointers – Advanced	• Dynamic memory: malloc, calloc, realloc, free • Pointer to pointer • Command-line arguments
11	Module 7: Structures & Unions	• Structure declaration, array of structures • Passing structures to functions • Nested structures, typedef • Introduction to Unions and Enums
12	Module 8: File Handling	• File I/O operations: fopen, fclose, fscanf, fprintf, fgetc, fputc, fgets, fputs • File modes, ftell, fseek, rewind, feof

		• Command-line file handling programs

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Introduction to AI and Data Science using Python **Credit: 3** **Lecture Hours: 36**

Subject Code: ESCCS102/ESCCS202

Lecture Notes **Coursera** **NPTEL** **LinkedIn Learning**

Course Objectives:

- Understand fundamental concepts of AI and Data Science.
- Apply Python programming skills to solve data-oriented problems.
- Utilize key Python libraries for data manipulation, analysis, and visualization.
- Implement basic machine learning algorithms.
- Gain practical experience through hands-on projects and assignments.

Course Outcomes:

- CO1: Understand fundamental components of programming in python
- CO2: Implement solutions using object orient programming concepts using python classes and objects
- CO3: Develop databases, perform numerical computation and visualize data using python packages
- CO4: Apply concepts of python to solve challenges in AI and Data Science

Module	Topic	Sub-topics	Mapping with Industryand International Academia	Lecture Hours	Corresponding Assignment
1	**Python Basics**	The Python Interpreter, Console I/O, Conditions, Control Flow, Functions, Datatypes, List, Tuple, Set, Dictionaries, File I/O	**International Academia**: https://ocw.mit.edu/courses/6-189-a-gentle-introduction-to-programming-using-python-january-iap-2008/pages/syllabus/ https://ocw.mit.edu/courses/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/pages/syllabus/ **AICTE Curriculum:** **LINK** **Industry Mapping** GitHub platform IDEs-PyCharm, IDLE, Visual Studio Code **Competitive Coding Platform** HackerRank, TCS Codevita projects web-based interactive computing platform jupyter notebook, google colab **LinkedIn Learning** **Artificial Intelligence** https://www.linkedin.com/learning/introduction-to-artificial-intelligence-24947908 **Prompt Engineering** https://www.linkedin.com/learning/tech-trends/welcome-to-tech-trends?u=229219690 https://www.linkedin.com/learning/introduction-to-prompt-	10	1. Write a program in python to print all prime numbers inside a range of numbers provided by the user. 2. Create one Fibonacci sequence till a specific no. of terms and count the number of variables used without any functions. Write one Python Program. 3. Print the series upto N terms: 1, 3, 7, 13, 21, 31 and count the number of mathematical operators used without any functions. Write one Python Program. 4. Input a number and check whether it is Krishnamurthy or not using functions and count the number of iterations used without any functions. Write one Python Program.\ 5. Create one list of 20 values and find out Mean, Median and Mode of a list of numbers. Count the number of separators used. Write one Python Program. 6. Given a list of numbers return the indices in which a specific number occurs. 7. Take input from one file and place it to another file. Use Ascii value for comparison Rotate the content in the copied file. Design one hash function to check the integrity of the two files. Write a Python program. 8. Write a Python program to demonstrate the use of Local and Global variables 9. Implement the following functions/methods which operates on lists in Python with suitable examples:

			engineering-for-generative-ai-24636124/joining-the-nlp-revolution?u=229219690 https://www.linkedin.com/learning/prompt-engineering-how-to-talk-to-the-ais **Data Science** https://www.linkedin.com/learning/learning-data-science-understanding-the-basics/welcome?u=229219690 **Python** https://www.linkedin.com/learning/python-functions-for-data-science/python-functions-you-should-know?u=229219690 **Beginner:** https://www.linkedin.com/learning/paths/getting-started-with-python **Intermediate:** https://www.linkedin.com/learning/paths/advance-your-skills-in-python-8969631 **Expert:** https://www.linkedin.com/learning/paths/advance-your-python-skills-for-data-science		**a) list( )** **b) len( )** **c) count( )** **d) index ( )** **e) append( )** **f) insert( )** **g) extend()** **h) remove( )** **i) pop( )** **j) reverse( )** **k) sort( )** **l) copy( )** **m) clear( )** 10. Implements the following functions/methods which operates on tuples in Python with suitable examples: **a) len( )** **b) count( )** **c) index( )** **d) sorted( )** **e) min ( )** **f) max( )** **g) cmp( )** **h) reversed( )**
2	**Object Oriented Programming with Python**	Classes, Objects, Special Methods: __init _, __call__ , __iter__ , __getitem__, __len__	**International Academia**: https://ocw.mit.edu/courses/6-189-a-gentle-introduction-to-programming-using-python-january-iap-2008/pages/syllabus/ https://ocw.mit.edu/courses/6-	10	1. Write a Python program to define a class " Box" and write functions to calculate its volume. 2. Write a program to define a class " Car" and necessary functions to calculate the velocity given starting velocity (input), acceleration (member variable) and time of acceleration(input). 3. Create a class that will return the Fibonacci

			0001-introduction-to-computer-science-and-programming-in-python-fall-2016/pages/syllabus/ **AICTE Curriculum:** **LINK** **Industry Mapping** GitHub platform IDEs-PyCharm, IDLE, Visual Studio Code **Competitive Coding Platform** HackerRank, TCS Codevita projects web-based interactive computing platform jupyter notebook, google colab **LinkedIn Learning** **Artificial Intelligence** https://www.linkedin.com/learning/introduction-to-artificial-intelligence-24947908 **Prompt Engineering** https://www.linkedin.com/learning/tech-trends/welcome-to-tech-trends?u=229219690 https://www.linkedin.com/learning/introduction-to-prompt-engineering-for-generative-ai-24636124/joining-the-nlp-revolution?u=229219690 https://www.linkedin.com/learning/prompt-engineering-how-to-talk-to-the-ais **Data Science** https://www.linkedin.com/learning/learning-data-science-		numbers sequentially every time it is called using __iter__() 4. Write a Python Program to call data member and function using classes and objects 5. Write a Python Program to demonstrate the use of constructors. 6. Write a Python program that attempts to divide two numbers entered by the user. Use a try-except block to handle the ZeroDivisionError if the user enters zero as the divisor. 7. Write a Python program that calculates the square root, sine, and cosine of a number entered by the user, using functions from the math module.

			understanding-the-basics/welcome?u=229219690 **Python** https://www.linkedin.com/learning/python-functions-for-data-science/python-functions-you-should-know?u=229219690 **Beginner:** https://www.linkedin.com/learning/paths/getting-started-with-python **Intermediate:** https://www.linkedin.com/learning/paths/advance-your-skills-in-python-8969631 **Expert:** https://www.linkedin.com/learning/paths/advance-your-python-skills-for-data-science		
3	**Numerical Data Analysis with Python**	NumPy N-D arrays, Indexing, Slicing, Reshaping, ND-Array Arithmetic	**International Academia**: https://ocw.mit.edu/courses/6-189-a-gentle-introduction-to-programming-using-python-january-iap-2008/pages/syllabus/ https://ocw.mit.edu/courses/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/pages/syllabus/ **AICTE Curriculum:** **LINK** **Industry Mapping** GitHub platform IDEs-PyCharm, IDLE, Visual Studio Code **Competitive Coding Platform** HackerRank, TCS Codevita	6	1. Create a NumPy array of the first 10 even numbers. 2. Write a Python program to take input and display the values of 2 dimensional NumPy array. 3. Write a Python program to transpose a 2-dimensional NumPy array. 4. Write a Python program to reshape a 2-dimensional NumPy array. 5. Write a Python program to find the determinant of NumPy matrix. 6. Write a Python program to find the inverse of a NumPy matrix. 7. Create two 2x2 NumPy arrays. Perform element-wise addition, subtraction, and multiplication on these arrays. 8. Calculate the dot product of the two arrays. 9. Given a 3x3 NumPy array, calculate its transpose.

			projects web-based interactive computing platform jupyter notebook, google colab **LinkedIn Learning** **Artificial Intelligence** https://www.linkedin.com/learning/introduction-to-artificial-intelligence-24947908 **Prompt Engineering** https://www.linkedin.com/learning/tech-trends/welcome-to-tech-trends?u=229219690 https://www.linkedin.com/learning/introduction-to-prompt-engineering-for-generative-ai-24636124/joining-the-nlp-revolution?u=229219690 https://www.linkedin.com/learning/prompt-engineering-how-to-talk-to-the-ais **Data Science** https://www.linkedin.com/learning/learning-data-science-understanding-the-basics/welcome?u=229219690 **Python** https://www.linkedin.com/learning/python-functions-for-data-science/python-functions-you-should-know?u=229219690 **Beginner:** https://www.linkedin.com/learning/paths/getting-started-with-python **Intermediate:** https://www.linkedin.com/learni		10. Find the determinant of the same 3x3 array. 11. Create a NumPy array of 10 random floating-point numbers. Calculate the mean, median, and standard deviation of this array. 12. Apply the sine and cosine functions to all elements of the array. 13. Create a NumPy array of 15 random integers. Sort the array in ascending order. 14. Use NumPy functions to find the index of the maximum and minimum elements in the sorted array.

			ng/paths/advance-your-skills-in-python-8969631 **Expert:** https://www.linkedin.com/learning/paths/advance-your-python-skills-for-data-science		
4	**Database Handling with Python**	Introduction to Pandas, Series, DataFrames, read CSV	**International Academia**: https://ocw.mit.edu/courses/6-189-a-gentle-introduction-to-programming-using-python-january-iap-2008/pages/syllabus/ https://ocw.mit.edu/courses/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/pages/syllabus/ **AICTE Curriculum:** **LINK** **Industry Mapping** GitHub platform IDEs-PyCharm, IDLE, Visual Studio Code **Competitive Coding Platform** HackerRank, TCS Codevita projects web-based interactive computing platform jupyter notebook, google colab **LinkedIn Learning** **Artificial Intelligence** https://www.linkedin.com/learning/introduction-to-artificial-intelligence-24947908 **Prompt Engineering** https://www.linkedin.com/learning/tech-trends/welcome-to-tech-trends?u=229219690	4	1. Create a Pandas Series containing the names of five different countries. 2. Create another Pandas Series containing the corresponding populations of those countries. 3. Combine these two Series into a single Series where the index is the country name and the value is the population. 4. Access the population of a specific country using its name. 5. Create a Pandas DataFrame from a dictionary containing data about students (name, age, grade). 6. Create a Pandas DataFrame from a list of lists representing student data. 7. Read a CSV file as a pandas DataFrame. 8. Load a sample CSV file (you can create a simple one or use a publicly available dataset). 9. Handle any missing values in the DataFrame (e.g., fill with the mean or drop rows with missing values). 10. Rename the columns of the DataFrame. 11. Display the value of specific columns of a pandas dataframe. 12. Find the mean and standard deviation of a specific column containing numeric data. 13. Read data from a JSON file into a Pandas DataFrame. 14. Write a Pandas DataFrame to an Excel file. 15. Using a DataFrame of student data, write Pandas queries to:

			https://www.linkedin.com/learning/introduction-to-prompt-engineering-for-generative-ai-24636124/joining-the-nlp-revolution?u=229219690 https://www.linkedin.com/learning/prompt-engineering-how-to-talk-to-the-ais **Data Science** https://www.linkedin.com/learning/learning-data-science-understanding-the-basics/welcome?u=229219690 **Python** https://www.linkedin.com/learning/python-functions-for-data-science/python-functions-you-should-know?u=229219690 **Beginner:** https://www.linkedin.com/learning/paths/getting-started-with-python **Intermediate:** https://www.linkedin.com/learning/paths/advance-your-skills-in-python-8969631 **Expert:** https://www.linkedin.com/learning/paths/advance-your-python-skills-for-data-science		a. Select students older than a certain age. b. Select students in a specific grade. c. Sort the DataFrame by name or age.
5	**Data Visualization**	Introduction to Matplotlib: Pyplot, markers, lines, labels, grid, subplot, scatter, bars, histograms, pie-chart	**International Academia**: https://ocw.mit.edu/courses/6-189-a-gentle-introduction-to-programming-using-python-january-iap-2008/pages/syllabus/ https://ocw.mit.edu/courses/6-	3	1. Create a simple line plot showing the relationship between two sets of data (e.g., time vs. temperature). Label the axes and add a title. 2. Create a scatter plot to visualize the relationship between two numerical variables from a Pandas DataFrame.

			0001-introduction-to-computer-science-and-programming-in-python-fall-2016/pages/syllabus/ **AICTE Curriculum:** **LINK** **Industry Mapping** GitHub platform IDEs-PyCharm, IDLE, Visual Studio Code **Competitive Coding Platform** HackerRank, TCS Codevita projects web-based interactive computing platform jupyter notebook, google colab **LinkedIn Learning** **Artificial Intelligence** https://www.linkedin.com/learning/introduction-to-artificial-intelligence-24947908 **Prompt Engineering** https://www.linkedin.com/learning/tech-trends/welcome-to-tech-trends?u=229219690 https://www.linkedin.com/learning/introduction-to-prompt-engineering-for-generative-ai-24636124/joining-the-nlp-revolution?u=229219690 https://www.linkedin.com/learning/prompt-engineering-how-to-talk-to-the-ais **Data Science** https://www.linkedin.com/learning/learning-data-science-		3. Create a bar chart to represent the counts of different categories in a Pandas Series. 4. Customize a Matplotlib plot by changing the color, marker style, and line style. 5. Add a legend to a plot with multiple lines. 6. Add annotations to highlight specific data points. **Subplots:** Create a figure with two subplots: one showing a histogram of a numerical variable and the other showing a box plot of the same variable. 7. Create a basic 3D scatter plot using mplot3d. 8. Create a distribution plot (e.g., histogram with KDE) using Seaborn. 9. Create a pair plot to visualize the relationships between multiple numerical variables in a DataFrame. 10. Create a box plot or violin plot to compare the distribution of a numerical variable across different categories.

			understanding-the-basics/welcome?u=229219690 **Python** https://www.linkedin.com/learning/python-functions-for-data-science/python-functions-you-should-know?u=229219690 **Beginner:** https://www.linkedin.com/learning/paths/getting-started-with-python **Intermediate:** https://www.linkedin.com/learning/paths/advance-your-skills-in-python-8969631 **Expert:** https://www.linkedin.com/learning/paths/advance-your-python-skills-for-data-science		
6	**Introduction to AI and Prompt Engineering**	Introduction to AI, Application Areas, Discriminative vs Generative AI, Definition & Types of Machine Learning, Prompt Engineering – Ethical Policies, Ideal Programming Practices with AI	**International Academia**: https://ocw.mit.edu/courses/6-189-a-gentle-introduction-to-programming-using-python-january-iap-2008/pages/syllabus/ https://ocw.mit.edu/courses/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/pages/syllabus/ **AICTE Curriculum:** **LINK** **Industry Mapping** GitHub platform IDEs-PyCharm, IDLE, Visual Studio Code **Competitive Coding Platform** HackerRank, TCS Codevita	3	1. Introduction to Generative AI tools 2. Introduction to Prompt Engineering 3. Research and list at least five different real-world applications of Artificial Intelligence across various domains (e.g., healthcare, finance, transportation). Briefly describe how AI is used in each application. 4. Explain the key differences between discriminative and generative AI models. 5. Briefly describe the three main types of machine learning: supervised learning, unsupervised learning, and reinforcement learning. Give a simple example of a problem that can be solved using each type. 6. Discuss one ethical consideration that arises in the field of AI or data science. Explain why it is important and suggest a potential way to

			projects web-based interactive computing platform jupyter notebook, google colab **LinkedIn Learning Artificial Intelligence** https://www.linkedin.com/learning/introduction-to-artificial-intelligence-24947908 **Prompt Engineering** https://www.linkedin.com/learning/tech-trends/welcome-to-tech-trends?u=229219690 https://www.linkedin.com/learning/introduction-to-prompt-engineering-for-generative-ai-24636124/joining-the-nlp-revolution?u=229219690 https://www.linkedin.com/learning/prompt-engineering-how-to-talk-to-the-ais **Data Science** https://www.linkedin.com/learning/learning-data-science-understanding-the-basics/welcome?u=229219690 **Python** https://www.linkedin.com/learning/python-functions-for-data-science/python-functions-you-should-know?u=229219690 **Beginner:** https://www.linkedin.com/learning/paths/getting-started-with-python **Intermediate:** https://www.linkedin.com/learni		mitigate the issue.

			ng/paths/advance-your-skills-in-python-8969631 **Expert:** https://www.linkedin.com/learning/paths/advance-your-python-skills-for-data-science		

Text Books:

1) Python for Everybody: Exploring Data in Python 3, Charles Severance, SPD
2) Python Computing Fundamentals and Applications, Abhijit Kar Gupta, Techno World.
3) Python Programming, Subrata Saha, Aryan Publishing House.
4) Prompt Engineering for Generative AI by James Phoenix, Mike Taylor, O'Reilly Media, Inc.

Reference Books:

1) Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, Wes McKinney, O'Reilly
2) Python: The Complete Reference, Martin C. Brown, Osborne/McGraw-Hill

Alternate Courses

NPTEL –Python for Data Science – Prof. Ragunathan Rengasamy, IIT Madras. https://nptel.ac.in/courses/106106212
COURSERA– Python for Data Science, AI & Development, Joseph Santarcangelo - https://www.coursera.org/learn/python-for-applied-data-science-ai

Lesson plan

Weeks	Topics
1	Python Basics - Introduction to Python, Console I/O, Data Types
2	Python Basics - Conditions, Control Flow, Functions
3	Python Basics - Lists, Tuples, Sets, Dictionaries, File I/O
4	Object Oriented Programming - Classes, Objects, Special Methods
5	OOP Continued - Constructors, Exception Handling, Math Module

6	Numerical Data Analysis with NumPy - Arrays, Indexing, Arithmetic
7	Numerical Data Analysis with NumPy - Matrix Operations, Statistics
8	Database Handling with Pandas - Series, DataFrames, CSV Handling
9	Database Handling Continued - JSON, Excel, Queries
10	Data Visualization with Matplotlib - Line, Bar, Scatter Plots
11	Data Visualization Continued - Subplots, Seaborn, Advanced Plots
12	Introduction to AI and Prompt Engineering - Types, Ethics, Applications

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Basic Electronics Engineering Credit Points: 4 Lecture Hours:

Subject Code: ESCEC101

Study Material Coursera NPTEL Linkedin Learning

COURSE OBJECTIVES:

1. To introduce basic concept of Electronics
2. To study semiconductor, its band-structure, p-type and n-type semiconductor
3. To introduce the concept of P-N junction diode, Zener diode.
4. To learn the concept of BJT, FET and OPAMP.
5. To illustrate the basic concept of logic gates

Course Outcomes:

CO1: To conceptualize the fundamentals of semiconductor physics including the band structures.

CO2: To be able to understand the basics of p-n junction diode and Zener diode and their applications.

CO3: To be able to understand the concept of Transistors working principles, characteristics and their applications.

CO4: To study the basics of digital electronics including basic gates, universal gates and truth tables.

Module number	Topic	Sub-topics	Textbook Name and chapter	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1.	**Semicon-ductor Physics**	Classification of Metal, insulator and semiconductor, Introduction to active and passive components, intrinsic and extrinsic semiconductor, n-type and p-type semiconductors and their Band structure, carrier concentration, scattering and drift of electrons and holes, drift current, diffusion mechanism, generation and recombination and injection of carriers, **density of state function and dimensional problem quantization**	Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky **Chapter**-1	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf)	6	1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, millimetres etc. 2. Familiarization with measuring and testing equipment like CRO, Signal generators etc.

				Industry Mapping: TCAD Software		
2.	**P-n Junction diode and Zener diode**	Diodes: Semiconductor p-n junction formation, forward and reverse bias, V-I characteristics of p-n junction diode, **Current equation**, **Derivation for Forward and Reverse current, piece-wise linear diode characteristics,** Diode as a switch, Application of diode in Clipper and Clamper Circuits, Zener Diodes, V-I characteristics of Zener Diodes, application of junction diode as a rectifier, Half-Wave and Full-Wave Rectifier Circuits, **SCR Operation & Characteristics.**	Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky **Chapter**-2	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** TCAD Software	6	1. Circuit designing using p-n junction diodes. **i.** Study the I-V characteristics of a p-n junction diode **ii.** Design and implement clipper circuits using a diode and observe their effect on the output waveform. **iii.** Design and implement clamper circuits using a diode and observe their effect on the output waveform. 2. Study of I-V characteristics of Zener diodes. 3. Design and implement voltage over-protection circuit using a Zener diode 4. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
3.	**Bipolar Junction Transistors**	Bipolar Junction Transistor (BJT): Type, Operation, Physical mechanism, current gain, minority current distribution; Punch-	Electronic Devices and Circuits Theory by Robert L.	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-	6	1. Study of Characteristic curves for CB, CE mode configuration and find the

		through and avalanche effect**,** V-I Characteristics, region of operation, input & output characteristics for CB. CE & CC mode, current amplification factors α for CB mode and β for CE mode, BJT as amplifier and switch, small signal analysis**, small signal analysis using h-parameter, gain and impedance calculation**	Boylestad, Louis Nashelsky **Chapter**-3	devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** TCAD Software, SPICE Software		respective hybrid parameters.
4.	**Field effect transistors**	Metal Oxide Semiconductor Field Effect Transistors (MOSFET): Construction, Types, Operation, V-I characteristics, Regions of operation, MOSFET as switch & amplifier, CMOS technology, Advanced CMOS devices (Example: FinFETs, MOSFETs with high mobility channels, and silicon nanowire transistors), IGBT	Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky **Chapter**-6	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Cur	6	1. Study of I-V characteristics of Field Effect Transistors and show the characteristics in LTSpice.

				riculum/Final_ECE.pdf) ***Industry Mapping:*** TCAD Software, SPICE Software		
5.	**OPAMP**	Ideal Op-AMP, CMRR, Open & Closed loop circuits, importance of feedback loop (positive & negative), Inverting Configuration, Noninverting configuration, DC imperfections, difference amplifiers, circuits based on Op-amps: Integrators, differentiators, filters, logarithmic amplifiers, Schmitt trigger, **frequency dependent negative resistance and solution of differential equations**	Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky **Chapter - 10**,11	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** TCAD Software, SPICE Software	6	1. Design and simulate Inverting and Non-inverting amplifiers using Op-amp and draw waveforms in LTSpice 2. Design and simulate Adder and Subtractor circuits using Op-amp and draw waveforms in LTSpice 3. Design and simulate Differentiator and Integrator circuits using Op-amp and draw waveforms in LTSpice 4. Determination of input-offset voltage, Offset null of Op-amps, etc.
6.	**Digital Logic gates**	Components of TTL circuits, Boolean Algebra and Logic Gates, Basic Logic AND, OR, NOT Gates and Universal gates, XOR and XNOR gate, their symbols and Truth tables,	Digital Logic Design 4th Edition by M . Morris Mana and Michael D. Ciletti Chapters 1,2,4	***International Academia:*** (https://web.stanford.edu/class/archive/ee/ee108a/ee108a.1082/schedule.html)	6	1. Study of Logic Gates and realization of Boolean functions using Logic Gates.

		De Morgan's Theorems, Combinational Circuit (adders/subtractors, magnitude comparator, multiplexer, demultiplexers, encoders, decoders).		***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** Hardware Chipsets Software- TinkerCad, EDA Playground		2. Show NAND and NOR gates are universal gates. 3. Write a VHDL code to describe the functionality of various gates. Compile and simulate the code to obtain the timing waveform.

Text Books:

1. Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky (Chapters 1,2,3,6,10,11)
2. Digital Logic Design 4th Edition by M . Morris Mano and Michael D. Ciletti (Chapters 1,2,4)

Reference Books:

1. Streetman, Solid State Electronic Devices, Pearson Education India
2. Donald Neamen, Semiconductor Physics and Devices, McGraw-Hill Higher Education
3. Simon M. Sze, Yiming Li, Kwok K. Ng, Physics of Semiconductor Devices, John Wiley & Sons
4. **Millman, Grabel, Microelectronics, McGraw Hill**
5. **Sedra, Smith, Microelectronic Circuits, Oxford University Press.**

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Basic Electrical Engineering **Credit: 4** **Lecture Hours: 42**

Subject Code: ESCEE101

Pre-requisite: Basic knowledge of Physics and Mathematics in Class- XI and XII level

Relevant Links:

COURSE OBJECTIVES:

CO1: Students can recognize different network elements, identify different network connections, and understand the concept of voltages and currents in AC or DC circuits.
CO2: Students can apply and relevant laws of electricity, network theorems to analyze electrical and magnetic circuits.
CO3: Students will be acquainted with the operations and characteristics of machines and converter circuits. They can understand the realistic applications of these machines. They will gain knowledge on requirement of deferent electrical safety tools which are mandatory during electric installations.
CO4: Develop an ability to analyze and solve theoretical problems of Basic Electrical Engineering.

COURSE OUTCOMES:

CO1: Students can recognize different network elements, identify different network connections, and understand the concept of voltages and currents in AC or DC circuits.
CO2: Students can apply and relevant laws of electricity, network theorems to analyze electrical and magnetic circuits.
CO3: Students will be acquainted with the operations and characteristics of machines and converter circuits. They can understand the realistic applications of these machines. They will gain knowledge on requirement of deferent electrical safety tools which are mandatory during electric installations.
CO4: Develop an ability to analyze and solve theoretical problems of Basic Electrical Engineering.

Module number	Topic	Text Book, Chapter	Sub-topics (Yellow highlighted portion: AICTE syllabus; Red highlighted portion: MIT Syllabus)	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	DC Circuits	Basic Electrical Engineering By B.L.Theraja S.Chand Publication Chapter 1,2,21	Electrical circuit elements (R, L and C), voltage and current sources, Fundamentals of linear systems, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.	***International Academia:*** https://catalog.mit.edu/subjects/6/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Untitled 1-min.pdf	8	Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2	AC Circuits	Basic Electrical Engineering By B.L.Theraja S.Chand Publication Chapter 11,12,13,14	Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.	***International Academia:*** https://catalog.mit.edu/subjects/6/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model Curriculum/AICTE%20-%20UG%20CSE.pdf	8	Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits –

						impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
3	Transformers	Basic Electrical Engineering By B.L.Theraja S.Chand Publication Chapter 6, 7, 32, 33	Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. Analysis and design of modern energy conversion and delivery systems.	***International Academia:*** *https://catalog.mit.edu/subjects/6/* ***AICTE Syllabus*:** https://www.aicte-india.org/sites/default/files/Model Curriculum/AICTE%20-%20UG%20CSE.pdf .	6	Observation of the no-load current waveform on an oscilloscope (nonsinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-

						neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
4	Electrical Machines	Basic Electrical Engineering By B.L.Theraja S.Chand Publication Chapter 26, 27, 28, 29, 30, 34, 35	Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.	***International Academia:*** https://catalog.mit.edu/subjects/6/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Untitled_1-min.pdf	8	Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine. Torque Speed Characteristic of separately excited dc motor. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-

						Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super synchronous speed.
5	Power Converters	Power Electronics By P.S. Bhimbra New Age Publication Chapter 7	DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.	***International Academia:*** https://catalog.mit.edu/subjects/6/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Untitled_1-min.pdf	6	Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.
6	Electrical Installations	Power Electronics By P.S. Bhimbra New Age Publication Chapter 11	Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup. critical challenges associated with global energy systems	***International Academia:*** https://catalog.mit.edu/subjects/6/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Untitled_1-min.pdf	6	Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

TEXT BOOK:

1. Basic Electrical Engineering (Vol. 1 & 2) - B.L.Theraja; S.Chand Publication

REFERENCE BOOKS:

1. Basic Electrical Engineering –Dr. Jagadish Pal; Aryan Publication
2. Basic Electrical engineering- 1St Edition Paperback – P.V. Prasad | S. Sivanagaraju | K. R. Varmah | Chikku Abraham
3. Basic Electrical and Electronics Engineering – 2nd Edition Dr. Vinoth Kumar K; Dr. Saravanakumar R; Dr. Jegathesan, Wiley Publication

NPTEL Link:

https://nptel.ac.in/courses/108105053- NPTEL course link
https://nptel.ac.in/courses/108106172- NPTEL course link
https://nptel.ac.in/courses/108108076- NPTEL course link
https://nptel.ac.in/courses/117106108- NPTEL course link

MATLAB Assignment:

Design an R-L-C series circuit using MATLAB Simulation (values of R,L,C may be advised in class)
Design an R-L-C parallel circuit using MATLAB Simulation (values of R,L,C may be advised in class)

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Engineering Mechanics-Principles Credit:2 Lecture Hours: 24

Subject Code: ESCME102A

Pre-requisite: High School Mathematics

Relevant Links:

Study Material Coursera NPTEL Linkedin Learning

COURSE OBJECTIVES:

1. To introduce students to the fundamental concepts of force, moment, and equilibrium in two- and three-dimensional systems.
2. To develop the ability to model and analyze mechanical systems using vector operations and free-body diagrams.
3. To understand and evaluate frictional effects and structural behavior of trusses under various loading conditions.
4. To apply principles of kinematics and kinetics to describe and solve particle motion problems in engineering contexts

COURSE OUTCOMES:

CO 1: Apply vector operations to represent forces and moments for solving basic engineering problems.

CO 2: Analyse force systems to determine conditions of equilibrium using free-body diagrams.

CO 3: Evaluate the effects of static and kinetic friction in various mechanical systems.

CO 4: Apply kinematic and kinetic principles to solve particle motion problems using rectilinear framework

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Text Book Mapping	Corresponding Lab Assignment
1	**Introduction to Vectors**	Basic concepts, types of forces, scalars and vectors- Vector operations -Force and moment representation using vectors	***International Academia:*** ***https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** *MATLAB*	2	Solving vector mechanics problems in MATLAB	B.B. Ghosh, S. Chakrabarti, S. Ghosh "Engineering Mechanics", Part I - Chapter 2
2	**Force & Equilibrium Systems**	Basic concepts, ; Rigid Body equilibrium (2-D & 3-D); System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Concept of Free body diagrams, Equations of Equilibrium of Coplanar Systems, Lami's Theorem.	***International Academia:*** ***https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** *MATLAB*	4	Solving force equilibrium problems in MATLAB and validating with analytical solutions.	B.B. Ghosh, S. Chakrabarti, S. Ghosh "Engineering Mechanics", Part I - Chapter 1, 3

3	**Friction**	Laws of Friction, Static and Dynamic Friction; Application of Friction in various systems.	***International Academia:*** ***https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** *MATLAB*	4	Solving numerical problems involving friction in MATLAB and validating the analytical solutions.	B.B. Ghosh, S. Chakrabarti, S. Ghosh "Engineering Mechanics", Part I- Chapter 4
4	**Basic Structural Analysis**	Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members.	***International Academia:*** ***https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** ***ANSYS Mechanical***	4	Solving numerical problems on Trusses in ANSYS Mechanical and verifying with analytical calculations	Engineering Mechanics (Statics & Dynamics), D.S. Kumar – Chapter 5
5	**Kinematics of Particles**	Definitions and basic concepts of particle motion, Rectilinear motion: equations of motion for constant and variable acceleration, Projectile motion, Introduction to	***International Academia:*** ***https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/***	5	Use Mujoco or PyBullet to simulate a particle's trajectory under different initial velocities and accelerations.	B.B. Ghosh, S. Chakrabarti, S. Ghosh "Engineering Mechanics" - Part II – Chapters 1,2

		relative motion.	***Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** *Mujoco, PyBullet*		Analyze how changes in parameters affect the path	
6	**Kinetics of Particles**	Application of Newton's laws and D' Alembert's principles to solve motion problems	***International Academia:*** ***https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** *Mujoco, PyBullet*	5	Create a ML model to predict a particle's final velocity given varying forces and masses	B.B. Ghosh, S. Chakrabarti, S. Ghosh "Engineering Mechanics" - Part II – Chapter 3

TEXT BOOKS:

1. B.B. Ghosh, S. Chakrabarti, S. Ghosh, "Engineering Mechanics", Vikas Publishing House (Part I - Chapters 1, 2, 3, 4 Part II – Chapters 1, 2, 3)
2. D.S. Kumar, "Engineering Mechanics (Statics & Dynamics)", S K Kataria and Sons
3.

REFERENCE BOOKS:

1. A. Chanda & D. Nag," Engineering Mechanics", Wiley India, 2017.
2. J. L. Meriam and L. G. Kraige, "Engineering Mechanics: Statics", Wiley.
3. J. L. Meriam and L. G. Kraige, "Engineering Mechanics: Dynamics", Wiley.
4. Timoshenko, Young, Rao, Pati, "Engineering Mechanics," McGraw Hill

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Engineering Mechanics-Essentials **Credit:2** **Lecture Hours: 24**

Subject Code: ESCME102B

Pre-requisite: High School Mathematics

Relevant Links:

Study Material Coursera NPTEL

COURSE OBJECTIVES:

1. To build foundational understanding of vector representation and computation of forces and moments in mechanical systems.
2. To enable students to determine the center of gravity and moment of inertia for regular and composite bodies.
3. To develop a conceptual understanding of dynamic equilibrium and the motion of rigid bodies using Newtonian and D'Alembertian frameworks.
4. To apply energy principles for analyzing particle motion, and understand the relationship between work, energy, and power in mechanical systems.

COURSE OUTCOMES:

CO 1: Apply vector operations to represent forces and moments for solving basic engineering problems.

CO 2: Analyse force systems to determine conditions of equilibrium using free-body diagrams.

CO 3: Evaluate the effects of static and kinetic friction in various mechanical systems.

CO 4: Apply kinematic and kinetic principles to solve particle motion problems using rectilinear framework

Modulee number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Text Book Mapping	Corresponding Lab Assignment
1	**Force & Equilibrium Systems**	Basic concepts, ; Rigid Body equilibrium (2-D & 3-D); System of Forces, Coplanar -Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Concept of Free body diagrams, Equations of Equilibrium of Coplanar Systems, Lami's Theorem.	***International Academia:*** ***https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** *MATLAB*	4	Solving force equilibrium problems in MATLAB and validating with analytical solutions.	B.B. Ghosh, S. Chakrabarti, S. Ghosh "Engineering Mechanics", Part I - Chapter 1, 3
2	**Centre of Gravity & Moment of Inertia**	Centre of Gravity and its implications; Centroid of simple figures from first principle, centroid of composite sections; Area moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Concept of Mass moment inertia.	***International Academia:*** ***https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** *MATLAB*	5	Solving numerical problems on CG & MI in MATLAB and validating with analytical solutions	

3	**Brief Introduction to Dynamic Equilibrium**	.Application of Newton's laws and D' Alembert's principles to solve motion problems	***International Academia:*** ***https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** *MATLAB, Tensorflow ,* *PyTorch*	5	Create a ML model to predict a particle's final velocity given varying forces and masses	B.B. Ghosh, S. Chakrabarti, S. Ghosh "Engineering Mechanics" - Part II – Chapter 3
4	**Dynamics of Rigid Bodies**	Translation and rotation of rigid bodies; instantaneous center of rotation and velocity analysis. Force, torque, and moment of inertia; plane motion types - translation, rotation, and general motion. Application of D'Alembert's principle for dynamic equilibrium; equations of motion for translation, rotation, and combined motion.	***International Academia:*** ***https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf*** ***Industry Mapping:*** ***ANSYS Mechanical***	6	Model a rigid body in Open Modelica with specified rotation and translation parameters. Observe the effect of applied torques and forces on its motion, and plot angular velocity and acceleration over time.	S.S. Bhavikatti "Engineering Mechanics – Vector and Classical Approach" - Chapter 8
5	**Work, Energy & Power**	Work-energy principle for particles, Kinetic energy, potential energy, and conservation of energy	***International Academia:*** ***https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_***	4	Use Mujoco or PyBullet to simulate a particle's trajectory under different initial velocities and accelerations. Analyze how	B.B. Ghosh, S. Chakrabarti, S. Ghosh "Engineering Mechanics" - Part II – Chapter 4

			Mechanical%20Engg.pdf ***Industry Mapping:*** *MATLAB, Blender*		changes in parameters affect the path	

TEXT BOOKS:

1. B.B. Ghosh, S. Chakrabarti, S. Ghosh, "Engineering Mechanics", Vikas Publishing House ((Part I - Chapters 1, 3, 5, 6, Part II – Chapters 4)
2. S.S. Bhavikatti "Engineering Mechanics – Vector and Classical Approach" New Age International Publishers (Chapter 8)

REFERENCE BOOKS:

1. A. Chanda & D. Nag," Engineering Mechanics", Wiley India, 2017.
2. J. L. Meriam and L. G. Kraige, "Engineering Mechanics: Statics", Wiley.
3. J. L. Meriam and L. G. Kraige, "Engineering Mechanics: Dynamics", Wiley.
4. Timoshenko, Young, Rao, Pati, "Engineering Mechanics," McGraw Hill

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Essential Studies for Career Development-I **Credit: 0.5** **Lecture Hours: 48**

Subject Code: ESP101A

Pre-requisite: Basic knowledge of school-level Social Science and Mathematics.

Relevant Links:

Study Material links:

1. http://egyankosh.ac.in//handle/123456789/80893
2. https://ncert.nic.in/textbook/pdf/iess101.pdf
3. https://ncert.nic.in/textbook.php?kegy1=1-6
4. http://egyankosh.ac.in//handle/123456789/80895
5. https://ncert.nic.in/textbook/pdf/iess102.pdf
6. http://egyankosh.ac.in//handle/123456789/67479
7. https://ncert.nic.in/textbook.php?leec1=1-6
8. https://books.google.co.in/books?id=lvAfP7uyKJsC&pg=PA18&source=gbs_toc_r&cad=2#v=onepage&q&f=false
9. http://egyankosh.ac.in//handle/123456789/67653
10. https://ncert.nic.in/textbook.php?leec1=2-6
11. https://books.google.co.in/books?id=4lGQISi9G7wC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
12. http://egyankosh.ac.in//handle/123456789/75067

COURSE OBJECTIVES:

1. To introduce fundamental techniques of quantitative aptitude and logical reasoning.
2. To impart knowledge on practical methods for solving problems related to percentage, profit & loss, mixtures, and related.
3. To impart knowledge on India's political and physiographic divisions.
4. To impart knowledge on basic economic concepts, national income measures, unemployment and poverty

COURSE OUTCOMES:

CO 1: Apply basic quantitative techniques to solve real-life numerical problems.

CO 2: Analyze and solve logical reasoning questions using structured approaches

CO 3: Identify and describe key features of India's political and physiographic geography.

CO 4: Demonstrate an understanding of core economic concepts and current socio-economic issues.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Text Book Mapping	Corresponding Lab Assignment
	Quantitative Aptitude	1. **Quant Foundation** 2. **Percentage-** Basic concept of percentage & its shortcut rules & applications. 3. **Profit & Loss-** Basic concept, formulae, shortcut tricks & application. 4. **Mixture & Alligation–** Proportion & mixtures in percentages, populations & liquids, shortcuts & application.	***International Exams*** ***1. GRE*** *(https://www.ets.org/gre/test-takers/general-test/prepare/content/verbal-reasoning.html#accordion-9f58105fc6-item-88093eca37)* ***National Exams:*** ***1. UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* ***3. Combined Graduate Level conducted by SSC*** *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* ***4. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** ***1. Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Sylla*	12	1. **Textbook:** Quantitative Aptitude, Author: R.S Aggarwal, Publisher: S. Chand (Chapter 1, 10. 11, 20)	❖ Assignment on Numerical Problem Solving on percentage, profit and loss and mixture alligation.

			bus.pdf&param2=advertisement, pg 1 ***2. Miscellaneous Services Recruitment Examination*** *(file:///C:/Users/UEMK/Downloads/2707970_2019.pdf) pg 1*			
2	**Logical Reasoning**	**1. Coding and Decoding** **i.** Conditional Coding, **ii.** Word-Pattern Coding, **iii.** Chinese Coding **2. Direction Sense Test** **i.** Direction Sense Test, **ii.** Direction Distance Test, **iii.** Shadow based Questions. **3. Syllogism**		12	**1. Textbook:** A Modern Approach to Verbal and Non-Verbal Reasoning, Author Dr. R.S Aggarwal, Publisher: S.Chand (Chapter 4, 8)	❖ Assignment on Letter Coding, Number Coding, Conditional Coding and Chinese Pattern. ❖ Assignment on Directions and Distance ❖ Assignment on Syllogism
3	**Geography**	**1. Political Division of India** **2. Physiographic Division of India**	***National Exams:*** *1.**UPSC Civil Services Exam** (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* *2. **UPSC Combined Defence Services** (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* *3. **Combined Graduate Level***	12	**1. IGNOU study material:** IGNOU-Block 1, BGGET- 141 (Unit 1, 2) **2. NCERT textbook for class IX:** Social Science Contemporary India- I (Chapter 1, 2)	❖ Essay on "Comparative analysis of the political divisions in India and another country of their choice". ❖ Brain-storming session on "Climate Change Impact Analysis to research and analyze the impact of climate change on the

			conducted by SSC *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* *4.* ***Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** *1.* ***Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement) pg 1* *2.* ***Miscellaneous Services Recruitment Examination*** *(https://adda247jobs-wp-assetsrod.adda247.com/jobs/wp-content/uploads/sites/7/2022/11/21142422/2707970_2019.pdf)) pg 1*		**3. NCERT textbook for class XI:** India Physical Environment (Chapter 1)	Himalayan region." ❖ Class Discussion on "Island Sustainability plan for environmental preservation." ** All the assignments are in line of GS Paper I of UPSC CSE Mains Examination
4	**Economics**	**1. Basic Concept of Economics** **2. National Income** **3. Unemployment and Poverty**	***National Exams:*** ***1.UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/defa*	12	**1. IGNOU study material:** a. BECC-101, Block-1,Unit-1, Unit-2, Unit-3, b. BECC-103, Unit-1, Unit-2, Unit-3, c. BECC-106,	❖ Essay on "Consumer Behavior Shifts: Navigating the Dynamics of Changing Demand Patterns in India"

			ult/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21 ***3. Combined Graduate Level conducted by SSC*** *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* ***4. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***5. RBI Grade B*** *(https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2CF473396B4FD7E5F69CDDE.PDF), pg 22-23* ***State Level Exams:*** ***1.Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement), pg 1* ***2. Miscellaneous Services Recruitment Examination*** *(https://adda247jobs-wp-assets-prod.adda247.com/jobs/wp-*		Block-2, Unit-6 **2. NCERT textbook for class XII-** Introductory Macroeconomics (Chapter 1, 2) **3. Frank, ISC Economics class XI** (Chapter 12, 14, 15, 16)	❖ Class discussion on "Per Capita Income in India: Challenges and Pathways to Growth ❖ Critical account on "Navigating Unemployment and Economic Recession: Policy Responses for Sustainable Recovery".

			*c*ontent/uploads/sites/7/2022/11/21142422/2707970_2019.pdf)*) pg 1*			

TEXT BOOKS:

1. Textbook: Quantitative Aptitude, Author: R.S Aggarwal, Publisher: S. Chand
2. Textbook: A Modern Approach to Verbal and Non-Verbal Reasoning, Author Dr. R.S Aggarwal, Publisher: S. Chand
3. IGNOU study material: IGNOU-Block 1, BGGET- 141
4. NCERT textbook for class IX: Social Science Contemporary India- I
5. NCERT textbook for class XI: India Physical Environment
6. IGNOU study material: BECC 101, 103, 106
7. NCERT textbook for class XII- Introductory Macroeconomics
8. Frank, ISC Economics Class XI

REFERENCE BOOKS:

1. ESP – I Study Material

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name: Essential Studies for Professionals-I **Credit: 0.5** **Lecture Hours: 48**

Subject Code: ESP101B

Pre-requisite: Basic knowledge of English grammar, Indian history, Civics and Mathematics.

Relevant Links:

Study Material links:

1. https://egyankosh.ac.in/handle/123456789/57865
2. https://ncert.nic.in/textbook.php?keps2=1-10
3. https://books.google.com.na/books?id=XJL5Rk6aHYUC&printsec=copyright&hl=en&pli=1#v=onepage&q&f=false
4. https://egyankosh.ac.in/handle/123456789/57869
5. https://books.google.com.na/books?id=XJL5Rk6aHYUC&printsec=copyright&hl=en&pli=1#v=onepage&q&f=false
6. https://egyankosh.ac.in/handle/123456789/57872
7. https://ncert.nic.in/textbook.php?keps2=2-10
8. https://books.google.com.na/books?id=XJL5Rk6aHYUC&printsec=copyright&hl=en&pli=1#v=onepage&q&f=false
9. https://egyankosh.ac.in/handle/123456789/57885
10. https://books.google.com.na/books?id=XJL5Rk6aHYUC&printsec=copyright&hl=en&pli=1#v=onepage&q&f=false
11. https://egyankosh.ac.in/handle/123456789/53138
12. https://ncert.nic.in/textbook.php?fees1=4-14
13. https://egyankosh.ac.in/handle/123456789/53138
14. https://ncert.nic.in/textbook.php?lehs1=1-4
15. https://nios.ac.in/media/documents/SrSec315NEW/315_History_Eng/315_History_Eng_Lesson3.pdf
16. https://egyankosh.ac.in/handle/123456789/53138
17. https://nios.ac.in/media/documents/SrSec315NEW/315_History_Eng/315_History_Eng_Lesson4.pdf

COURSE OBJECTIVES:

1. To introduce the foundations of grammar, vocabulary, and writing in functional English.
2. To impart knowledge on interpreting data through pie charts.
3. To impart knowledge on the basic structure and key features of the Indian Constitution.
4. To impart knowledge on the early sources and civilizations of Indian history.

COURSE OUTCOMES:

CO 1: Demonstrate proficiency in basic grammar, vocabulary, comprehension, and formal writing.

CO 2: Interpret and analyze data presented in pie charts with accuracy.

CO 3: Explain the making, structure, and key principles of the Indian Constitution.

CO 4: Identify major sources and features of ancient Indian civilizations.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Text Book Mapping	Corresponding Lab Assignment
1	**Objective English**	**1. Verbs**: Application, Subject-Verb Agreement, **2. Non-Finites** (Infinitives, Gerunds and Participles) **3. Application of Tense** **4. Basic Application of Vocabulary** (Synonyms and Antonyms) **5. Reading Comprehension** **6. Official Letter/ Application Writing**	***International Exams*** ***1. GRE*** *(https://www.ets.org/gre/test-takers/general-test/prepare/content/verbal-reasoning.html#accordion-9f58105fc6-item-88093eca37)* ***National Exams:*** ***1. UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* ***3. Combined Graduate Level conducted by SSC*** *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* ***4. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-*	12	**1. Textbook:** Objective General English, Author: R.S Agarwal, Publishing house: S. Chand	❖ Verbs and its Application: Practice set based on Spot the Error. ❖ Non-Finites (Infinitives, Gerunds and Participles): Practice set based on Spot the Error. ❖ Application of Tenses: Practice set based on Spot the Error, ❖ Filler (Single & Double) ❖ Reading Comprehension:

			ACIO-Recruitment-2023-Notification-Emp-News.pdf) ***State Level Exams:*** ***1. Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* ***2. Miscellaneous Services Recruitment Examination*** *(file:///C:/Users/UEMK/Downloads/2707970_2019.pdf) pg 1*			Comprehend the passage ❖ Official Letter/Application Writing
2	**Data Interpretation**	**1. Pie Charts**	***International Exams*** ***1. GRE*** *(https://www.ets.org/gre/test-takers/general-test/prepare/content/verbal-reasoning.html#accordion-9f58105fc6-item-88093eca37)* ***National Exams:*** ***1. UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* ***3. Combined Graduate Level conducted by SSC***	12	1. **Textbook:** An Advanced Approach to Data Interpretation for Competitive Examinations, Author: R.S. Aggarwal, Publisher: S. Chand	❖ Percentage, ratio & average based pie charts. ❖ Degree based pie charts. ❖ Single Pie chart. ❖ Double & Mixed Pie chart

			(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22 ***4. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** ***1. Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* ***2. Miscellaneous Services Recruitment Examination*** *(file:///C:/Users/UEMK/Downloads/2707970_2019.pdf) pg 1*			
3	**Constitution of India**	**1. Making of Constitution** **2. Preamble** **3. Fundamental Rights and DPSP** **4. Fundamental Duties**.	***National Exams:*** ***1.UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* ***3. Combined Graduate Level***	12	**1. IGNOU Study material:** BPSC-102, (Unit 1, 3, 4, 6) **2. NCERT Textbook for class XI:** India Constitution at Work (Chapter 1, 2) **3. History & Civics for ICSE Class**	❖ Classroom Discussion on: "Proposing and defending Constitutional Amendments, fostering critical thinking about societal needs" ❖ Classroom Debate on "the principles outlined in the Preamble exploring their

			conducted by SSC *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* ***4. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** ***1.Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement), pg 1* ***2. Miscellaneous Services Recruitment Examination*** *(https://adda247jobs-wp-assets-prod.adda247.com/jobs/wp-content/uploads/sites/7/2022/11/21142422/2707970_2019.pdf) pg 1*		**IX Textboo**k : Sudeshna Sengupta (Chapter-1, 3)	relevance in contemporary society" ❖ Case Study: "Focus on real-life situations involving Fundamental Rights violations or protections" ❖ Assignment: "Analyze the historical background and evolution of Fundamental Duties, along with their relevance in today's societal context." **All the assignments are in line of GS Paper I of UPSC CSE Mains Examination
4	**History**	**1. Sources of Indian History** **2. The Harappan Civilization**	***National Exams:*** ***1.UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence***	12	**1. IGNOU study material -** BHIC-131- (Unit 1) (History of India from the Earliest Times upto 300	❖ Class discussion on "Advanced Urban Planning in the Indus Valley: Comparisons with Modern City

		3. Vedic Civilization	***Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf , pg 20-21)* ***3. Combined Graduate Level conducted by SSC*** *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* ***4. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf* ***State Level Exams:*** ***1.Civil Services Executive Exam (WBCS)*** ***(****https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* ***2.*** **Miscellaneous Services Recruitment Examination** *(https://adda247jobs-wp-assets-prod.adda247.com/jobs/wp content/uploads/sites/7/2022/11/21142422/2707970_2019.pdf)), pg 1*		C.E.), (Unit 5, 6, 8, 9) **2. NCERT textbook for Class VI:** *Exploring Society India and Beyond* **3. NCERT textbook for Class XII):** *Themes in Indian History-I* **4. NIOS History Module 1**	Planning." ❖ Assignment: Write a short note "Evolution of the Vedic Caste System: Origins, Functions, and Changes Over Time." ❖ Debate: "Status and Roles of Women in the Vedic Civilization: Progressive or Conservative?" ** All the assignments are in line of GS Paper I of UPSC CSE Mains Examination.

TEXT BOOKS:

1. Textbook: Objective General English, Author: R.S Agarwal, Publishing house: S. Chand
2. IGNOU Study material: BPSC-102
3. NCERT Textbook for class XI: India Constitution at Work
4. History & Civics for ICSE Class IX Textbook : Sudeshna Sengupta
5. IGNOU study material - BHIC-131
6. NCERT textbook for Class VI: *Exploring Society India and Beyond*
7. NCERT textbook for Class XII): *Themes in Indian History-I*
8. NIOS History Module 1

REFERENCE BOOKS:

1. ESP – I Study Material

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name**: Design Thinking and Innovation- Ideation & Research** Credit**: 0** Lecture Hours**: 12**

Subject Code**: IVC181A**

Prerequisite: Basic Knowledge of Physics, Chemistry and Mathematics of 10+2 Level

Relevant Links:

Linkedin Learning **Coursera** **SWAYAM**

Study Materials: Design Thinking and Innovation-Basic

Course Outcomes

At the end of the course

CO1: The student will be able to Understand the concepts of design thinking approaches.

CO2: The student will be able to Create design thinking teams and conduct design thinking sessions.

CO3: The student will be able to Apply both critical thinking and design thinking in parallel to solve Problems

CO4: The student will be able to Understand how to conduct research and how to write a research paper.

Module Number	Topics	Subtopics	Mapping with Industry and International Academia	Lectue Hours	Corresponding Hands on Assignment
1	**Introduction to Design Thinking**	Introduction to Design Thinking, Importance of Design Thinking and Innovation in Today's World, Stages of Design Thinking, Design Thinking: A Non-Linear Process, Understanding the User: Empathy and Empathy Mapping, Case Studies of Empathy Mapping, Customer Journey Mapping, Case Studies of Customer Journey Mapping, Techniques for generating ideas: Brainstorming and Its Importance, Techniques for generating ideas: Mind Mapping and Its Importance, Divergent Thinking and Convergent Thinking, Human Centered Design and Case Studies of Human Centered Design.	**International Academia:** ***MIT***- Design Thinking Certification at MIT Sloan | Online Program ***Stanford University-*** Creativity and Design Thinking | Stanford Online ***AICTE Syllabus:*** AICTE Model Curriculum for UG Degree Course in Computer Science and Engineering (Artificial Intelligence and Data Science (AI&DS)) (aicte-india.org) **Industry Mapping:** Many companies across various sectors, such as technology, healthcare, and finance, are adopting design thinking methodologies to foster innovation and create user-centric products and services. For example, companies like Apple, Google, and IDEO are known for incorporating design thinking into their product development processes. Industries recognize that design thinking is not just a buzzword but a crucial approach for staying competitive in a rapidly changing market. Companies like Airbnb, IBM, and Nike have all embraced design thinking to drive innovation and enhance customer experiences. Various industries follow the stages of design thinking, including empathizing with users, defining problems, ideating solutions, prototyping, and testing. Companies like Samsung, Toyota, and Procter & Gamble utilize these stages to develop products and services that meet customer needs effectively. Companies leverage empathy mapping techniques to gain deeper insights into their target audience's needs, desires, and pain points. For instance, companies like Netflix and Spotify use empathy mapping to understand user preferences and tailor their content recommendations accordingly.	4	**Assignment-1:** Empathy Interview: Conduct an empathy interview with a potential user or customer to understand their needs, challenges, and experiences. Create an empathy map based on the insights gathered. **Assignment-2:** Customer Journey Mapping: Choose a product or service and create a customer journey map to visualize the user's experience from start to finish. Identify pain points and areas for improvement. **Assignment-3:** Brainstorming Session: Organize a brainstorming session with a group to generate ideas for solving a specific design challenge. Use techniques such as "How Might We" questions to guide brainstorming. **Assignment-4:** Mind Mapping Exercise: Use mind mapping to explore and visualize connections between different ideas related to a design problem. Share your mind map and explain the connections you've identified.

2	**Introduction to Creative Process, Biomimicking and Prototyping.**	Introduction to Creative Process, Introduction to Creative Process, Stages of Creative Process, Preparation Stage of Creative Process, Incubation Stage of Creative Process, Illumination Stage of Creative Process, Evaluation Stage of Creative Process, Implementation Stage of Creative Process, Creative Thinking Principles: New ideas are composed of old elements., Creative Thinking Principles: Not all new ideas are on a par, Creative Thinking Principles: Creativity is Enhanced by the Ability to Detect Connections between Ideas, Steps to Enhance Creative Thinking, Introduction to Biomimicking, Importance of Biomimicking, Examples of Product designed from Biomimicking, Biomimicking for Engineering, Case Studies of Biomimicry.	**International Academia:** *MIT*- Design Thinking Certification at MIT Sloan | Online Program *Stanford University*- Creativity and Design Thinking | Stanford Online **AICTE Syllabus:** AICTE Model Curriculum for UG Degree Course in Computer Science and Engineering (Artificial Intelligence and Data Science (AI&DS)) (aicte-india.org) **Industry Mapping:** Industries employ customer journey mapping to visualize and optimize the entire customer experience across different touchpoints. Companies like Starbucks, Amazon, and Disney use this technique to identify opportunities for improving customer satisfaction and loyalty. Brainstorming and mind mapping are widely used in industries to foster creativity and innovation during problem-solving sessions. Companies like Google, Facebook, and 3M regularly conduct brainstorming sessions to generate new product ideas and improve existing processes. Industries value both divergent and convergent thinking to explore a wide range of possibilities and then converge on the best solutions. Companies like Tesla, SpaceX, and IDEO encourage their teams to think divergently to explore innovative ideas before converging on feasible solutions. Human-centered design principles are applied across industries to create products and services that prioritize the user's needs and preferences. Companies like Airbnb, Uber, and Slack integrate human-centered design into their design processes to deliver seamless user experiences.	**4**	**Assignment-5:** Design Challenge: Present a design challenge to students and ask them to come up with innovative solutions using the principles of human-centered design. Prototype and test the most promising ideas. **Assignment-6:** Creative Process Analysis: Analyze a creative process from a real-world example (e.g., a product design, a marketing campaign) and identify the stages of preparation, incubation, illumination, evaluation, and implementation. **Assignment-7:** Biomimicry Case Study: Research and present a case study where biomimicry was used to design a product or solve a problem. Discuss the principles of biomimicry and how they were applied in the case.

3	**Introduction to Research and Research Ethics**	Meaning, Objectives and Motivation in Research, Types of Research and its Examples, Research Approaches, Significance of Research, Research Methods versus Methodology, Library Research, Field Research, Laboratory Research, Introduction to Review Article, Structure of a Review Articles, How to Write a Review Article, Advantages of Writing a Review Article, Importance of Google Scholar, Google Patent and Research-gate for Design Thinking and Innovation, Literature Survey, Reading a Review Articles and Research Articles to Generate Ideas [with reference to few latest research article], Databases of Library Research, Open-Source Databases, Introduction to Journal Indexing, H-Index and i-10 Index, Introduction to Journal Impact Factor, Impact Factor and 5-Year Impact Factor, Choosing the right Journal for Your Article, Research Ethics, Importance of Research Ethics.	**International Academia:** *MIT*- Design Thinking Certification at MIT Sloan | Online Program *Stanford University*- Creativity and Design Thinking | Stanford Online **AICTE Syllabus:** AICTE Model Curriculum for UG Degree Course in Computer Science and Engineering (Artificial Intelligence and Data Science (AI&DS)) (aicte-india.org) **Industry Mapping:** Biomimicry is increasingly being adopted by industries, such as architecture, automotive, and materials science, to design innovative products inspired by nature. Companies like Tesla, Airbus, and Nike draw inspiration from biological systems to create sustainable and efficient designs. Research methods and ethics are essential considerations for industries conducting product development, market research, and user testing. Companies like Microsoft, Pfizer, and Google adhere to ethical research practices and leverage various research methods to inform their decision-making processes.	**4**	**Assignment-8:** Literature Review: Conduct a literature review on a topic related to your domain of interest. Summarize key findings and identify gaps in the existing research. **Assignment-9:** Research Ethics Discussion: Lead a discussion on the importance of research ethics in design thinking and innovation. Discuss ethical considerations in research and how they can impact the design process. **Assignment-10:** Journal Selection Exercise: Explore different academic journals related to design thinking and innovation. Choose a journal and write a mock submission for an article on a relevant topic.

TextBook: ***Design Thinking for Beginners: Innovation as a factor for entrepreneurial success***

1st Semester Syllabus for B.Tech. Admission Batch 2025-2029

Subject Name**: Design Thinking and Innovation- Creativity and IPR** Credit**: 0** Lecture Hours**: 12**

Subject Code**: IVC181B**

Prerequisite: Basic Knowledge of Physics, Chemistry and Mathematics of 10+2 Level

Relevant Links:

Linkedin Learning **Coursera** **SWAYAM**

Study Materials: Design Thinking and Innovation-Intermediate

Course Outcomes :

At the end of the course

CO1: The student will be able to Examine Design Thinking concepts and principles.

CO2: The student will be able to Practice the methods, processes, and tools of Design Thinking.

CO3: The student will be able to Apply the Design Thinking approach and model to real world situations.

CO4: The student will be able to Learn about Intellectual Property rights and how to file a Patent.

Module Number	Topics	Subtopics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Hands on Assignment
1	**Product Innovation**	Invention and Innovation, Importance of Innovation, Innovation and Modern-Day Civilization, Differences between Invention and Innovation with examples, How Innovations can help various Engineering disciplines, Types of Innovations and examples, Levels of Innovations, Incremental Innovation with Examples, Breakthrough innovation with Examples, Breakout Innovation with Examples, Characteristics of Innovation, Product Innovation, Various steps in Product Innovation by Design, Problem Identification, Analysis and Insights in Product Innovations, Design Brief, Concept Generation, Prototyping, Testing in Product Innovations, Various Types of Prototyping Methods, Introduction to New Product Development Process (NPD), Case studies of Product Innovation.	**International Academia:** ***MIT***- Design Thinking Certification at MIT Sloan |Online Program ***Stanford University-*** Creativity and Design Thinking | Stanford Online***AICTE Syllabus:*** AICTE Model Curriculum for UG Degree Course in Computer Science and Engineering (Artificial Intelligence and Data Science (AI&DS)) (aicte-india.org) **Industry Mapping:** *NPD is a systematic approach to bringing a new product to market.* Industries that heavily invest in research and development, such as pharmaceuticals and electronics, follow NPD processes to ensure the successful launch of new products. *Manufacturing, aerospace, and automotive industries use prototyping to test and validate designsbefore mass production.*	**4**	**Assignment 1:** Form small groups and select a problem related to any engineering discipline. Follow the steps of the product innovation process: problem identification, analysis, insights, design brief, concept generation, prototyping, and testing. Each group should presenttheir final prototype along with the challenges faced and lessons learned during the process. **Assignment-2:** Researchand compile a comprehensive report onhow innovation has impacted different engineering disciplines suchas civil, mechanical, electrical, and computer engineering. Provide real-world examples of innovations in each discipline, discussing theirsignificance and contributions to therespective fields. **Assignment-3:** Simulate a new product development process for a hypothetical product. Students will go through each stage of the process, from problem identification to the final case study of product innovation. The simulation should involve creating a design brief, generating concepts, developing prototypes, and testing theproduct. Each group shouldpresent their findings and reflections on the challenges faced.

2	**SCAMPER Technique**	Introduction SCAMPER Technique, Importance of SCAMPER Technique, How SCAMPER Technique can help in Innovation, Substitution Technique for Innovation with examples, Combine Technique for Innovation with examples, Adaptation Technique for Innovationwith examples, Minification Technique for Innovation with examples, Magnification Technique for Innovation with examples, Modification Technique for Innovation with examples, Put to Other Use Technique for Innovation with examples, Elimination Technique for Innovation with examples, Rearrange/Replace/Reverse Techniques for Innovations, Case Studies of Scamper Techniques.	**International Academia:** *MIT-* Design Thinking Certification at MIT Sloan |Online Program *Stanford University-* Creativity and Design Thinking | Stanford Online**AICTE Syllabus:** AICTE Model Curriculum for UG Degree Course in Computer Science and Engineering (Artificial Intelligence and Data Science (AI&DS)) (aicte-india.org) **Industry Mapping:** Replacing traditional materials with advanced materials in electronic components for improvedperformance. Integrating different technologies (e.g.,electric and autonomous) to create innovative automotive solutions. Modifying product features to meet changing consumer preferences or address emerging trends.Rearranging or reconfiguring manufacturing processes toimprove efficiency and reduce costs.	**4**	**Assignment-4:** Select a product or service from a specific industry (e.g., technology, healthcare, automotive) and apply the SCAMPER techniques to generate innovative ideas for improvement. (Use at least three SCAMPER techniques (e.g., Combine, Adaptation, Minification) tobrainstorm and propose modifications). **Assignment-5:** Choose a business process within a chosen industry and analyse how the SCAMPER techniques can be employed to optimize andinnovate the workflow. (Identify specific steps in the chosen process and apply relevant SCAMPER techniques). Explore how the SCAMPER techniques can be utilized to expand the market reach of an existing product or service. **Assignment-6:** Explore how the SCAMPER techniques can be utilized to expand the market reach of an existing product or service. (Select a product/service, and apply techniques like Put to Other Use, Modification, and Magnification to devise strategies for entering new markets or attracting new customer segments. Includea comprehensive market analysis and potential challenges). **Assignment-7:** Choose a commonly used product (e.g., a smartphone, a water bottle,a backpack). Apply each SCAMPER technique to brainstorm innovative ideas for improving the chosenproduct. Create a presentation or report showcasing your ideas and the impact eachinnovation could have on the product. Discuss potential challengesand benefits of implementing the suggested changes.

3	**Introduction to IPR and Patent Filing**	Introduction to IPR, Examples of IPR, Types of IPR, Patents, Copyrights, Trademarks, Industrial designs, Geographical indications, Trade secrets, Plant variety rights, Database rights, Integrated circuit topographies, Traditional knowledge, Importance ofIPR, The Patent Act 1970 and Patent System in India, Procedure of Patent Filling, Criteria for Patentability, Advantages of Patents, How to File a Patent in India, Sample Patent form ofIndia, Patent Databases for Patent Search, Patent System in USA, Importance of USA Patent, Difference between Indian Patent and USA Patent, Advantages of USA Patent, How to get Patent from USA, How to File Patent Application for USA Patent, Sample Patent Form of USA, CaseStudy of few interesting Patents.	**International Academia:** *MIT-* Design Thinking Certification at MIT Sloan |Online Program *Stanford University-* Creativity and Design Thinking | Stanford Online **AICTE Syllabus:** AICTE Model Curriculum for UG Degree Course in Computer Science and Engineering (Artificial Intelligence and Data Science (AI&DS)) (aicte-india.org) **Industry Mapping:** Technology, Pharmaceuticals, Biotechnology Companies in these sectors heavily rely on patent protection for their innovations. Understanding the patent system, criteria for patentability, and procedures is essential for research and development. Trademarks are crucial for companies to establish and protect their brand identity. Industries producing physical products often focus on industrial designs to protect the aesthetic and visual aspects of their products.	**4**	**Assignment-8:** (To develop practical skills in drafting a patent application) You are required to choose a simpleinvention (e.g., a householditem, a gadget, or a process) and draft a provisional patent application. You shouldinclude detailed descriptions, drawings, andclaims. Emphasis should beplaced on meeting the criteria for patentability andclarity in expression. **Assignment-9:** (To understand the process of trademark registration andconduct a comprehensive search) Select a fictional business or product and perform a trademark searchto ensure uniqueness. Thensimulate the process of filing a trademark application, including completing the necessary forms and understanding the associated legal considerations. You should also discuss the importance of trademarks for businesses. **Assignment-10:** (To compare and contrast the patent systems of India andthe USA) Do research and prepare a report on the differences between the Indian and USA patent systems. You should focuson the legal frameworks, criteria for patentability, and procedural aspects. Additionally, You should analyze the advantages and disadvantages of eachsystem.

Reference Book: ***Design Thinking and Innovations***

1st Semester Syllabus for B.Tech Batch 2025-2029

Subject Name: Economics and Business Model Credit: 0 Lecture Hours: 12 Subject

Code: IVC182A

Pre-requisite: Basic Mathematical Knowledge

Relevant Links:

Study Material

https://drive.google.com/drive/folders/1nG94FKCOI7kFTeAFPeYjdRwYv_2UpXpH?usp=drive_link

Coursera

https://www.coursera.org/programs/iem-uem-program-2024-2dvv9/learn/firm-level-economics?source=search&collectionId=skill~business-economics#modules https://www.coursera.org/programs/iem-uem-program-2024-2dvv9/learn/market-equilibrium-government-policies-and-elasticity?source=search&collectionId=skill~business-economics https://www.coursera.org/programs/iem-uem-program-2024-2dvv9/learn/introduction-to-tech-entrepreneurship?fromClip=sfc_page_course_link~U91j2
https://www.coursera.org/specializations/business-entrepreneurship

NPTEL

https://onlinecourses.nptel.ac.in/noc25_me98/preview

COURSE OBJECTIVES:

1. To introduce the fundamentals of economics with a focus on engineering applications, including basic economic problems, micro and macroeconomic concepts, and the scope of engineering economics.
2. To impart knowledge on market structures, demand and supply analysis, production and cost behavior, and strategies for identifying target markets and customer segments using analytical tools.
3. To impart knowledge on consumer and producer behavior, utility concepts, elasticity, equilibrium conditions, and value proposition frameworks through real-world case studies.
4. To impart knowledge on entrepreneurship skill development, including self-discovery, effectuation principles, team building, leadership styles, hiring, bootstrapping, and creative problem-solving techniques.

COURSE OUTCOMES:

CO 1: Apply basic economic principles and distinguish between micro and macroeconomic concepts in the context of engineering decision-making.

CO 2: Analyze market dynamics, demand-supply behavior, and consumer segmentation to evaluate business opportunities and market potential.

CO 3: Interpret consumer and producer behavior using economic laws and value proposition models to design customer-centric products and services.

CO 4: Demonstrate entrepreneurial mindset by identifying problems, applying effectuation principles, and developing team-based, resource-efficient startup solutions.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Text Book Mapping	Corresponding Lab Assignment
1	**An Overview of Engineering Economics**	What is Economics, Basic Economic Problems, Micro vs Macro, Engineering Economics Overview	***International Academia:*** *https://ocw.mit.edu/courses/3-080-economic-environmental-issues-in-materials-selection-fall-2005/resources/lec_ee1/* ***AICTE-prescribed syllabus:*** *NA* ***Industry Mapping:*** *Wadhwani Global Foundation*	2	**Book: Engineering Economics and Costing by Sasmita Mishra** Chapter 1: Engineering Economics- An Overview and Chapter 2: Microeconomics and Macroeconomics (2.1 and 2.2)	❖ Plan your own new business idea.
2	**Market Analysis**	Utility Analysis, Demand and Supply, Market and Market Equilibrium under Perfect Competition, Production and Cost Analysis, Revenue and Profit, Target Customer Identification, Segmentation and Targeting (including Niche Marketing), Customer Jobs, Pains and Gains, Early Adopters	***International Academia:*** *https://ocw.mit.edu/courses/2-964-economics-of-marine-transportation-industries-fall-2006/resources/market_econ/* ***AICTE-prescribed syllabus:*** *NA* ***Industry Mapping:*** *Wadhwani Global Foundation*	4	**Book: Engineering Economics and Costing by Sasmita Mishra** Chapter 2: Microeconomics and Macroeconomics (2.3-2.8)	❖ Plan your own new business idea. ❖ Pitch the same idea.

3	**Consumer and Producer Behaviour**	Law of Diminishing Marginal Utility, Elasticity of Demand, Consumer Equilibrium, Law of Variable Proportions, Stages of Production and Returns to Scale, Elasticity of Supply, Producer Equilibrium, Customer vs Consumer, Value Proposition Design, Case Studies	***International Academia:*** *https://ocw.mit.edu/courses/14-01sc-principles-of-microeconomics-fall-2011/pages/unit-3-producer-theory/productivity-and-costs/ , https://ocw.mit.edu/courses/15-010-economic-analysis-for-business-decisions-fall-2004/resources/mkt_elstic_srpl/ , https://ocw.mit.edu/courses/14-01sc-principles-of-microeconomics-fall-2011/pages/unit-3-producer-theory/introduction-to-producer-theory/ , https://ocw.mit.edu/courses/11-203-microeconomics-fall-2010/resources/mit11_203f10_handout2/* ***AICTE-prescribed syllabus:*** *NA* ***Industry Mapping:*** *Wadhwani Global Foundation*	4	**Book: Microeconomics | Ninth Edition | By Pearson [Paperback] Pindyck,Robert and Rubinfeld, Daniel by Robert Pindyck and Daniel Rubinfeld** Part 2: Producers, Consumers and Competitive Market	❖ Design Value Proposition Canvas of your own business.
4	**Entrepreneurship Skill Development**	Entrepreneurship as a Domain of Expertise, Effectuation Principles, Self-Discovery and Flow, Team Building and Shared Leadership, Leadership Styles, Hiring Strategy, Bootstrapping, Problem Identification and Brainstorming	***International Academia:*** *https://ocw.mit.edu/courses/15-390-new-enterprises-spring-2013/resources/mit15_390s13_lec14/* ***AICTE-prescribed syllabus:***	2	**Book: Entrepreneurship (Second Edition) by Rajeev Roy, Oxford University Press** Chapter 1: Understanding Entrepreneurship	❖ Pitch Deck Presentation – Showcasing Your Entrepreneurial

			NA ***Industry Mapping:*** *Wadhwani Global Foundation*		and Chapter 2: Growth of a Business Idea	Mindset

TEXT BOOKS:

1. Engineering Economics and Costing by Sasmita Mishra, PHI Learning Private Limited
2. Microeconomics | Ninth Edition | By Pearson [Paperback] Pindyck,Robert and Rubinfeld, Daniel by Robert Pindyck and Daniel Rubinfeld
3. Entrepreneurship (Second Edition) by Rajeev Roy, Oxford University Press

REFERENCE BOOKS:

1. Entrepreneurship Development & Project Management by Supriya Biswas and Dr. Shampa Chakraborty, Aryan Publishing House
2. Financial Economics: A Simple Introduction (Simple Introductions), by K.H. Erickson
3. Economics for Engineers by Partha Chatterjee, Vrinda Publication (P) Ltd.

1st Semester Syllabus for B.Tech Batch 2025-2029

Subject Name: Finance and Venture Design **Credit: 0** **Lecture Hours: 12**

Subject Code: IVC182B

Pre-requisite: Basic Mathematical Knowledge

Relevant Links:

Study Material

https://drive.google.com/drive/folders/1nG94FKCOI7kFTeAFPeYjdRwYv_2UpXpH?usp=drive_link

Coursera

https://www.coursera.org/programs/iem-uem-program-2024-2dvv9/learn/firm-level-economics?source=search&collectionId=skill~business-economics#modules https://www.coursera.org/programs/iem-uem-program-2024-2dvv9/learn/market-equilibrium-government-policies-and-elasticity?source=search&collectionId=skill~business-economics https://www.coursera.org/programs/iem-uem-program-2024-2dvv9/learn/introduction-to-tech-entrepreneurship?fromClip=sfc_page_course_link~U91j2 https://www.coursera.org/specializations/business-entrepreneurship

NPTEL
https://onlinecourses.nptel.ac.in/noc25_ec13/preview

COURSE OBJECTIVES:

1. To introduce the fundamental concepts of money, banking, financial systems, and market structures including financial instruments, risk–return trade-offs, and the role of central and commercial banks in the Indian economy.

2. To impart knowledge on cost and pricing concepts including cost structures, revenue streams, profitability analysis, cost control, variance analysis, break-even and profit–volume analysis, and their implications for financial decision-making.

3. To impart knowledge on entrepreneurial finance and strategy through lean business model design, MVP development, customer solution validation, risk assessment, branding, and positioning strategies.

4. To impart knowledge on preparing and presenting a comprehensive business pitch, incorporating sales and marketing planning, customer lifecycle understanding, and solution-focused innovation.

COURSE OUTCOMES:

CO 1: Apply basic economic principles and distinguish between micro and macroeconomic concepts in the context of engineering decision-making.

CO 2: Analyze market dynamics, demand-supply behavior, and consumer segmentation to evaluate business opportunities and market potential.

CO 3: Interpret consumer and producer behavior using economic laws and value proposition models to design customer-centric products and services.

CO 4: Demonstrate entrepreneurial mindset by identifying problems, applying effectuation principles, and developing team-based, resource-efficient startup solutions.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Text Book Mapping	Corresponding Lab Assignment
1	**Introduction to Financial Economics**	Money and Banking, Structure of the Financial System, Financial Instruments, Risk and Return Concepts, Risk–Return Trade-off, Currency and Money Supply, Functions of Commercial and Central Banks, Indian Money and Financial Markets, Cost Structures (Startup, Fixed, Variable), Revenue Streams, Pricing Concepts and Strategies	***International Academia:*** *https://ocw.mit.edu/courses/15-414-financial-management-summer-2003/resources/lec9_risk_return/* , *https://ocw.mit.edu/courses/15-s12-blockchain-and-money-fall-2018/resources/session-16-central-banks-commercial-banking-part-2/* ***AICTE-prescribed syllabus:*** *NA* ***Industry Mapping:*** *Wadhwani Global Foundation*	3	**Book: Engineering Economics and Costing by Sasmita Mishra** Chapter 10: Reserve Bank of India and Chapter 11: Indian Money Market	❖ Perform the financial and sales planning of your own business.

2	**Financial Analysis**	Cost Concepts (Including Marginal and Standard Costing), Variance Analysis, Cost Control and Reduction, Cash Flow Types and Diagrams, Depreciation (Causes, Properties, Methods), Break-Even Analysis (Point, Chart, Assumptions, Uses, Limitations), Profit–Volume Analysis, Cost Structures, Revenue Generation, Profitability, Pricing Analysis, Financial Decision Impact, Risk Assessment	***International Academia:*** *https://ocw.mit.edu/courses/14-01-principles-of-microeconomics-fall-2018/resources/lec-6-costs/* , *https://ocw.mit.edu/courses/1-133-masters-of-engineering-concepts-of-engineering-practice-fall-2007/resources/lec_03/*, *https://ocw.mit.edu/courses/1-011-project-evaluation-spring-2011/resources/mit1_011s11_chpt10/* ***AICTE-prescribed syllabus:*** *NA* ***Industry Mapping:*** *Wadhwani Global Foundation*	3	**Book: Engineering Economics and Costing by Sasmita Mishra** Chapter 5: Cash Flows for Investment Analysis – Concepts and Diagrams, Chapter 6: Evaluation of Engineering Alternatives and Chapter 12: Costing and Cost Concepts	❖ Create one practice venture from your own new business idea. ❖ Pitch your idea.
3	**Proposing a sustainable business**	Lean Business Model Design, Minimum viable product (MVP), Early adopters, Customer solution validation, Blue Ocean strategy	***International Academia:*** *https://ocw.mit.edu/courses/15-394-designing-and-leading-the-entrepreneurial-organization-spring-2003/* ***AICTE-prescribed syllabus:*** *NA* ***Industry Mapping:*** *Wadhwani Global Foundation*	3	**Book: Entrepreneurship (Second Edition) by Rajeev Roy, Oxford University Press** Chapter 14: New Product Development	❖ Design Lean Business model of your own business.

4	**Solution demo, Sales and Branding**	Solution Demo and Minimum Viable Product (MVP), Sales and Business Plan, Marketing and Promotion Strategy, Customer Lifecycle, Branding and Positioning (Including Value-Based Branding and Positioning Statement), Pitch Deck Preparation	***International Academia:*** https://ocw.mit.edu/courses/15-s21-nuts-and-bolts-of-business-plans-january-iap-2014/ https://ocw.mit.edu/courses/15-835-entrepreneurial-marketing-spring-2002/ ,https://ocw.mit.edu/courses/15-431-entrepreneurial-finance-spring-2011/ ***AICTE-prescribed syllabus:*** *NA* ***Industry Mapping:*** *Wadhwani Global Foundation*	3	**Book: Entrepreneurship (Second Edition) by Rajeev Roy, Oxford University Press** Chapter 10: Making a Business Plan	❖ Pitch Deck Presentation – Showcasing Your Entrepreneurial Mindset

TEXT BOOKS:

1. Engineering Economics and Costing by Sasmita Mishra, PHI Learning Private Limited
2. Microeconomics | Ninth Edition | By Pearson [Paperback] Pindyck,Robert and Rubinfeld, Daniel by Robert Pindyck and Daniel Rubinfeld
3. Entrepreneurship (Second Edition) by Rajeev Roy, Oxford University Press

REFERENCE BOOKS:

1. Entrepreneurship Development & Project Management by Supriya Biswas and Dr. Shampa Chakraborty, Aryan Publishing House
2. Financial Economics: A Simple Introduction (Simple Introductions), by K.H. Erickson
3. Economics for Engineers by Partha Chatterjee, Vrinda Publication (P) Ltd.

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech Batch 2025-2029

Subject Name: Competitive Aptitude Training-I **Credit: 0.5** **Lecture Hours: 48**

Subject Code: SDP181A

Pre-requisite: Basic knowledge of English, Mathematics and general awareness of current events.

COURSE OBJECTIVES:

1. To introduce key components of English grammar and their practical usage.
2. To impart knowledge on effective vocabulary usage and comprehension skills.
3. To impart knowledge on interpreting data from tables and structured formats.
4. To impart knowledge on recent current affairs and essential static general knowledge.

COURSE OUTCOMES:

CO 1: Demonstrate an understanding of nouns, pronouns, prepositions, and apply grammar rules correctly.

CO 2: Use synonyms and antonyms effectively in written and spoken English.

CO 3: Interpret tabular data accurately and draw relevant conclusions.

CO 4: Stay informed about national and international events, and recall key facts from static general knowledge.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Text Book Mapping	Corresponding Lab Assignment
1	**Verbal English**	1. **Noun:** What is noun, Kinds of Noun, Rules & Application. 2. **Pronoun**: Definition of Pronoun, Examples, Rules & Application. 3. **Preposition**: Preposition and its Application. 4. **Basic Application of Vocabulary** (Synonyms and Antonyms) **5. Reading Comprehension** **6. Personal Letter Writing**	***International Exams*** ***1.GRE*** *(https://www.ets.org/pdfs/gre/gre-math-review.pdf)* ***2.GMAT*** *(https://downloads.mba.com/downloads/gmat-handbook.pdf)* ***National Exams:*** ***1.UPSC Civil Services Exam*** (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26 ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* ***3. RBI Grade B*** *(https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB090520223FA65E4FB1C2CF473396B4FD7E5F69CDDE.PDF), pg 22-23* ***4. IBPS Probationary officer*** *(https://www.ibps.in/wp-content/uploads/Detailed-Advt.-CRP-PO-XII.pdf) , Pg 7* ***5. Combined Graduate Level conducted by SSC***	20	**1. Textbook:** Objective General English, Author: R.S Aggarwal, Publishing house: S. Chand	❖ Noun Identification: Underline nouns in given sentences. ❖ Pronoun Replacement: Replace nouns with appropriate pronouns. ❖ Synonym Matching: Match words with their synonyms. ❖ Synonym Rewrite: Replace underlined words with synonyms. ❖ Antonym Matching: Match words with their antonyms. ❖ Antonym Rewrite: Replace

			(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22 ***6. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***7. XAT*** *(https://xat.org.in/xat-syllabus/)* ***8. GATE*** *(https://gate2024.iisc.ac.in/papers-and-syllabus/)* ***9. CAT*** *https://iimcat.ac.in/per/g01/pub/756/ASM/WebPortal/1/index.html?756@@1@@1* ***State Level Exams:*** ***1.Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* ***2. Miscellaneous Services Recruitment Examination*** *(file:///C:/Users/UEMK/Downloads/2707970_2019.pdf), pg 1*			underlined words with antonyms. ❖ Antonym Listing: Write 10 words with their antonyms.

2	**Data Interpretation**	**1. Table Data Interpretation**	***National Exams:*** ***1.UPSC Civil Services Exam*** (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26 ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf , pg 20-21)* ***3. Combined Graduate Level conducted by SSC*** *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf)* ***pg. 20-22*** ***4. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf* ***State Level Exams:*** ***1.Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* ***2. Miscellaneous Services Recruitment Examination*** *(file:///C:/Users/UEMK/Downloads/2707970_2019.pdf), pg 1*	20	1. **Textbook:** An Advanced Approach to Data Interpretation for Competitive Examinations, Author: R.S. Aggarwal, Publisher: S. Chand	❖ **Calculating Totals and Averages**: Provide a table with sales data over several months. Ask students to calculate the total sales and average sales for each month. ❖ **Comparing Data**: Provide a table with data on two or more products or categories. Ask students to compare the data and determine which product/category performed better based on different criteria (e.g., sales, growth rate).

3	**Current Affairs and Static GK**	National News, International News, MOU's and agreements, Summits and Conclaves, Obituaries, Awards and Events, Sports, Important Days, Banking and Economic Awareness	***National Exams:*** ***1.UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* ***3. RBI Grade B*** *(https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2CF473396B4FD7E5F69CDDE.PDF), pg 22-23* ***4. IBPS Probationary officer*** *(https://www.ibps.in/wp-content/uploads/Detailed-Advt.-CRP-PO-XII.pdf) , Pg 7.* ***5. Combined Graduate Level conducted by SSC*** *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* ***6. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** ***1.Civil Services Executive Exam (WBCS)***	08	1. **Current Affairs Magazine of IEM-UEM** 2. **Lucent GK**	❖ Discussion on National and International affairs ❖ Discussion on MOU's and agreements, Summits and Conclaves ❖ Discussion on recent Awards and Events, Sports. ❖ Discussion on Economic Awareness

			(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1 ***2. Miscellaneous Services Recruitment Examination*** *(https://adda247jobs-wp-assets-prod.adda247.com/jobs/wp-content/uploads/sites/7/2022/11/21142422/2707970_2019.pdf)), pg 1*			

TEXT BOOKS:

1. Textbook: Objective General English, Author: R.S Agarwal, Publishing house: S. Chand
2. Textbook: An Advanced Approach to Data Interpretation for Competitive Examinations, Author: R.S. Aggarwal, Publisher: S. Chand
3. Lucent GK

REFERENCE BOOKS:

1. Current Affairs Magazine of IEM-UEM

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

1st Semester Syllabus for B.Tech Batch 2025-2029

Subject Name: Skill Development for Professionals-I **Credit: 0.5** **Lecture Hours: 48**

Subject Code: SDP181B

Pre-requisite: Basic understanding of mathematics, reasoning, and current affairs.

COURSE OBJECTIVES:

1. To introduce foundational concepts in quantitative aptitude.
2. To impart knowledge on pattern recognition through alphanumeric and number series.
3. To impart knowledge on blood relation and seating arrangement problems using logical reasoning techniques.
4. To impart knowledge on national and international current events and key general awareness topics.

COURSE OUTCOMES:

CO 1: Apply shortcut methods to solve problems on ratio, proportion, averages, time & work, and simplification.

CO 2: Solve alphanumeric series and number pattern problems using logical reasoning.

CO 3: Analyze and solve various types of blood relation and seating arrangement questions.

CO 4: Recall and interpret important national and global events, agreements, awards, and economic updates.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Text Book Mapping	Corresponding Lab Assignment
1	**Quantitative Aptitude**	1. **Ratio and Proportion** Basic concept of Ratio & Proportion, Shortcut tricks & applications. 2. **Average-** Concept on average, different missing numbers in average estimation, shortcuts & application. 3. **Time & Work -** Basic concept, Different problems & shortcut tricks. 4. **Simplification**	***International Exams*** ***1. GRE*** *(https://www.ets.org/gre/test-takers/general-test/prepare/content/verbal-reasoning.html#accordion-9f58105fc6-item-88093eca37)* ***National Exams:*** ***1. UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* ***3. Combined Graduate Level conducted by SSC*** *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* ***4. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-*	20	**1. Textbook:** Quantitative Aptitude, Author: R.S Aggarwal, Publisher: S. Chand (Chapter 4, 6, 12, 15)	❖ Assignment on Ratio Applications ❖ Average Estimation Practice ❖ Time & Work Worksheet ❖ Simplification Practice

			Notification-Emp-News.pdf) ***State Level Exams:*** ***1. Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* ***2. Miscellaneous Services Recruitment Examination*** *(file:///C:/Users/UEMK/Downloads/2707970_2019.pdf) pg 1*			
2	**Logical Reasoning**	**1. Alphanumeric Series Completion** i. Alphabet Series, ii. Random Series, iii. Number Series, iv. Letter Gap, v. Missing Number Series, vi. Series Completion **2. Blood Relations –** i. Family Tree Questions ii. Indication Type BR, iii. Coding Blood Relations, iv. Miscellaneous	***International Exams*** ***1. GRE*** *(https://www.ets.org/gre/test-takers/general-test/prepare/content/verbal-reasoning.html#accordion-9f58105fc6-item-88093eca37)* ***National Exams:*** ***1. UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* ***3. Combined Graduate Level***	20	**1. Textbook:** Verbal and Non-Verbal reasoning , **Author:** R.S Agarwal, **Publishing House:** S.Chand (Chapter 1, 5)	❖ Assignment on Blood Relation, Alphanumeric series and sitting arrangement.

		Blood Relations. **3. Sitting Arrangement**	***conducted by SSC*** *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* ***4. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** ***1. Civil Services Executive Exam (WBCS)*** ***(****https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* ***2. Miscellaneous Services Recruitment Examination*** (*file:///C:/Users/UEMK/Downloads/2707970_2019.pdf) pg 1*			
3	**Current Affairs and Static GK**	National News, International News, MOU's and agreements, Summits and Conclaves, Obituaries, Awards and Events, Sports, Important Days, Banking and Economic Awareness	***National Exams:*** ***1.UPSC Civil Services Exam*** *(https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26* ***2. UPSC Combined Defence Services*** *(https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-*	08	**1. Current Affairs Magazine of IEM-UEM** **Lucent GK**	❖ Discussion on National and International affairs ❖ Discussion on MOU's and agreements, Summits and Conclaves ❖ Discussion on recent Awards

			2023-Engl-211222.pdf), pg 20-21 ***3. RBI Grade B*** *(https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2CF473396B4FD7E5F69CDDE.PDF), pg 22-23* ***4. IBPS Probationary officer*** *(https://www.ibps.in/wp-content/uploads/Detailed-Advt.-CRP-PO-XII.pdf) , Pg 7.* ***5. Combined Graduate Level conducted by SSC*** *(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* ***6. Intelligence Bureau ACIO*** *(https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** ***1.Civil Services Executive Exam (WBCS)*** *(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* ***2. Miscellaneous Services***			and Events, Sports. ❖ Discussion on Economic Awareness

			Recruitment Examination *(https://adda247jobs-wp-assets-prod.adda247.com/jobs/wp-content/uploads/sites/7/2022/11/21142422/2707970_2019.pdf)), pg 1*			

TEXT BOOKS:

1. Textbook: Quantitative Aptitude, Author: R.S Aggarwal, Publisher: S. Chand
2. Textbook: Verbal and Non-Verbal reasoning , Author: R.S Agarwal, Publishing House: S.Chand
3. Lucent GK

REFERENCE BOOKS:

1. Current Affairs Magazine of IEM-UEM

DEPARTMENT OF BASIC SCIENCE AND HUMANITIES GAMES AND SPORTS

CURRICULUM

INTRODUCTION

The path to success can sometimes be a difficult one. Students have packed schedules. Classes, employment, and family or social obligations tend to take over calendars quickly; however, just as it's important to set aside time for rest, it's also important to exercise. Scientific studies show that regular exercise provides students with important cognitive benefits that could have positive effects on their scholarly efforts.

According, to AICTE (All India Council for Technical Education), Students must have physically and mentally fit so that he or she can achieve individual goals.

INDUCTIONPROGRAM

According to AICTE - Model Curriculum for Undergraduate Degree Course in Engineering and Technology (Vol.2):

"2.1 Physical Activity This would involve a daily routine of physical activity with games and sports. It would start with all students coming to the field at 6 am for light physical exercise or yoga. There would also be games in the evening or at other suitable times according to the local climate. These would help develop team work. Each student should pick one game and learn it for three weeks. There could also be gardening or other suitably designed activity where labour yields fruits from nature."

INDUCTION PROGRAM – BRIDGE COURSE

PHYSICAL EXERCISE

Exercise is a bodily activity that enhances or maintains Physical Fitness and overall health and wellness. It is performed for various reasons, to aid growth and improve strength, preventing aging, developing muscles and cardiovascular system, honing athletic skills, Weight loss or maintenance, improving health and also for enjoyment.

YOGA

Yoga is a systematic practice of physical exercise, breath control, relaxation, and positive thinking. The practice entails low-impact physical activity, postures (called *Asanas*), Breathing Techniques (P*ranayama*), relaxation, and meditation aimed at developing harmony in the body, mind, and environment.

SHANTIMANTRA

OM Sahana Vavatu Sahanau Bhunaktu
Saha Viryam Karavavahai Tejasvi Navaditamastu Ma
Vidvishavahai
OM Sahana Vavatu Sahanau Bhunaktu
Saha Viryam Karavavahai Tejasvi Navaditamastu Ma
Vidvishavahai
OM Sahana Vavatu Sahanau Bhunaktu
Saha Viryam Karavavahai Tejasvi Navaditamastu Ma
Vidvishavahai

OM Shanti Shanti Shantihi

SURYANAMASKARA

ASANA

Sukhasana, Padmasana, Vajrasana, Ardha Kurmasana, Utkatasana, Trikonasana, Uthanpadasana, Bhujangasana, Baddha Konasana, Savasana, Tadasana

PRANAYAMA

Kapalbhati Pranayama, Anulom-Vilom Pranayama

MEDITATION

Breathe Awareness Meditation, Mantra Meditation

KARATE-DO

Karate is the open hand technique of self defense which includes Kicks (Japanese Term: GERI), Punches (Japanese Term: ZUKI), Strikes (Japanese Term: UCHI) and Blocks (Japanese Term: UKE) and also some Throwing Techniques. Modern Karate is a Sport which was to be introduced in Tokyo Olympic 2020 but unfortunately delayed for the Pandemic of COVID-19.

EXERCISE

Warm-Up
Neck & Arm Stretching Waist & Lower Back Exercise
Leg Stretching

KARATE TECHNIQUES

- How to make a Fist
- Parts of our Hands used to Attack
- PUNCH: Middle Level Punch Face Level Punch Reserve Hand Punch
- STRIKE: Open Hand Strike Elbow Strike
- KICK: Front Kick Round Feet Kick
- BLOCK: Middle Level Block Block for Kicks

GAMES & SPORTS

Some Basic Technical Topic on:

Cricket, Football, Table Tennis, Golf, Badminton, Basketball, Volleybal

SEMESTER-I

YOGA

THEORY

1. Meaning of Yoga.
2. Importance of Asana.
3. Importance of Pranayama.
4. Importance of Meditation.

PRACTICAL

Asanas

1. **Sitting Poses:** Gomukhasana, Akarna-Dhanurasana, Ardha-Matsyendrasana, Janusirasana, Marichyasana, Upabistha-Konasana, Ardha-Padmasana, Vrikshasana, Naukasana, Parivirtta-janusirasana, Eka Pada Rajakapotasana, Trikonasana

2. **Lying Poses:**

Supine: Ardha-Halasana, Halasana, Sarvangasana, Pavanamuktasana, Setubandhasana, Supta Virasana, Matsyasana, Supta Kapotasana, Supta Matsyendrasana, Eka Pada Setu Bandhasana

Prone Poses: Bhujangasana, Usthrasana, Kumbhakasana, Vasisthasana, Uthita Parsavakonasana, Adho Mukha savanasana, Salvasana

Pranayama

Anulom-vilom, Kapalbhati, Sheetkari, Bhastrika, Bhamri, Samavritti Pranayama

KARATE-DO

THEORY

1. Meaning of Karate-Do
2. History of Karate-Do
3. Karate as Sports in Olympic

PRACTICAL

FITNESS EXERCISE: *(Junbi Taiso)*

1. Warm-Up Exercise
2. Neck Exercise
3. Forearm & Shoulder Exercise
4. Waist & Lower Back Exercise
5. Leg Stretching Exercises

BASIC TECHNIQUES: *(Kihon)*

1. **KARATE STANCE *(Dachi)***
   - i. Closed Feet Stance
   - ii. V-Stance
   - iii. Parallel Stance
   - iv. Normal Feet Stance
   - v. Forward Leaning Stance
   - vi. Sumo/Square Feet Stance
2. **PUNCH *(Zuki)***
   - i. Making Fist Properly
   - ii. Face Level Punch
   - iii. Middle/Stomach Level Punch
   - iv. 3Level Consecutive Punch

v. Reserve Hand Punch

3. **STRIKE *(Uchi)*** i. Open Hand Strike
   ii. Knife Hand Strike
   iii. Front Elbow Strike

4. **KICK*(Geri)*** i. Front Kick
   ii. Round Feet Kick
   iii. Back Leg Kick

5. **BLOCK *(Uke)*** i. Middle Level Block
   ii. Lower Level Block
   iii. Open Hand Block

SPORTS & GAMES

Demonstration Practice of the skills, correction, involvement in game situation of following Sports:

Football, Basketball, Throwball, Cricket, Table Tennis, Chess

SEMESTER-II

YOGA

THEORY

1. Benefits of Asana.
2. Importance of Meditation.

PRACTICAL

Asanas

Standing Poses:
Utkatasana,Vrikshasana,Virabhadrasana,Garudasana,Tadasana,Natarajasana, Namaskara - Parsavakonasana, Hasta - Padangusthasana, Parivarta-Parsavakonasana, Utthito – Akopodo paschimottanasana

Bending poses:

Ardha-Paschimottanasana, Ustrasana, Chakrasana, Padahastasana, Chandrasana, Trikonasana, Sasangasana, Padottanasana, Ekapada – Rajakapotasana.

Pranayama

Anulom-vilom, Kapalbhati, Sheetkari, Bhastrika, Bhamri, Samavritti Pranayama

Breathe Awareness Meditation Mantra Meditation
Progressive Relaxation Focused Meditation

KARATE-DO

THEORY

1. Karate as Sports in Olympic
2. World Karate Federation(WKF) Competition Fighting Rules(updated)
3. Scoring of Points during Competition

PRACTICAL

FITNESS EXERCISE: (Junbi Taiso)

1. Cardio-Vascular Exercise
2. Shoulder & Back Strengthen Exercise
3. Stomach & Lower Abdomen Exercise
4. Advance Stretching Exercises
5. Full Stretching

BASIC TECHNIQUE (Kihon)

1. KARATE STANCE (Dachi)
   - i. Backward Leaning Stance
   - ii. Cat Stance
   - iii. Crane Stance
   - iv. L-Stance & T-Stance
2. PUNCH (Zuki)
   - i. Middle Finger Punch
   - ii. Back Fist Punch
   - iii. Front Punch
3. KICK (Geri)
   - i. Side Kick
   - ii. Blade –Feet Kick
   - iii. Round Kick

4. BLOCK (Uke)	i. Round Block ii. Knife-Hand Block iii. Crossed Hand Block
5. TECHNIQUE WITH MOVEMENT (IdoKihon)	i. Punch with Movement ii. Kick with Movement iii. Combination of Punch– Kick– Block with Movement

SPORTS & GAMES

Demonstration Practice of the skills, correction, involvement in games situation of following Sports:

i. Badminton,
ii. Kabaddi,
iii. VolleyBall,
iv. HandBall,
v. Pool, and Others

List of Course Outcome:

CO1: Improved understanding of movement and the human body

CO2: Improved knowledge of rules and strategies of particular games and sports

CO3: Self-confidence and self-worth as they relate to physical education recreation programs.

CO4: Students can narrate and describe in past, present and future times.

CO5: Students can satisfy requirements of everyday situations.

CO6: Students can be understand most speech on a familiar topic

CO- PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**---**	**---**	**---**	**---**	**2**	**---**	**---**		**3**	**---**	**2**
CO2	**---**	**---**	**1**	**---**	**---**	**---**	**---**	**2**	**2**	**3**	**---**	**3**
CO3	**---**	**---**	**---**	**---**	**2**	**3**	**3**	**---**	**---**	**---**	**---**	**3**
CO4	**---**	**---**	**---**	**---**	**---**	**3**	**---**	**---**	**3**	**1**	**---**	**3**
CO5	**---**	**---**	**---**	**---**	**---**	**1**	**---**	**---**	**---**	**3**	**1**	**3**
CO6	**---**	**---**	**---**	**---**	**1**	**---**	**---**	**---**	**3**	**3**	**---**	**3**

Note:
"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"—" indicates there is no correlation.

Soft Skills

Course Outcomes:

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

1. The students will be able to apply various skills in their day-today life.
2. The students will be able to solve problems with their critical thinking and emotional intelligence both in personal life as well as in their work place.
3. The students will be able to develop and analyse better team work and productivity.
4. The students will be able to understand corporate culture and improve work ethics
5. The students will be able to demonstrate the various soft skills in both academic, social and corporate life.
6. The students will be able to identify both their soft and hard skills in various works of life and contribute to a healthy and a sustainable society that promotes to lifelong learning.

Detailed Contents:

Module:1: Communication Skills: 3 L

Introduction to Soft Skills and Hard Skills— Importance and Purpose of Communication— Understanding inter and cross cultural nuances—Building relationships through communication— Building rapport.

Module: 2: Basic Skills at the fundamental Level: **3L** Body Language— Basic etiquettes—

Emotional intelligence-interpersonal skills

Module: 3: Life Skills: Developing Key traits: 3L

Criticalthinkingskills—problem-solvingskills—Conflict-resolutionskills—employability skills

Module:4: Corporate Skills: 3L

Collaborative skills—Negotiation skills— Presentation skills—Leadership Skills— Adaptability skills—Stress Management and Time Management Skills—Work Ethics— Telephonic Conversations and etiquettes

---

Reference:

Gopalaswamy Ramesh and Mahadevan Ramesh, The Ace of Soft Skills :Attitude, Communication and Etiquette for Success, Noida: Pearson, 2010.

CO- PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	---	---	---	---	---	2	2	2	2	3	---	2
CO2	1	1	1	1	---	---	2	2	2	3	---	3
CO3	---	---	1	---	2	---	---	3	3	3	---	3
CO4	---	---	---	---	---	---	---	3	3	3	---	3
CO5	---	---	---	---	---	1	---	3	1	3	3	3
CO6	1	1	3	---	1	---	3	3	1	3	---	3

Note:

"1" – Slight (Low) Correlation

"2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation

"—" indicates there is no correlation.

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Laboratory Syllabus for B.Tech. Admission Batch 2025-2029

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech. Admission Batch 2025

Course Name: Physics Laboratory	
Course Code: BSCPH191/291	
Course Code: BSCPH191/291	**Category:** Basic Science Courses
Course Title: Physics Laboratory	**Semester:** First/Second
L-T-P: 0-0-3	Credit: 1.5
Pre-Requisites: Basic Knowledge of Algebraic Calculation and graph plot, Basic knowledge about measurement techniques by vernier calipers and screw gauge, Basic concepts of 12^{th} standard physics	
Course Outcomes CO1. Apply the working principles, learn to handle instruments, analyze data and comparison of results with theoretical calculations. CO2. Develop familiarity with range of experiments related to elastic, electric and electronic properties of materials. CO3. Verify theories of different optical and quantum phenomenon by conducting relevant experiments. CO4. Develop an ability to work in team to design innovative projects with engineering knowledge in solving real time problems in societal and environmental contexts.	

List of Hands-on experiment to be conducted in the laboratory				
Sl No.	**Name of Experiments**	**Digital Twin link**	**Mapping with MIT & Stanford**	**Use of Software**
1	To determine the radius of curvature of a Plano convex lens by formation of Newton's ring method	https://lo-au.vlabs.ac.in/laser-optics/Newtons_Rings_Wavelength_of_light/experiment.html	NA	NA
2	To determine the wavelengths of a given light source by diffraction grating method	https://ov-au.vlabs.ac.in/optics/Diffraction_Grating/	NA	NA
3	Determination the excitation potential of a given gas by Franck-Hertz experiment	https://www.laboratoriovirtual.fisica.ufc.br/experimento-de-frank-hertz?lang=en	https://www.laboratoriovirtual.fisica.ufc.br/experimento-de-frank-hertz?lang=en	MATLAB
4	To determine the Young's Modulus of material of a bar by Flexure method	https://amv-au.vlabs.ac.in/advanced-mechanics/Youngs_Modulus_Uniform_Bending/	NA	MATLAB
5	Determination the band-gap of a semiconductor by measuring the resistivity at different Temperatures by four-probe method	https://bop-iitk.vlabs.ac.in/exp/energy-band-gap/index.html	NA	MATLAB
6	To determine the resistance per unit length of a given bridge wire and hence to determine the very low unknown resistance by using Carey Foster's bridge	https://bop-iitk.vlabs.ac.in/exp/carey-foster-bridge/index.html	NA	NA

7	To determine the Modulus of rigidity of a material of a rod by static method	https://amv-au.vlabs.ac.in/advanced-mechanics/Rigidity_Modulus/experiment.html	NA	MATLAB
8	To determine the Modulus of rigidity of a material of a wire by dynamic method	https://amv-au.vlabs.ac.in/advanced-mechanics/Rigidity_Modulus_Torsion_Pendulum/	NA	NA
9	To study the different characteristics of a solar cell	https://vlab.amrita.edu/?sub=1&brch=195&sim=360&cnt=1	NA	MATLAB
10	Determining electronic charge by its mass (e/m) by JJ Thomson method.	NA	NA	NA
11	Deflection of charged particle under electric field and magnetic field (Particle Accelerator)	NA	NA	MATLAB
12	Conversion of vibration to voltage using piezoelectric materials.	NA	NA	MATLAB
13	Conversion of thermal energy into voltage using thermoelectric modules.	NA	NA	MATLAB
14	Cymatics visualization experiments with Sand and Water (Hands-on)	NA	NA	NA

List of virtual lab experiments			
Sl No	**Name of the experiment**	**Simulation software link**	**Mapping link with MIT/Standford**
15	Numerical Aperture of Optical Fiber	https://vlab.amrita.edu/?sub=1&brch=189&sim=343&cnt=4	
16	Black Body Radiation	https://htv-au.vlabs.ac.in/heat-thermodynamics/Black_Body_Radiation/experiment.html	
17	Thermo Couple-Seebeck Effect	https://htv-au.vlabs.ac.in/Thermo_Couple_Seebeck_Effect/experiment.html	
18	Compton Scattering	https://www.geogebra.org/m/dgx8uSXJ	https://ocw.mit.edu/courses/8-13-14-experimental-physics-i-ii-junior-lab-fall-2016-spring-2017/pages/experiments/compton-scattering/
19	Optical Emission Spectra of Hydrogenic Atoms	https://javalab.org/en/spectrum_of_hydrogen_en/	https://ocw.mit.edu/courses/8-13-14-experimental-physics-i-ii-junior-lab-fall-2016-spring-2017/pages/experiments/optical-emission-spectra-of-hydrogenic-atoms/

List of Experiments using MATLAB			
20	Virtual Measurement of the ratio of charge of an electron to the mass of an electron	https://in.mathworks.com/matlabcentral/fileexchange/94540-virtual-measurement-of-e-m-lab?s_tid=srchtitle_site_search_4_Physics%20lab	NA
List of Experiment/project using Generative AI			
21	Solve Schrodinger equation for a 1-dimensional infinite potential well and plot the wave function for ground state and first two excited states.	https://in.mathworks.com/matlabcentral/fileexchange/75495-schrodinger-s-equation-in-the-1-dimensional-potential-well?s_tid=srchtitle_site_search_1_schrodinger%20equation	NA

Project Work			
22	Making of solar cell and solar panel	NA	NA

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech. Admission Batch 2025

Course Name: Chemistry Laboratory	
Course Code: BSCCH192/292	
Course Code: BSCCH192/292	**Category:** Basic Science Courses
Course Title: Chemistry Laboratory	**Semester:** First/Second
L-T-P: 0-0-3	Credit: 1.5
Pre-Requisites: Basic knowledge of Chemistry in Class- XI and XII level. Basic concepts of qualitative and quantitative analysis. Basic knowledge of algebraic calculation and graph plot	

Course Outcomes

CO1: Apply knowledge in quantitative estimation, and synthesis of nanomaterials.

CO2: Operate the instruments properly, record and interpret data.

CO3: Estimate rate constants of reactions from concentration of reactants/products as a function of time.

CO4: Work effectively in teams to accomplish the assigned responsibilities.

List of Experiments

Expt. No.	List of Regular Experiments
1	Determination of the alkalinity present in water (Acid – Base Titration)
2	Determination of the pH of sample solutions by digital pH meter: pH metric titration
3	Determination of cell constant and conductance of solutions: Conductometric titration
4	Determination of surface tension of liquids using Stalagmometer Instrument.
5	Determination of viscosity of liquids using Ostwald Viscometer.
6	Determination of the partition coefficient of a substance between two immiscible liquids
7	Determination of the rate constant of a reaction
8	Potentiometry - determination of redox potentials and emfs
9	Determination of the hardness of water.

Innovative Experiments

Sl No	Name of Experiment	Corresponding Equipments/Links
10	Synthesis and characterization of Nanoparticles	Magnetic Stirrer, UV-visible Spectrophotometer
11	Synthesis and characterization of Carbon Dots	Magnetic Stirrer, UV-visible Spectrophotometer
12	Beer's Law Lab Study/Verification	Using UV-visible Spectrophotometer and also using PHET simulator (https://phet.colorado.edu/en/simulations/beers-law-lab)

List of Virtual experiments to be conducted in the laboratory		
Sl No	**Name of the experiment**	**Simulation software link**
13	Saponification/acid value of an oil	https://vlab.amrita.edu/index.php?sub=3&brch=63&sim=688&cnt=4
14	Determination of the Chemical Oxygen Demand.	https://ee2-nitk.vlabs.ac.in/exp/chemical-oxygen/simulation.html
15	Adsorption of acetic acid by charcoal	https://vlab.amrita.edu/?sub=3&brch=190&sim=606&cnt=1
16	Thin layer chromatography	https://vlab.amrita.edu/index.php?brch=63&cnt=1&sim=154&sub=3
17	Colligative properties using freezing point depression	https://vlab.amrita.edu/index.php?sub=2&brch=190&sim=337&cnt=1
18	Rutherford Scattering Experiment	https://phet.colorado.edu/en/simulations/ruth erford-scattering
19	Fluorescence Spectroscopy	https://mfs-iiith.vlabs.ac.in/exp/fluorescence- instrumentation/simulation.html
20	Infrared Spectroscopy	https://ccnsb06-iiith.vlabs.ac.in/exp/solutions-infra-red- spectroscopy/simulation.html

University of Engineering and Management

Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech Admission Batch 2025

Subject Name: Language Laboratory Subject Code: HSMC191

Course Code: HSMC191	**Category: Humanities and Social Sciences including Management**
Course Title: Language Laboratory	**Semester: First**
L-T-P: 0-0-2	**Credit: 1**
Pre-Requisites: Language Acquisition model, Technological aids for language simulation, Hands-on Training, and Practice.	

Course Outcomes:

CO1. The course will facilitate students to understand the codes and conducts of Business communication.

CO2. It will help students acquire proper body language and speaking nuances to become industry ready.

CO3. It will enable students to experience real-life interview situations through various simulation-based lab experiments.

CO4. It will help in students' brainstorming through various real-life situations. Enabling leadership qualities through mock-interview, telephonic conversations, and group communication among students.

List of Assignments:

S.L.	NAME OF ASSIGNMENTS	MAPPED INNOVATIVE PROJECTS	MAPPED LAB MANUAL ASSIGNMENTS	Mapped with AICTE	Mapped with IIT
1	**Icebreaker**	JAM (Just a Minute) & Impromptu Speech	Casual and Academic Listening (1.1), Listening to Speeches and Evaluating them (1.2), Introducing Oneself (5.1), Impromptu Speech Delivery (5.2)	JAM	Public Speaking
2	**Creative Studio**	Personal YouTube Channel, Personal Blog & Personal Podcast	Listening to Speeches and Evaluating them (1.2), Creative Writing (3.1), Writing a piece of Fiction (3.2), Story-Telling (4.1), Discussion about Current Affairs, and Mock Job Placement Interviews (4.2), Introducing Oneself (5.1), Impromptu Speech Delivery (5.2), Acquiring Decision making and problem-solving ability, Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self Control, and influencing others (7.1), Developing Intra and Interpersonal Skills through Practice, Acquiring Business Attributes. (8.2)	Information Transfer, Public Speech - T.V. Programme analysis	Exercises based on Reading Comprehension (Extract from IELTS)
3	**Echoes of Me**	Publish a Book	Skimming and Scanning, Extensive reading, newspaper reading (2.2), Creative Writing (3.1), Writing a piece of Fiction (3.2), Dialogue writing on the day-to-day situation (3.3), Storytelling- Virtual Field Trip, Design and Debate through Tinker cad (4.1), Discussion about current affairs, and mock job/placement interviews (4.2), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, and influencing	**NO DIRECT MATCH**	**NO DIRECT MATCH**

			others (7.1)		
4	**Tech Talks**	Comparative Video & Create Reels	Reading non/technical passages, graphics, diagrams, etc. (2.2), Creative Writing (3.1), Writing a piece of Fiction (3.2), Dialogue writing on the day-to-day situation (3.3), Story-Telling (4.1), Discussion about current affairs, and mock job/placement interviews (4.2), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, and influencing others (7.1)	Reading Comprehension	Movie Review

5	**Stage Presence I**	Individual Technical Paper Presentation & Poster Presentation (with Plagiarism Report)	Reading non/technical passages, graphics, diagrams, etc. (2.2), Creative Writing (3.1), Writing a piece of Fiction (3.2), Dialogue writing on the day-to-day situation (3.3), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, and influencing others (7.1)	Power Point Presentation, Poster/ PPT Presentation- (Topics from Industry)	**NO DIRECT MATCH**
6	**Stage Presence II**	Group Technical Paper Presentation & Poster Presentation (with Plagiarism Report)	Reading non/technical passages, graphics, diagrams, etc. (2.2), Creative Writing (3.1), Writing a piece of Fiction (3.2), Dialogue writing on the day-to-day situation (3.3), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, and influencing others (7.1)	Power Point Presentation, Poster/ PPT Presentation- (Topics from Industry)	**NO DIRECT MATCH**

7	**Case & Critique Connect**	Case Study/Case lets & Paper/Book/Movie Review	Listening to Speeches and Evaluating them (1.2), Skimming and Scanning, extensive reading, newspaper reading (2.1), Reading non/technical passages, graphics, diagrams, etc. (2.2), Creative Writing (3.1), Writing a piece of Fiction (3.2), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, and influencing others (7.1)	**NO DIRECT MATCH**	Movie Review
8	**Dramatico**	Drama Competition/Role Play & Short Film (5 minutes)	Casual and Academic Listening (1.1), Listening to Speeches and evaluating them (1.2), Writing a piece of Fiction (3.2), Dialogue writing on the day-to-day situation (3.3), Storytelling- Virtual Field Trip, Design and Debate through Tinker cad (4.1), Discussion about current affairs, and mock job/placement interviews (4.2), Introducing Oneself (5.1), Impromptu Speech Delivery (5.2), Strategies for making and working in a group (6.1), Features of a group leader (6.2), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, and influencing others (7.1), Business Etiquette, Formal Approach in the work field, Codes of Conduct, Body Language, and Non-verbal Techniques of Communication (8.1), Developing Intra and Interpersonal Skills through Practice, Acquiring Business Attributes (8.2)	Role Play	Role Play Activity

9	**Artist's Arcade**	Craft Exhibition - 'Using Best Out of Waste' & Create Your Personal Brand	Creative Writing (3.1), Discussion about current affairs, and mock job/placement interviews (4.2), Introducing Oneself (5.1), Strategies for making and working in a group (6.1), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, and influencing others (7.1), Developing Intra and Interpersonal Skills through Practice, Acquiring Business Attributes (8.2)	**NO DIRECT MATCH**	**NO DIRECT MATCH**
10	**Profile Prism**	Video CV, One page CV & ATS Resume Checker	Creative Writing (3.1), Introducing Oneself (5.1), Impromptu Speech Delivery (5.2), Strategies for making and working in a group (6.1), Features of a group leader (6.2), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, and influencing others (7.1), Business Etiquette, Formal Approach in the work field, Codes of Conduct, Body Language, and Non-verbal Techniques of Communication (8.1), Developing Intra and Interpersonal Skills through Practice, Acquiring Business Attributes (8.2)	Self Introduction, Resume Writing, Mock Interviews	Mock Interview session, Exercises based on Reading Comprehension (Extract from IELTS sample papers)

11	**Group Discussion**	Job Skills: Learning the Basics & Mastering Communication as a Leader	Discussion about current affairs, and mock job/placement interviews (4.2), Introducing Oneself (5.1), Impromptu Speech Delivery (5.2), Strategies for making and working in a group (6.1), Features of a group leader (6.2), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self Control, and influencing others (7.1), Business Etiquette, Formal Approach in the work field, Codes of Conduct, Body Language, and Non-verbal Techniques of Communication (8.1), Developing Intra and Interpersonal Skills through Practice, Acquiring Business Attributes (8.2)	Group Discussion	Group Discussion, Debate

12	**Professional Toolkit**	Create and Design Avatars Using AR/VR & Create Communicative Interfaces Using No-Code Platforms	Casual and Academic Listening (1.1), Listening to Speeches and Evaluating them (1.2), Reading non/technical passages, graphics, diagrams, etc. (2.2)	Vocabulary, Introduction to Phonetics	Exercises based on writing skills (Thematic presentation/ picture based
13	**Innovate & inspire**	Develop Comprehensive Case Models for Audio and Visual Communication Using Generative AI	Casual and Academic Listening (1.1), Listening to Speeches and Evaluating them (1.2), Reading non/technical passages, graphics, diagrams, etc. (2.2), Creative Writing (3.1), Writing a piece of Fiction (3.2), Dialogue writing on the day-to-day situation (3.3)	Vocabulary, Introduction to Phonetics	**NO DIRECT MATCH**

14	**Tune In and Think**	Create a Short Animated Video Using Text-to Animation Software	Casual and Academic Listening (1.1), Listening to Speeches and Evaluating them (1.2), Reading non/technical passages, graphics, diagrams, etc. (2.2)	Vocabulary, Introduction to Phonetics	Sci-fi Movie Screening
15	**Communicating to the Future**	Interaction with Digital Twins, Chatting with Digital Twins	Casual and Academic Listening (1.1), Listening to Speeches and Evaluating them (1.2), Reading non/technical passages, graphics, diagrams, etc. (2.2), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, and influencing others (7.1)	Vocabulary, Introduction to Phonetics	**NO DIRECT MATCH**
16	**Minefield**	Leadership Team Skill Building, Trust & Collaboration	Casual and Academic Listening (1.1), Introducing Oneself (5.1), Strategies for making and working in a group (6.1), Features of a group leader (6.2), Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self Control, and influencing others (7.1), Business Etiquette, Formal Approach in the work field, Codes of Conduct, Body Language, and Non-verbal Techniques of Communication (8.1), Developing Intra and Interpersonal Skills through Practice, Acquiring Business Attributes (8.2)	Activity on Event Management / Expansion	Screening of motivational lectures (e.g. How to deal with stress etc.)
17	**MATLAB**	Activity Using MATLAB	Casual and Academic Listening (1.1), Listening to Speeches and Evaluating them (1.2), Reading non/technical passages, graphics, diagrams, etc. (2.2)	Vocabulary	**NO DIRECT MATCH**

Software Used:

• Orell Talk https://orelltalk.com/

Generative AI: Chatgpt, Gemini, Meta AI,

Image **generator:** Dall-E, Nvidia, Canva

Plagiarism checker: GptZero, Ithenticate

App: Tinkercad

ATS Resume Checker

Suggested Textbooks:

1. Technical Communication Principles and Practice by Meenakshi Raman, Oxford UniversityPress.

Suggested Reference books:

1. Communication Skills for Professionals by Nira Konar, Publisher: PHI Learning.

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech. Admission Batch 2025

Course Code: ESCCS191/ESCCS291	**Category: Engineering Science Course**
Course Name: Programming for Problem Solving Laboratory	**Semester- First/Second**
L-T-P: 0-0-4	**Credit-2**

Laboratory/Practical: List of Experiments:

Week	Ques	Problem Statements
1	1	Write a Program to display "Hello World".
	2	Write a Program to find the last digit of a number and delete the last digit.
	3	Write a Program to find the last digit of a number without using % modulus operator.
	4	Write a Program to delete the last two digits of any user given input number.
	5	Write a Program to double the last digit of any user given input number.
	6	Write a Program to exchange the last two digits of any user given input number.
	7	Read two numbers. Write a Program to find their product after exchanging last digits.
	8	Write a Program to insert 1 as a first digit after decimal.
	9	Write a Program to find out the summation of two variables.
	10	Write a Program to swap two numbers using and without using a third variable.
	11	Write a Program to change temperature from Fahrenheit to Celsius or vice-versa.
2	1	Write Program, which reads a, b and c as sides of a triangle and prints area. Hint: area = $\sqrt{s*(s-a)*(s-b)*(s-c)}$.
	2	Write Program, which reads x1, y1, x2 and y2 and finds distance between points (x1,y1) and (x2,y2).
	3	Write a Program, which reads a, b and c as sides of a Triangle and print whether angel A is 90° or not.
	4	Write a Program to check whether a number is even or odd.

	5	Write a Program to test whether any year is Leap year or not.
	6	Write a Program to accept the marks of a student and display the grade accordingly.
	7	Write a Program to reverse the digits of an integer.
	8	Write a Program to print the summation of digits of user given input number.
	9	Write a Program to check whether a given number is Palindrome or not.
	10	Write a Program to find all the Fibonacci numbers for a given range.
	11	Write a Program to find all prime numbers within a given range.
	12	Write a Program to calculate the Factorial of any integer.
3	1	Print the following pattern upto N Lines: **** **** **** **** for N = 4
	2	Print the following pattern upto N Lines: * ** *** **** for N = 4
	3	Print the following pattern upto N Lines: **** *** ** * for N = 4
	4	Print the following pattern upto N Lines: * * * * * * * * * * for N = 4
4	1	Print the following pattern upto N Lines: * *** ***** ******* for N = 4
	2	Print the following pattern upto N Lines: ******* ***** *** * for N = 4
	3	Write a Program to print given pattern: A BB

		CCC DDDD
	4	Write a Program to print given pattern: ABCDE CDEF EFG GH I
	5	Write a Program to print given pattern: A BC CDE DEFG EFGHI
5	1	Write a Program to print given pattern: A AC ACE ACEG ACEGI
	2	Write a Program to print given pattern: 1 12 123 1234 12345 for N=5
	3	Print the following pattern upto N Lines: 10001 01010 00100 01010 10001 for N = 5
	4	Print the following pattern upto N Lines: 1 121 12321 1234321 for N = 4
	5	Print the following pattern upto N Lines: 1 1 1 1 2 1 1 3 3 1 1 4 6 4 1 for N=5
6	1	Write a Program to declare, read and display values in 1-D array.
	2	Write a Program to declare, read and display values in a 2-D array.
	3	Write a Program in C to copy the elements of one array into another array.
	4	Write a Program in C to count the frequency of each element of an array.
	5	Write a Program to perform different matrix operations like addition, multiplication with

		3x3 matrices.
	6	Write a Program to find out the largest/smallest element in array.
	7	Write a Program in C to sort elements of array in ascending order.
	8	Write a Program in C to sort elements of the array in descending order.
7	1	Write a Program to reverse an array.
	2	Write a Program to split an array.
	3	Write a Program to merge two arrays.
	4	Write a Program to check an element is present or not in one 1D array.
	5	Write a Program to find the number of even and odd positions elements in 1D array.
	6	Write a Program to accept your name and print your name using string.
	7	Write a Program to reverse a string.
	8	Write a Program to check whether a string is palindrome or not.
	9	Write a Program to find the length of string.
	10	Write a Program to copy one string to another string.
8	1	Write a Program to concatenate two string.
	2	Write a Program to compare two string.
	3	Write a Program to find the vowels in the given string.
	4	Write a Program to perform linear search of 5 elements taken as user input.
	5	Write a Program to perform binary search of 5 elements taken as user input.
	6	Write a Program to perform bubble sort in C.
	7	Write a Program to perform insertion sort in C.
	8	Write a Program to perform merge sort in C.
	9	Write a Program to perform selection sort in C.
9	1	Write a Program to add three numbers using function.
	2	Write a Program to find X^Y using user defined function.
	3	Write a Program to find factorial of a given number using user defined functions as well as recursion function.
	4	Write a Program to find GCD (Greatest Common Divisor) and LCM (Least Common Multiple) of two numbers using recursion.
	5	Write a Program to display the Fibonacci series for a given range using function.
10	1	Write a Program to check whether any use given input number is Armstrong number or not using user defined function.
	2	Write a Program to check whether any use given input number is Peterson number or not using user defined function.
	3	Write a Program to create a structure called Student to store his/her name, and marks.
	4	Write a Program to implement an array of structures to store the data of multiple students.
11	1	Write a Program to print address of an integer variable.
	2	Write a Program to swap two numbers using pointers.
	3	Write a Program to add two numbers using pointers.
	4	Write a Program to read and display values in a 1-D array using pointers.
	5	Write a Program to find the factorial of a given number using function and pointers.
	6	Write a Program to print the Ackermann function with recursion.
12	1	Write a Program to read a text file and display the contents.
	2	Write a Program to read a text file containing subject and marks of a student and calculate his average marks.
	3	Write a Program to write into a file.

	4	Write a Program to copy the content of one file to another.

Course Outcomes:

CO1: Impart the fundamental concepts of problem-solving approaches and algorithmic thinking.
CO2: Provide comprehensive knowledge of the C programming language, including character sets, expressions, and operators.
CO3: Demonstrate control over program flow and logic using input/output operations, control structures, and program organization. **CO4:** Enable students to solve real-world challenges by applying advanced concepts such as functions, arrays, pointers, data structures, and file handling in building end-to-end applications.

Text Books:

1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
2. Reema Thareja, Computer Fundamentals and programming in C, Oxford University Press
3. Yashavant Kanetkar, Let Us C, BPB Publications

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

Alternate Courses:

NPTEL – Introduction to programming in C, SatyadevNandakumar, IIT Kanpur - https://nptel.ac.in/courses/106104128
COURSERA – Introductory C Programming Specialization- Andrew D. Hilton- https://www.coursera.org/specializations/c-programming

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech. Admission Batch 2025

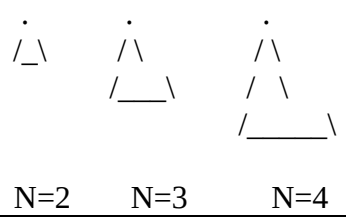
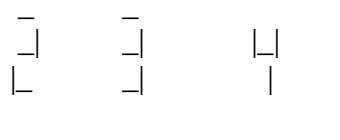
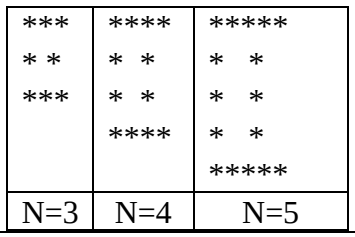
Course Code: ESCCS192/ESCCS292	**Category: Engineering Science Course**
Course Name: Introduction to AI and Data Science using Python Laboratory	**Semester- First/Second**
L-T-P: 0-0-4	**Credit-2**

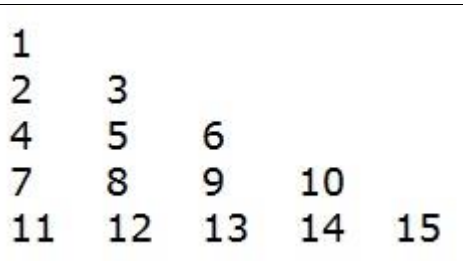
Laboratory/Practical: List of Experiments:

Week	Ques	Problem Statements
1	1	Write a Python program that asks the user for his name and then welcomes him.
	2	Write a Python program that accepts principle, rate, and time from the user and prints the simple interest.
	3	Write a Python program that prompts the user to input principle, rate, and time and calculate compound interest.
	4	Write a program in Python to calculate the area and perimeter of various polygons such as triangles, rectangles, and circles.
	5	Write a program in Python to input 3 numbers separated by comma, and find the largest and smallest among them.
	6	Write a program in Python to find the roots of a quadratic equation using Python.
	7	Write a program in Python to print all prime numbers inside a range of numbers provided by the user.
2	8	Write a program in Python to print the mean and standard deviation of 5 scores input by the user.
	9	Write a program in Python to create a calculator that can perform basic arithmetic operations.
	10	Write a program in Python to convert temperatures between Celsius and Fahrenheit.
	11	Write a program in Python to check whether an input is even or odd.
	12	Write a program in Python to check whether an input is leap year or not.
	13	Write a python program that prompts the user to enter a number and determines whether it is positive, negative, or zero.
	14	Write a program that prompts the user to enter their age and prints the corresponding age group. The program should use the following age groups:

		0-12: Child 13-19: Teenager 20-59: Adult 60 and above: Senior Citizen
	15	Write a program that prompts the user to enter their weight (in kilograms) and height (in meters). The program should calculate the Body Mass Index (BMI) using the formula: BMI = weight / (height * height). The program should then classify the BMI into one of the following categories: less than 18.5 - Underweight BMI between 18.5 and 24.9 - Normal weight BMI between 25 and 29.9 - Overweight BMI 30 or greater - Obesity
3	1	Write a Python program that prompts the user to input a number from 1 to 7. The program should display the corresponding day for the given number. For example, if the user types 1, the output should be Sunday. If the user types 7, the output should be Saturday.
	2	Write a Python program that prompts the user to input the number of calls and calculate the monthly telephone bills as per the following rule: Minimum Rs. 200 for up to 100 calls. Plus Rs. 0.60 per call for the next 50 calls. Plus Rs. 0.50 per call for the next 50 calls. Plus Rs. 0.40 per call for any call beyond 200 calls.
	3	Write a program in Python to calculate the factorial of a number.
	4	Write a program in Python to calculate the Fibonacci sequence till a specific no. of terms.
	5	Write a program in Python to calculate the factors of numbers.
	6	Write a program in Python to calculate the magic square based on a given number.
	7	Write a program in Python to check if a number is a palindrome
	8	Write a program in Python to check if a number is an Armstrong number.
	9	Write a program in Python to check if a number is Krishnamurthy number.
	10	Write a program in Python to find the sum of digits of a number.
	11	Write a program in Python to reverse a given number.
	12	Write a program in Python to find the sum of squares of the first n natural numbers.
	13	Write a program in Python to convert a decimal number to a binary number.
	14	Write a program in Python that prompts the user to input a number and prints its multiplication table.

	15	Write a Python program to print the first 6 terms of a geometric sequence starting with 2 and having a common ratio of 3.
4	1	Print the series upto N terms: 1, 4, 9, 16, 25, 36…
	2	Print the series up to N terms: 2, 4, 8, 16, 32, 64…
	3	Print the series upto N terms: 1, 3, 7, 13, 21, 31…..
	4	Print the series upto N terms: 1, 2, 4, 8, 16, 23, 28, 38, 49, 62 …
	5	Print the series upto N terms: 1,2,6,24,120,720 …
	6	Write a program that takes a positive integer N as input and calculates the sum of the reciprocals of all numbers from 1 up to N. The program should display the final sum.
	7	Write a Python program that prompts the user to enter a base number and an exponent, and then calculates the power of the base to the exponent. The program should not use the exponentiation operator (**) or the math.pow() function.
5	8	Write a Python program that prompts the user to enter a positive integer. Your program should display all the factors of the number. Additionally, calculate and display the sum of its factors.
	9	Write a python program that uses a loop to repeatedly ask the user to enter integers. The loop will come to an end when zero is entered. After collecting all the integers, the program will compute and display the average of all the entered numbers.
	10	Write a python program to enter the numbers till the user wants and at the end it should display the count of positive, negative and zeros entered.
	11	Write a python program that prompts the user to input two numbers and display its HCF.
	12	Write a python program to add first seven terms of the following series using a for loop: $\frac{1}{1!}+\frac{2}{2!}+\frac{3}{3!}+\cdots$
	13	Compute the sum up to n terms in the series 1 - 1/2 + 1/3 - 1/4 + 1/5 -... 1/n where n is a positive integer and input by user.
	14	Write a program to compute sin x for given x. The user should supply x and a positive integer n. We compute the sine of x using the series and the computation should use all terms in the series up through the term involving xn sin x = x - x3/3! + x5/5! - x7/7! + x9/9! .....
	15	Write a program to compute cosine of x. The user should supply x and a positive integer n. We compute the cosine of x using the series and the computation should use all terms in the series up through the term involving xn cos x = 1 - x2/2! + x4/4! - x6/6! ....
6	1	Print the pattern upto N Lines:

		 N=2 N=3 N=4
	2	Print a number as a 8 segment display N Lines:  N=2 N=3 N=4
	3	Print the pattern upto N lines: 1 2 1 2 3 1 2 3 4 4 3 8 9 4 12 13 14 5 7 6 5 11 16 15 6 10 9 8 7 N=2 N=3 N=4
	4	Print the following pattern upto N lines: 1 1 1 1 2 1 1 3 3 1 1 4 6 4 1 1 5 10 10 5 1 …
	5	Print the shape for Height = N  N=3 N=4 N=5
	6	Floyd's triangle is a right-angled triangular array of natural numbers as shown below:

		 Write a program to print the Floy'd triangle.
7	7	Write programs to print following patterns: `**********` `**********` `**********` `**********`

	8	Write programs to print following patterns:
		`*`
		`**`
		`***`
		`****`
		`*****`

	9	Write programs to print following patterns:
		`  *`
		`  **`
		`  ***`
		`  ****`
		`*****`

	10	Write programs to print following patterns:
		`*`
		`***`
		`*****`
		`*******`
		`*********`

	11	Write programs to print following patterns: 1 222 33333 4444444 555555555
	12	Write a program that prints the following diamond pattern:

		1 123 12345 123 1
8	1	Write a python program that accepts a string from user. Your program should count and display number of vowels in that string.
	2	Write a python program that reads a string from the keyboard and display: * The number of uppercase letters in the string * The number of lowercase letters in the string * The number of digits in the string * The number of whitespace characters in the string
	3	Write a Python program that accepts a string from user. Your program should create and display a new string where the first and last characters have been exchanged. For example if the user enters the string 'HELLO' then new string would be 'OELLH'
	4	Write a Python program that accepts a string from user. Your program should create a new string in reverse of first string and display it. For example if the user enters the string 'EXAM' then new string would be 'MAXE'
	5	Write a Python program that accepts a string from user. Your program should create a new string by shifting one position to left. For example if the user enters the string 'examination 2021' then new string would be 'xamination 2021e'
9	6	Write a program that asks the user to input his name and print its initials. Assuming that the user always types first name, middle name and last name and does not include any unnecessary spaces. For example, if the user enters Ajay Kumar Garg the program should display A. K. G. Note: Don't use split() method
	7	Write a program that determines whether the string is a palindrome.
	8	Write a program that display following output: SHIFT HIFTS IFTSH FTSHI

		TSHIF SHIFT
	9	Write a program in python that accepts a string to setup a passwords. Your entered password must meet the following requirements: • The password must be at least eight characters long. • It must contain at least one uppercase letter. • It must contain at least one lowercase letter. • It must contain at least one numeric digit. Your program should should perform this validation
	10	Write a python program to check whether an input of an arithmetic expression is correct or not.
10	1	Write a program to Insert and Delete elements from list based on a given position.
	2	Find out Mean, Median and Mode of a list of numbers.
	3	Sort a list of numbers without using a user defined function.
	4	Use a dictionary to count the frequency of words in a string input by the user.
	5	Given a list of numbers return the indices in which a specific number occurs.
	6	Find and display the largest number of a list without using built-in function max().
	7	Write a program that accepts a list from user and print the alternate element of list.
	8	Write a program that rotates the element of a list so that the element at the first index moves to the second index, the element in the second index moves to the third index, etc., and the element in the last index moves to the first index.
	9	Write a program that input a string and ask user to delete a given word from a string.
	10	Write a program to add two matrices of size n x m.
	11	Write a program to multiply two matrices.
11	1	Write a program to create a text file as per the path and filename provided by the user and add text as input by the user.
	2	Write a program to copy the content of a text file to another file but while copying convert all capital letters to small letters.
	3	Create a text file to append N lines such that each line displays the Fibonacci sequence upto the term corresponding to specific line number separated by '-'. For N = 5 the text file should read. 1 1-1 1-1-2

		1-1-2-3 1-1-2-3-5
	4	Take input four values from user with respect to number of books, pens, bags and total price as follows. 36, 116, 23, 4649 and save it as a text file Books: 36 Pens: 116 Bags : 23 Price : Rs. 4649
	5	Write a program to create a dictionary by reading records from the text file output in program 4th Dictionary : {“Books”:36, “Pens”: 116, “Bags”:23, “Price”: “4649”}
	6	Write a program to take inputs from user to create a dictionary for storing and displaying student data.
	7	Write a program to print all elements in a list those have only single occurrence.
12	8	Write a program to read 6 numbers and create a dictionary having keys EVEN and ODD. Dictionary's value should be stored in list. Your dictionary should be like: {'EVEN':[8,10,64], 'ODD':[1,5,9]}.
	9	Write a program to input roll numbers and their names of students of your class and store them in the dictionary as the key-value pair. Perform the following operations on the dictionary: a) Display the Roll numbers and name for all students. b) Add a new key-value pair in this dictionary and display the modified dictionary c) Delete a particular student's record from the dictionary d) Modify the name of an existing students.
	10	Write a program that reads string from user. Your program should create a dictionary having key as word length and value is count of words of that length. For example, if user enters 'A fat cat is on the mat'. Word Word length A 1 fat 3 cat 3 is 2 on 2 the 3 mat 3
	11	Write a program using matplotlib to display a line plot
	12	Write a program using matplotlib to use different types of Matplotlib Markers

	13	Write a program using matplotlib to use Matplotlib Labels and Title
	14	Write a program using matplotlib to display a scatter plot
	15	Write a program using matplotlib to display Matplotlib Histograms

Course Outcomes:

CO1: Understand fundamental components of programming in python
CO2: Implement solutions using object orient programming concepts using python classes and objects
CO3: Develop databases, perform numerical computation and visualize data using python packages
CO4: Apply concepts of python to solve challenges in AI and Data Science

Text Books:

1) Python for Everybody: Exploring Data in Python 3, Charles Severance, SPD
2) Python Computing Fundamentals and Applications, Abhijit Kar Gupta, Techno World.
3) Python Programming, Subrata Saha, Aryan Publishing House.
4) Prompt Engineering for Generative AI by James Phoenix, Mike Taylor, O'Reilly Media, Inc.

Reference Books:

1) Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, Wes McKinney, O'Reilly
2) Python: The Complete Reference, Martin C. Brown, Osborne/McGraw-Hill

Alternate Courses

NPTEL –Python for Data Science – Prof. Ragunathan Rengasamy, IIT Madras.
https://nptel.ac.in/courses/106106212
COURSERA– Python for Data Science, AI & Development, Joseph Santarcangelo - https://www.coursera.org/learn/python-for-applied-data-science-ai

Syllabus for B.Tech Admission Batch 2025

Subject Name: Basic Electronics Engineering Lab

Credit Points: 1 **Lecture Hours:**

Subject Code: ESCEC191

Study Material **Coursera** **NPTEL**

Linkedin Learning

COURSE OBJECTIVES:

1. **To introduce basic concept of Electronics**
2. **To study semiconductor, its band-structure, p-type and n-type semiconductor**
3. **To introduce the concept of P-N junction diode, Zener diode.**
4. **To learn the concept of BJT, FET and OPAMP.**
5. **To illustrate the basic concept of logic gates**

Course Outcomes:

CO1: To conceptualize the fundamentals of semiconductor physics including the band structures.

CO2: To be able to understand the basics of p-n junction diode and Zener diode and their applications.

CO3: To be able to understand the concept of Transistors working principles, characteristics and their applications.

CO4: To study the basics of digital electronics including basic gates, universal gates and truth tables.

Module number	Topic	Sub-topics	Textbook Name and chapter	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1.	**Semiconductor Physics**	Classification of Metal, insulator and semiconductor, Introduction to active and passive components, intrinsic and extrinsic semiconductor, n-type and p-type semiconductors and their Band structure, carrier concentration, scattering and drift of electrons and holes, drift current, diffusion mechanism, generation and recombination and injection of carriers, **density of state function and dimensional problem quantization**	Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky **Chapter**-1	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** TCAD Software	6	1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, millimetres etc. 2. Familiarization with measuring and testing equipment like CRO, Signal generators etc.
2.	**P-n Junction diode and Zener diode**	Diodes: Semiconductor p-n junction formation, forward and reverse bias, V-I characteristics of p-n junction diode, **Current equation, Derivation for Forward and Reverse current, piece-wise linear diode characteristics,** Diode as a switch, Application of diode in Clipper and Clamper Circuits, Zener Diodes, V-I characteristics of Zener Diodes, application of junction diode as a rectifier, Half-Wave and Full-Wave Rectifier Circuits, **SCR**	Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky **Chapter**-2	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:***	6	1. Circuit designing using p-n junction diodes. **i.** Study the I-V characteristics of a p-n junction diode **ii.** Design and implement clipper circuits using a diode and observe their effect on

		Operation & Characteristics.		TCAD Software		the output waveform. **iii.** Design and implement clamper circuits using a diode and observe their effect on the output waveform. 2. Study of I-V characteristics of Zener diodes. 3. Design and implement voltage over-protection circuit using a Zener diode 4. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
3.	**Bipolar Junction Transistors**	Bipolar Junction Transistor (BJT): Type, Operation, Physical mechanism, current gain, minority current distribution; Punch-through and avalanche effect**,** V-I Characteristics, region of operation, input & output characteristics for CB. CE & CC mode, current amplification factors α for CB mode and β for	Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky **Chapter**-3	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-	6	1. Study of Characteristic curves for CB, CE mode configuration and find the respective hybrid parameters.

		CE mode, BJT as amplifier and switch, small signal analysis**, small signal analysis using h-parameter, gain and impedance calculation**		india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** TCAD Software, SPICE Software		
4.	**Field effect transistors**	Metal Oxide Semiconductor Field Effect Transistors (MOSFET): Construction, Types, Operation, V-I characteristics, Regions of operation, MOSFET as switch & amplifier, CMOS technology, Advanced CMOS devices (Example: FinFETs, MOSFETs with high mobility channels, and silicon nanowire transistors), IGBT	Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky **Chapter**-6	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** TCAD Software, SPICE Software	6	1. Study of I-V characteristics of Field Effect Transistors and show the characteristics in LTSpice.
5.	**OPAMP**	Ideal Op-AMP, CMRR, Open & Closed loop circuits, importance of feedback loop (positive & negative), Inverting Configuration, Noninverting configuration, DC imperfections, difference amplifiers, circuits based on Op-amps: Integrators, differentiators, filters, logarithmic amplifiers, Schmitt trigger, **frequency dependent negative resistance and solution of differential equations**	Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky **Chapter - 10**,11	***International Academia:*** (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009) (https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2005/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** TCAD Software, SPICE Software	6	1. Design and simulate Inverting and Non-inverting amplifiers using Op-amp and draw waveforms in LTSpice 2. Design and simulate Adder and Subtractor circuits using Op-amp and draw waveforms in LTSpice 3. Design and simulate

						Differentiator and Integrator circuits using Op-amp and draw waveforms in LTSpice 4. Determination of input-offset voltage, Offset null of Op-amps, etc.
6.	**Digital Logic gates**	Components of TTL circuits, Boolean Algebra and Logic Gates, Basic Logic AND, OR, NOT Gates and Universal gates, XOR and XNOR gate, their symbols and Truth tables, De Morgan's Theorems, Combinational Circuit (adders/subtractors, magnitude comparator, multiplexer, demultiplexers, encoders, decoders).	Digital Logic Design 4th Edition by M . Morris Mana and Michael D. Ciletti Chapters 1,2,4	***International Academia:*** (https://web.stanford.edu/class/archive/ee/ee108a/ee108a.1082/schedule.html) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** Hardware Chipsets Software- TinkerCad, EDA Playground	6	1. Study of Logic Gates and realization of Boolean functions using Logic Gates. 2. Show NAND and NOR gates are universal gates. 3. Write a VHDL code to describe the functionality of various gates. Compile and simulate the code to obtain the timing waveform.

Text Books:

1. Electronic Devices and Circuits Theory by Robert L. Boylestad, Louis Nashelsky (Chapters 1,2,3,6,10,11)

2. Digital Logic Design 4th Edition by M . Morris Mano and Michael D. Ciletti (Chapters 1,2,4)

Reference Books:

1. Streetman, Solid State Electronic Devices, Pearson Education India
2. Donald Neamen, Semiconductor Physics and Devices, McGraw-Hill Higher Education
3. Simon M. Sze, Yiming Li, Kwok K. Ng, Physics of Semiconductor Devices, John Wiley & Sons
4. **Millman, Grabel, Microelectronics, McGraw Hill**
5. **Sedra, Smith, Microelectronic Circuits, Oxford University Press.**

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech. Admission Batch 2025

Course Name: Basic Electrical Engineering Laboratory	
Course Code: ESCEE191	
Course Code: ESCEE-191	**Category:** Basic Science Courses
Course Title: Basic Electrical Engineering Laboratory	**Semester:** First
L-T-P: 0-0-3	Credit: 1
Pre-Requisites: High School Mathematics & Physics	

Course Outcomes

CO1: Get an exposure to common electrical components and their ratings and make electrical connections by wires of appropriate ratings

CO2: Understand the usage of common electrical measuring instruments.

CO3: Understand and verify different networking theorems.

CO4: Understand the basic characteristics of transformers and electrical machines.

List of Hands on experiment to be conducted in the laboratory				
Sl No.	**Name of Experiments**	**Digital Twin link**	**Mapping with MIT & Stanford**	**Use of Software**
1	**1. (a) Basic safety precautions mentioning do's and don'ts.** **(b) Introduction and uses of electrical instrument :- Ammeter, Voltmeter, Wattmeter, Variac , Autotransformer and colour codes of resistors.**	https://www.amrita.edu/course/basic-electrical-and-electronics-engineering-lab/	NA	MATLAB, Simulink toolbox
2	**Demonstration about the cut section of a.c & d.c. machines.**	NA	NA	NA
3	**Demonstration about the LT switch gears and electrical components.**	NA	NA	NA
4	**Verification of Super position theorem with theoretical calculations**	https://www.amrita.edu/course/basic-electrical-and-electronics-engineering-lab/	NA	MATLAB, Simulink toolbox
5	**Verification of Thevenin theorem with theoretical calculations**	https://www.amrita.edu/course/basic-electrical-and-electronics-engineering-lab/	NA	MATLAB, Simulink toolbox
6	**Verification of Maximum power theorem with theoretical calculations**	https://www.amrita.edu/course/basic-electrical-and-electronics-engineering-lab/	NA	MATLAB, Simulink toolbox
7	**Calibration of wattmeter. Draw the curve between percentage error vs test meter reading**	https://www.amrita.edu/course/basic-electrical-and-electronics-engineering-lab/	NA	MATLAB, Simulink toolbox

8	**Verification of Norton's theorem with theoretical calculations**	https://www.amrita.edu/course/basic-electrical-and-electronics-engineering-lab/	NA	MATLAB, Simulink toolbox
9	**Determination of steady state response of R-L, R-C, R-L-C Series circuit and calculation of Impedance, power factor., power losses and draw the vector diagram**	https://www.amrita.edu/course/basic-electrical-and-electronics-engineering-lab/	NA	MATLAB, Simulink toolbox
10	**Calibration of ammeter, voltmeter . Draw the curve between percentage error vs test meter reading**	https://www.amrita.edu/course/basic-electrical-and-electronics-engineering-lab/	NA	MATLAB, Simulink toolbox
11	**Open circuit and short circuit test of 1ph transformer and determination of efficiency on Full load, Half of full load, ¾ of full load, 1/4 of full load and draw the efficiency curve.**	https://em-coep.vlabs.ac.in/List%20of%20experiments.html	NA	MATLAB, Simscape toolbox
12	**Determination of steady state response of R-L, R-C,R-L-C parallel circuit and Calculation of impedance and power factor.**	https://www.amrita.edu/course/basic-electrical-and-electronics-engineering-lab/	NA	MATLAB
13	**Determination of torque speed characteristic of separately excited D.C Shunt Motor.**	https://em-coep.vlabs.ac.in/List%20of%20experiments.html	NA	MATLAB, Simscape toolbox
14	**No load characteristics of separately D.C. Shunt generator. Draw the characteristics Curve.**	https://em-coep.vlabs.ac.in/List%20of%20experiments.html	NA	MATLAB, Simscape toolbox

15	**Speed control of D.C shunt motor (Armature volt. and field current control method. Draw the characteristics.**	https://em-coep.vlabs.ac.in/List%20of%20experiments.html	NA	MATLAB, Simscape toolbox
16	**Measurement of 3ph power by two wattmeter method.**	https://em-coep.vlabs.ac.in/List%20of%20experiments.html	NA	MATLAB, Simscape toolbox
List of Innovative Experiments in Laboratory				
1	**To study and run the 1ph a.c. motor and change the D.O.R.**	NA	NA	MATLAB, Simscape toolbox
2	**Using FLUX.AI creat a complex circuit and solve load current and voltage using KVL and KCL**	NA	NA	**https://www.flux.ai/p**

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech. Admission Batch 2025

Subject Name: Engineering Graphics & Design **Credit: 3**
Lecture Hours: 70

Subject Code: ESCME192

Total of 10 Lecture Hours & 60 Hours of Lab. Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory (as per AICTE).

Course Objective:

1. Introduction to engineering design and its place in society,
2. Exposure to the visual aspects of engineering design,
3. Exposure to engineering graphics standards,
4. Exposure to creating working drawings,
5. Exposure to computer-aided geometric design,
6. Exposure to engineering communication.

Course Content:

Module No.	Module Name with details	Mapping with Industry and International Academia	Lecture (L)	Practical (P)
1.	**INTRODUCTION TO ENGINEERING DRAWING:** Principles of Engineering Graphics and their significance, usage of Drawing instruments,	***AICTE prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf ***International Standards*** : https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-	1	4

	lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales	resources/drawing_and_sketching/ ***Industry Mapping:*** AutoCAD, Solidworks, Creo ***Linkedin Learning Course:*** https://www.linkedin.com/learning/autocad-2024-essential-training?trk=learning-serp_learning-search-card_search-card&upsellOrderOrigin=default_guest_learning		
2.	**ORTHOGRAPHIC PROJECTIONS:** Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes -Auxiliary Planes;	***AICTE prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf ***International Standards*** : https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/ ***Industry Mapping:*** AutoCAD, Solidworks, Creo	1	8
3.	**PROJECTIONS OF REGULAR SOLIDS:** Solids inclined to both the Planes-Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower	***AICTE prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf ***International Standards*** : https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/ ***Industry Mapping:*** AutoCAD, Solidworks, Creo, Tinkercad	1	8

4.	**SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS** Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)	***AICTE prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf ***International Standards*** : https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/ ***Industry Mapping:*** AutoCAD, Solidworks, Creo	1	8
5.	**ISOMETRIC PROJECTIONS** Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;	***AICTE prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf ***International Standards*** : https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/ ***Industry Mapping:*** AutoCAD, Solidworks, Creo, Tinkercad ***Linkedin Learning Course:*** https://www.linkedin.com/learning/cert-prep-certified-solidworks-professional-2/welcome?u=229219690	2	8

6.	**OVERVIEW OF COMPUTER GRAPHICS** The computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids	***AICTE prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf ***International Standards*** : https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/ ***Industry Mapping:*** AutoCAD, Solidworks, Creo	1	8
7.	**CUSTOMISATION & CAD DRAWING** Set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for	***AICTE prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf ***International Standards*** : https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/	1	8

	coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;	***Industry Mapping:*** AutoCAD, Solidworks, Creo		
8.	**ANNOTATIONS , LAYERING & OTHER FUNCTIONS** Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/length en); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface;	***AICTE prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf ***International Standards*** : https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/ ***Industry Mapping:*** AutoCAD, Solidworks, Creo	1	2

9	**DEMONSTRATION OF A SIMPLE TEAM DESIGN PROJECT** Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids in 3D printed model; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid- modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling	***AICTE prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_Mechanical%20Engg.pdf ***International Standards*** : https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/ ***Industry Mapping:*** Solidworks, Creo, Staad Pro, Cura, Aurdino, Raspberry pi ***Linkedin Learning Course:*** https://www.linkedin.com/learning/product-design-from-cad-to-3d-model/welcome?u=229219690 ***Linkedin Learning Course:*** ***https://www.linkedin.com/learning/solidworks-simulationxpress/welcome?u=229219690*** ***Coursera Learning Course:*** ***https://www.coursera.org/learn/modelling-analysis-and-design-of-steel-buildings*** ***Linkedin Learning Course:*** ***https://www.linkedin.com/learning/learning-arduino-foundations-2/getting-started-with-arduino-22858971?u=229219690***	1	6

Course Outcomes

- Prepare students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Prepare students to communicate effectively.
- Prepare students to use the techniques, skills, and modern engineering tools necessary for engineering practice
- Helping students to increase their visualization power

Learning Resources

1. Pradeep Jain, Ankita Maheswari, A.P. Gautam, Engineering Graphics & Design, Khanna Publishing House
2. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
3. Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMHPublication
4. Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, PearsonEducation
5. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, ScitechPublishers
6. Corresponding set of Software Theory and User Manual

University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur

Syllabus for B.Tech. Admission Batch 2025

Course Name: Workshop/Manufacturing Practices Laboratory	
Course Code: ESCME193	
Course Code: ESCME193/ 293	**Category:** Basic Science Courses
Course Title: Workshop/Manufacturing Practices Laboratory	**Semester:** First
L-T-P: 1-0-4	Credit: 3
Pre-Requisites: Knowledge in dimensions and units. Usage of geometrical instruments and analytical ability.	

Course Outcomes

CO1: Upon completion of this laboratory course, students will be able to fabricate components with their own hands.

CO2: They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.

CO3: By assembling different components, they will be able to produce small devices of their interest.

CO4: Exposure to some of the advanced and latest manufacturing techniques being employed in the industry.

List of Hands on experiment to be conducted in the laboratory				
Sl No.	**Name of Experiments**	**Digital Twin link**	**Mapping with MIT & Stanford**	**Use of Software**
1	**Fitting shop :** Typical jobs that may be made in this practice module: To prepare a simple type fitting job **Fitting shop:** Typical jobs that may be made in this practice module: To make a Gauge from MS plate.	• http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpMM/exp2/index.html • http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpMM/exp1/index.html	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .
2	**Casting :** Typical jobs that may be made in this practice module: One/ two green sand moulds to prepare, and a casting be demonstrated.	• https://fab-coep.vlabs.ac.in/exp/molding-casting-polyurethane-parts/	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .
3	**Welding shop:** Typical jobs that may be made in this practice module: ARC WELDING (4 hours): To join two thick (approx	• https://mm-coep.vlabs.ac.in/exp/welding-ndyag-laser/procedure.html • https://mm-coep.vlabs.ac.in/exp/welding-ndyag-laser/procedure.html	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .

	6mm) MS plates by manual metal arc welding. **Welding shop:** Typical jobs that may be made in this practice module: To join two thin mild steel plates or sheets by gas welding.		• https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	
4	**Smithy :**Typical jobs that may be made in this practice module: Prepare a simple type job by upsetting process **Smithy:** Typical jobs that may be made in this practice module: Prepare a simple type job by drawing down process		• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .
5	**Carpentry:** Typical jobs that may be made in this practice module: To make wooden joints and/or a pattern or like.	• https://fab-coep.vlabs.ac.in/exp/computer-controlled-cutting/	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bu	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .

			lletin0809/current/pdf/MechEng.pdf	
6	**Machine shop:** Typical jobs that may be made in this practice module: To make a pin from a mild steel rod in a lathe. **Machine shop:** Typical jobs that may be made in this practice module: To make rectangular and vee slot in a block of cast iron or mild steel in a shaping and / or milling machine.	• https://fab-coep.vlabs.ac.in/exp/3d-machining/	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .
7	**Plastic moulding & Glass cutting:** Typical jobs that may be made in this practice module: For plastic moulding, making at least one simple plastic component should be made. **Plastic moulding & Glass cutting :** Typical jobs that may be made in this practice module: For glass cutting, three rectangular glass pieces may be cut to make a	• https://fab-coep.vlabs.ac.in/exp/molding-casting-polyurethane-parts/ • https://fab-coep.vlabs.ac.in/exp/pcb-design-fabrication/theory.html	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .

	kaleidoscope using a black colour diamond cutter, or similar other components may be made.			
8	**Electrical & Electronics:** Familiarization with LT switchgear elements, making its sketches and noting down its specification. Kitkat fuse, Glass cartridge fuse, Plastic fuse holders (optional), Iron clad isolators, MCB style isolators, Single phase MCB, Single-phase wire, wiring cable. Electrical & Electronics: Demonstration of domestic wiring involving two MCB, two piano key switches, one incandescent lamp, one LED lamp and plug point. Electrical & Electronics: Simple wiring exercise to be executed to understand the basic electrical	• https://be-iitkgp.vlabs.ac.in/ • https://be-iitkgp.vlabs.ac.in/	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .

	circuit. Electrical & Electronics: Fabrication of a single-phase full wave rectifier with a step down transformer using four diodes and electrolytic capacitor and to find its volt-ampere characteristics to understand basic electronic circuit fabrication. Electrical & Electronics: Simple soldering exercises to be executed to understand the basic process of soldering.			
9	Advance Machining by using Advance Laser Cut machine.	• http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpMM/exp2/index.html	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks, Creo, Fusion 360, Catia** .
10	Advance Welding by usng Adavnce Robotic Arm	• https://www.weldsimulator.com/?gad_source=1&gclid=CjwKCAjwk8e1BhALEi	• https://catalog.mit.edu/schools/engin	**Auto CAD, Solidworks, Creo, Fusion 360,**

	welding .	wAc8MHiJyE9E0aVgudFeA93Gr_LBCtWysh33JuVvCIeEjOibSPP4H9attARRoCeyQQAvD_BwE	eering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Catia** .
11	Automated Metarial cutting by Smart Cutting machine like Cricut Maker3.	• https://guides.library.illinois.edu/Cricut	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .
12	Adavced maching by using CNC Lathe and CNC Milling.	• http://vlabs.iitkgp.ernet.in/vlabs/rtvlab1/cncbase%20software.html • https://fab-coep.vlabs.ac.in/exp/computer-controlled-cutting/theory.html	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .

List of Innovative Experiments in Laboratory				
1	Advance Machining by using Advance Laser Cut machine.	• http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpMM/exp2/index.html	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .
2	Advance Welding by usng Adavnce Robotic Arm welding .	• https://www.weldsimulator.com/?gad_source=1&gclid=CjwKCAjwk8e1BhALEiwAc8MHiJyE9E0aVgudFeA93Gr_LBCtWysh33JuVvCIeEjOibSPP4H9attARRoCeyQQAvD_BwE	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks , Creo, Fusion 360, Catia** .

3	Automated Metarial cutting by Smart Cutting machine like Cricut Maker3.	• https://guides.library.illinois.edu/Cricut	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks, Creo, Fusion 360, Catia** .
4	Adavced maching by using CNC Lathe and CNC Milling.	• http://vlabs.iitkgp.ernet.in/vlabs/rtvlab1/cncbase%20software.html • https://fab-coep.vlabs.ac.in/exp/computer-controlled-cutting/theory.html	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf	**Auto CAD, Solidworks, Creo, Fusion 360, Catia** .
5	**Plastic moulding & Glass cutting:** Typical jobs that may be made in this practice module: For plastic moulding, making at least one simple plastic component should be made. **Plastic moulding & Glass cutting :** Typical jobs that	• https://fab-coep.vlabs.ac.in/exp/molding-casting-polyurethane-parts/ • https://fab-coep.vlabs.ac.in/exp/pcb-design-fabrication/theory.html	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/Mec	**Auto CAD, Solidworks, Creo, Fusion 360, Catia** .

	may be made in this practice module: For glass cutting, three rectangular glass pieces may be cut to make a kaleidoscope using a black colour diamond cutter, or similar other components may be made.		hEng.pdf	

List of virtual lab experiments			
Sl No	**Name of the experiment**	**Simulation software link**	**Mapping link with MIT/Standford**
1	Advance Machining by using Advance Laser Cut machine.	**Auto CAD, Solidworks, Creo, Fusion 360, Catia .**	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf
2	Advance Welding by usng Adavnce Robotic Arm welding .	**Auto CAD, Solidworks, Creo, Fusion 360, Catia .**	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf

3	Automated Metarial cutting by Smart Cutting machine like Cricut Maker3.	**Auto CAD, Solidworks, Creo, Fusion 360, Catia** .	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf
4	Adavced maching by using CNC Lathe and CNC Milling.	**Auto CAD, Solidworks, Creo, Fusion 360, Catia** .	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf
5	**Plastic moulding & Glass cutting:** Typical jobs that may be made in this practice module: For plastic moulding, making at least one simple plastic component should be made.	**Auto CAD, Solidworks, Creo, Fusion 360, Catia** .	• https://catalog.mit.edu/schools/engineering/mechanical-engineering/ • https://stanford.edu/dept/registrar/bulletin0809/current/pdf/MechEng.pdf
List of Experiments using MATLAB			
1	Model-Based Design Series: Basic Component Modeling	https://in.mathworks.com/academia/courseware/basic-component-modeling.html	NA
2	Heat Transfer with MATLAB	https://in.mathworks.com/academia/courseware/heat-transfer.html	NA

List of Experiment/project using Generative AI			
1	AI for Computational Design and Manufacturing	https://professional.mit.edu/course-catalog/ai-computational-design-and-manufacturing	NA
2	Robotic Welding	https://www.canadianmetalworking.com/canadianfabricatingandwelding/article/automationsoftware/ai-and-robotics-in-assembly-and-finishing	NA