

I SEMESTER SYLLABI COMMON FOR ALL BRANCHES

Applicable to the students admitted to

R-2021: CBCS

Academic year 2021-2022
onwards



VEL TECH HIGH TECH

Dr. RANGARAJAN Dr. SAKUNTHALA ENGINEERING COLLEGE

An Autonomous Institution

#60, Avadi – Vel Tech Road, Vel Nagar,
Avadi, Tamil Nadu 600062



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Accredited by NBA, New Delhi & Accredited by NAAC with "A" Grade & CGPA of 3.27

LIST OF ABBREVIATIONS

S. No.	Abbreviations	Detailed Description
1	HSMC	Humanities & Social Science including Management Courses
2	BSC	Basic Science Courses
3	ESC	Engineering Science Courses
4	PCC	Professional Core Courses
5	PEC	Professional Elective Courses
6	OEC	Open Elective Courses
7	PROJ	Project Work
8	EEC	Employability Enhancement Courses
9	MC	Mandatory Courses

Curriculum (R2021)

SEMESTER I										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
THEORY										
1	21EN11T	Communicative English	HSMC	40	60	100	3	0	0	3
2	21MA12T	Matrices and Differential Calculus	BSC	40	60	100	3	1	0	4
3	21PH13T	Engineering Physics I	BSC	40	60	100	3	0	0	3
4	21CY14T	Engineering Chemistry	BSC	40	60	100	3	0	0	3
5	21CS15IT	Problem Solving and Python Programming	ESC	40	60	100	2	0	4	4
6	21ME16T	Engineering Graphics	ESC	40	60	100	4	0	0	4
PRACTICAL										
7	21BS17P	Physics and Chemistry Laboratory	BSC	40	60	100	0	0	4	2
8	21ME18P	Engineering Practices Laboratory	ESC	40	60	100	0	0	4	2
TOTAL										25



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Course code	21EN11T	Semester	I						
Category	HUMANITIES & SOCIAL SCIENCE INCLUDING MANAGEMENT COURSES (HSMC)					L	T	P	C
Course Title	COMMUNICATIVE ENGLISH (COMMON FOR ALL BRANCHES)					3	0	0	3

COURSE OBJECTIVES:

- To exhibit the students of Engineering and Technology to develop their listening and to recall the pattern of listening.
- To facilitate the learners to develop speaking skills to convey their ideas and views in the real context.
- To develop their reading skills and grasp the central ideas of the text.
- To expose them to acquire writing technique with basic grammar.
- To motivate the students to use appropriate vocabulary in academic and categorize the inferences in writings.

PREREQUISITE:

- Foundation of language with Basic English Grammar.

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C101. 1	<i>Listen</i> to different talks and lectures and understand them easily.	K1
C101. 2	<i>Communicate</i> their thoughts confidently using communicative strategies	K2
C101. 3	<i>Read</i> and grasp different genres of texts effortlessly	K2
C101. 4	<i>Write</i> grammatically correct academic, business and technical texts	K3
C101. 5	<i>Apply</i> the appropriate vocabulary to communicate efficiently in all forms of communication.	K4

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
C101.1	-	-	-	-	-	-	-	-	1	3	-	1	-	-	-
C101.2	-	-	-	-	-	-	-	-	1	3	-	1	-	-	-
C101.3	-	-	-	-	-	-	-	-	1	3	-	1	-	-	-
C101.4	-	-	-	-	-	-	-	-	1	3	-	1	-	-	-
C101.5	-	-	-	-	-	-	-	-	1	3	-	1	-	-	-
C101.6	-	-	-	-	-	-	-	-	1	3	-	1	-	-	-
C101	-	-	-	-	-	-	-	-	1	3	-	1	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

UNIT I BASIC GRAMMAR I AND READING FOR INFORMATION 9**PRACTICAL**

LISTENING: Listening to short dialogues with good accent

SPEAKING : Introducing oneself - Exchanging personal information

TUTORIAL

READING : Reading short comprehension passages- practice skimming and scanning for specific information

WRITING: Parts of speech - Sentence patterns – Tenses – ‘wh’- questions - Yes/No questions
-Countable and Uncountable nouns

VOCABULARY AND GRAMMAR: Affixation – word formation - Synonyms and Antonyms.

UNIT II BASIC GRAMMAR II AND SHARING INFORMATION 9**PRACTICAL**

LISTENING : Listening to documentaries - inspiring speeches of great leaders and practicing opinion sharing

SPEAKING : Self-introduction - peer introduction - picture description - JAM

TUTORIAL

READING: Note-making- Critical reading finding key information in a given text - shifting facts from opinions and paraphrasing

WRITING: Autobiographical writing (writing about one’s leisure time activities, hometown - favourite place and school life) - Biographical writing (place, people)

VOCABULARY AND GRAMMAR: Compound Words – Guessing meaning of words contexts - One Word substitutes – Pronouns- Adjectives – Adverbs – Imperatives - Direct and Indirect questions.

UNIT III BASIC GRAMMAR III AND FREE WRITING 9**PRACTICAL**

LISTENING : News Bulletins - Ted talks - telephonic conversations

SPEAKING : functions of Language - giving reasons - talking about future plans - comparing and contrasting - making suggestions

TUTORIAL

READING: Current Affairs - newspaper reading /magazines - loud in the classroom

WRITING: Coherence and cohesion in writing- cause and effect - compare & contrast and narrative & analytical paragraphs.

VOCABULARY AND GRAMMAR: Discourse marker - Reference words - Process description - Conjunctions – Prepositions - Articles - Degrees of comparison.

PRACTICAL

LISTENING : Listen to audio/ Conversation from BEC/IELTS /TOFEL.

SPEAKING : Interpersonal Skills: Role play/group discussion/debate/ conduct of meeting

TUTORIAL

READING: Reading different types of texts /genres/ for comprehension and pleasure – related with human values.

WRITING: Letter writing (informal letters) and formal letters – rejecting and accepting Letters - Personal emails and etiquette.

VOCABULARY AND GRAMMAR: Single Word substitutes - Use of abbreviations Acronyms - Cloze reading - interpreting visual materials - Jumbled sentences - Subject verb agreement - Modal verbs - Phrasal verbs.

UNIT V BASIC GRAMMAR V AND LANGUAGE DEVELOPMENT**PRACTICAL**

LISTENING : Listen to official meetings to know about the project proposal.

SPEAKING : Discussing the project and the proposals in the group - Creative writing and speaking - Poster making and description - project proposals.

TUTORIAL

READING: Reading comparison and contrast text with the deeper level of meaning **WRITING**
: Essay writing - different types of essays - dialogue writing

VOCABULARY AND GRAMMAR: Word association (connotations) - Lexical items (fixed / semi fixed expressions) - Clause - Direct and indirect speech - Correction of errors.

Total: 45 Periods

Extensive Reading:

Kalam , Abdul. The Wings of Fire , Universities Press, Hyderabad. 19

LEARNING RESOURCES:**TEXT BOOKS:**

1. Board of Editors, Department of English, Anna University, Chennai. Using English:A Course Book for Undergraduate Engineers and Technologists, Orient Black Swan: Chennai,2017.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Black Swan Publications, Chennai,2011.

REFERENCES:

1. Raman, Meenakshi & Sangeetha Sharma, Technical Communication: English Skills for Engineers. Oxford University Press, NewDelhi.2011.

2. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006
3. Rizvi M, Ashraf. Effective Technical Communication. Tata McGraw- Hill Publishing Company Limited, New Delhi, 2007.
4. Rutherford, Andrea J. Basic Communication Skills for Technology. Pearson Edition (II Edition), NewDelhi, 2001.
5. Mandel, Steve. *Effective Presentation Skills*. New Delhi: Viva Books Pvt. Ltd., 2004.
6. Kilmet, Stephen. "The Resume and "The Computerized Resume." In Writing for Design Professionals.
7. Writing Cover Letters-Kilmet, Stephen. "Cover Letter, "and" Enclosures and Attachments." in Writing for Design Professionals New York.



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Course code	21MA12T	Semester	I				
Category	BASIC SCIENCE COURSE (BSC)			L	T	P	C
Course Title	MATRICES AND DIFFERENTIAL CALCULUS (COMMON FOR ALL BRANCHES)			4	0	0	4

COURSE OBJECTIVES:

- To apply advanced matrix knowledge to solve engineering problems
- To improve their ability in solving geometrical applications of differential calculus
- To familiarize with the application of differential equations

PREREQUISITE:

- Basic Mathematics skills at 12th level

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
At the end of the course students are able to		
C102.1	<i>Solve</i> Engineering problems using matrices.	K3
C102.2	<i>Use</i> various test to discuss the convergence of infinite series.	K2
C102.3	<i>Apply</i> the geometrical concepts to solve differential calculus.	K4
C102.4	<i>Compute</i> partial derivatives of functions of several variables.	K2
C102.5	<i>Apply in Engineering many physical initial</i> and boundary value problems can be described by ODE.	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C102.1	3	3	-	-	-	-	-	-	-	-	-	-
C102.2	3	2	-	-	-	-	-	-	-	-	-	-
C102.3	3	3	-	-	-	-	-	-	-	-	-	-
C102.4	3	2	-	-	-	-	-	-	-	-	-	-
C102.5	3	2	-	-	-	-	-	-	-	-	-	-
C102	3	2	-	-	-	-	-	-	-	-	-	-

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Course code	21PH13T	Semester	I				
Category	BASIC SCIENCE COURSE (BSC)			L	T	P	C
Course Title	ENGINEERING PHYSICS I (COMMON FOR ALL BRANCHES)			3	0	0	3

COURSE OBJECTIVES:

- To understand the importance of polarization, optical fiber and Lasers
- To familiar the knowledge of electromagnetic waves oscillations
- To understand the importance of quantum physics
- To cognize the basics of heat and thermodynamics
- To express the basics of crystal physics

PREREQUISITE:

- High School Maths and Physics

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C103.1	<i>Utilize</i> the concepts of polarization, optical fiber and Lasers for engineering applications	K3
C103.2	<i>Apply</i> the knowledge of electromagnetic waves oscillations	K3
C103.3	<i>Understand</i> the importance of quantum physics.	K2
C103.4	<i>Cognize</i> the basics of heat and thermodynamics	K2
C103.5	<i>Express</i> the basics of crystal physics	K2

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
C103.1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
C103.2	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
C103.3	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
C103.4	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
C103.5	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-
C103	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

UNIT I PHOTONICS 9

Polarization and Fiber Optics: Electromagnetic waves - Production and analysis of linearly, elliptic and circularly polarized light-Polaroid and applications of polarization. Fiber optics - principle of operation – numerical aperture - acceptance angle and applications of fiber optics.

Optical Sources: Characteristics of Lasers - Spontaneous and Stimulated Emission of Radiation - Population Inversion - Einstein's Coefficients and Relation between them - Applications of Lasers.

UNIT II WAVES AND OSCILLATION 9

Oscillatory motion: Differential equation of SHM- Velocity and acceleration- Restoring Force- Frequency response - phase response and resonance-Analogy with LCR circuits and oscillators- Energy and energy loss- Damped oscillations- Significance in control systems - vibration and vibration isolation.

Wave motion: Definition of a plane progressive wave- Attenuation of waves- Phase Velocity- Introduction to numerical methods for solution of wave equation- Importance of spherical and plane wave fronts.

UNIT III QUANTUM MECHANICS 9

Need for Quantum Physics-Historical overviews - Matter waves - De-Broglie's concept of matter waves - Properties of matter waves - Photo electric effect - Heisenberg's uncertainty principle – Statement - Interpretation and application - Schrödinger's time dependent and time independent equations - Operators - Eigen values and Eigen functions - Expectation values -Physical significance of wave function-Quantum superposition and entanglement for Qbits (quantitatively)

UNIT IV HEAT AND THERMODYNAMICS 9

Heat and internal energy - Specific heat and calorimetry - Latent Heat coefficient of linear thermal expansion - Methods of measurement of thermal expansion - Thermal expansion -Applications - The bimetallic strip - Differential equation of one-dimensional heat flow - Lee's disc apparatus for determination of thermal conductivity - Thermal Insulation- Heat dissipation and heat sinking of electronic devices-solid state refrigerators (qualitatively)

UNIT V CRYSTAL PHYSICS 9

Introduction of Crystallography - Space Lattice - Unit Cell - Lattice Parameters – Crystal Systems - Bravais Lattices - Miller Indices and its applications - Crystal Planes and Directions- Inter Planar Spacing of Orthogonal Crystal Systems - Atomic Radius - Co-ordination Number and Packing Factor of SC, BCC, FCC – Crystal growth –Solution growth -Structure determination by x-ray diffraction method (cubic structure).

Total: 45 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. Richard Wolfson, "Essential University Physics", Vols. 1 and 2. Pearson Education, Singapore, 2011.
2. Gaur R K, Gupta S L, "Engineering Physics", DhanpatRai Publications, 2013.

REFERENCES:

1. Halliday D., Resnick R. and Walker J., “Fundamentals of Physics”, Wiley Publications, 2008.
2. Avadhanulu M. N., “Engineering Physics”, S. Chand & Co., 2007.
3. Purcell E. M., “Electricity and Magnetism – Berkeley Physics Course”, Vol. 2, Tata McGraw-Hill, 2008.
4. Paul A. Tipler and Gene Mosca, “Physics for Scientists and Engineers”, W.H. Freeman and Company, New York, 2004.



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Course code	21CY14T	Semester	I				
Category	BASIC SCIENCE COURSE (BSC)			L	T	P	C
Course Title	ENGINEERING CHEMISTRY (COMMON FOR ALL BRANCHES)			3	0	0	3

COURSE OBJECTIVES:

- To make the students conversant with water quality parameters and treatment techniques.
- To get the basic idea about the polymers, electrochemistry and corrosion.
- To deal with the information about various types of fuels and energy sources.

PREREQUISITE:

- Basic Chemistry Skills

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
At the end of the course students are able to		
C104.1	<i>Understand</i> the water related problems and their treatment techniques.	K2
C104.2	<i>Explain</i> the applications of polymers and reinforced plastics.	K2
C104.3	<i>Acquire</i> knowledge on electrochemistry and corrosion.	K2
C104.4	<i>Summarize</i> the types of fuels and its production process and calculate the CV values.	K2
C104.5	<i>Classify</i> the non-conventional energy sources and its applications.	K2

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
C104.1	2	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
C104.2	2	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
C104.3	2	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
C104.4	2	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
C104.5	2	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
C104	2	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

UNIT I WATER AND ITS TREATMENT 9

Introduction - characteristics - alkalinity - types and determination - hardness - types expression of hardness - units - estimation of hardness of water by EDTA - numerical problems -boiler feed water-requirements-boiler troubles – scale & sludge -disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) -softening of hard water - external treatment process - demineralization and zeolite, internal treatment - boiler compounds (carbonate, phosphate, Calgon, sodium aluminate and colloidal conditioning methods) – desalination of brackish water –reverse osmosis.

UNIT II POLYMERS AND REINFORCED PLASTICS 9

Introduction - classification of polymers - Natural and synthetic - Thermoplastic and Thermosetting, Functionality - Degree of polymerization, Properties of polymers: T_g, Tacticity, Molecular weight - weight average, number average and polydispersity index. Types – addition, condensation and Copolymerization – free radical, cationic and anionic polymerization mechanism - Preparation, properties and uses of PVC, Nylon- 6,6, Teflon and Epoxy resin. Plastics - Compounding of plastics – moulding methods – injection, extrusion and compression – Engineering plastics-applications-fibre-reinforced plastics (FRP) – carbon and glass– applications.

UNIT III ELECTROCHEMISTRY AND CORROSION 9

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential-oxidation potential-reduction potential - measurement and applications - electrochemical series and its significance - Nernst equation (derivation and problems). Corrosion- causes- factors- types: chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. Paints- constituents and function Electroplating of Copper and electroless plating of nickel-Chemical conversion coatings-phosphate, chromate, chemical oxide, and anodized coatings.

UNIT IV FUELS AND COMBUSTION 9

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum – refining- manufacture of synthetic petrol (Bergius process) – knocking - octane number- cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) – synthesis, advantages and commercial application of power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value –problems- ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V ENERGY SOURCES AND STORAGE DEVICES 9

Energy-Types- Non-renewable energy- Nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries - primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells - H₂-O₂ fuel cell.

Total: 45 Periods

LEARNING RESOURCES:

TEXT BOOKS:

1. P.C. Jain and Monika Jain, Engineering Chemistry, DhanpatRai, Publishing Company (P) Ltd., New Delhi, 2015.
2. S.S Dara&S.S Umare, A Text book of Engineering Chemistry, S.Chand & Company Ltd., New Delhi, 2015.

REFERENCES:

1. S. Vairam,P. Kalyani and Suba Ramesh., Engineering Chemistry, Wiley India Pvt. Ltd, New Delhi, 2013.
2. B.K.Sharma, Engineering Chemistry, Krishna Prakasan Media (P) Ltd., Meerut, 2014.
3. Prasanta Rath, Engineering Chemistry, Cengage Learning India Pvt. Ltd, Delhi, 2015.
4. Shikha Agarwal, Engineering Chemistry-Fundamentals and Applications, Cambridge University Press, Delhi, 2015.
5. V.R.Gowariker, N.V.Viswanathan, J.Sreedhar, Polymer Science, New Age International (P) Ltd., Publishers, New Delhi, 2011.



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Course code	21CS15IT	Semester		I			
Category	ENGINEERING SCIENCE COURSE (ESC)			L	T	P	C
Course Title	PROBLEM SOLVING AND PYTHON PROGRAMMING (COMMON FOR ALL BRANCHES)			2	0	4	4

COURSE OBJECTIVES:

- To be familiar with the basics of algorithmic problem solving.
- To construct python programs with conditionals, loops and functions.
- To use python data structures-Lists, Tuples and Dictionaries.

PREREQUISITE:

- Basic Mathematics Skills and Computer Knowledge

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
At the end of the course students will be able to		
C105. 1	<i>Develop</i> algorithmic solutions to simple computational problems	K3
C105. 2	<i>Construct</i> simple Python programs for solving problems.	K3
C105. 3	<i>Build</i> Python programs with conditionals and loops.	K3
C105. 4	<i>Demonstrate</i> a Python program into functions.	K2
C105. 5	<i>Show</i> compound data using Python lists, tuples, and dictionaries.	K2
C105. 6	<i>Read</i> and write data from/to files in Python Programs.	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
C105. 1	3	2	1	-	-	-	-	-	-	-	-	-	2	2
C105. 2	3	2	1	-	-	-	-	-	-	-	-	-	2	2
C105. 3	3	2	1	-	-	-	-	-	-	-	-	-	2	2
C105. 4	3	2	1	-	-	-	-	-	-	-	-	-	2	2
C105. 5	3	2	1	-	-	-	-	-	-	-	-	-	2	2
C105. 6	3	2	1	-	-	-	-	-	-	-	-	-	2	2
C105	3	2	1	-	-	-	-	-	-	-	-	-	2	2

Note: 1: Slight, 2: Moderate, 3: Substantial

UNIT- I ALGORITHMIC PROBLEM SOLVING AND BASICS OF PYTHON 8

Algorithms-building blocks of algorithms (statements, state, control flow, functions), simple Strategies for developing algorithms (iteration, recursion)-pseudo code- flow chart-programming language. Introduction to Python-Features of Python-Python Interpreter: Interactive and script mode- Values and types, variables, Keywords, Identifiers, operators, precedence of operators, expression, Comments.

UNIT-II CONTROL FLOW, FUNCTIONS 8

Conditional statements-Iterative statements, Functions: Built-in functions, user defined function-Function Arguments-Fruitful functions and void functions- local and global variable - function composition- recursion-Lambda Functions.

UNIT-III MODULES, PACKAGES, STRINGS 4

Modules-Packages-Strings-string operations, string functions and methods.

UNIT-IV LISTS, TUPLES, DICTIONARIES 5

Lists- list operations, list methods, list loop, mutability, aliasing, cloning lists-Tuples-Tuple assignment, Operations on Tuples, Tuple as return value- Dictionaries- operations and methods-Sets-Operations on sets.

UNIT-V FILES AND EXCEPTIONS 5

Files –Types of files, file operations, file methods, format operator-command line arguments-Errors and Exceptions, handling exceptions.

List of Experiments: 30 Periods

1. Write a python program to demonstrate basic data types in python.
2. Write a python program using conditional statements.
3. Write a python program using Iterative statements.
4. Write a python program using built-in and user defined functions.
5. Write a python program using lambda functions and recursions.
6. Write a python program to demonstrate Strings and its Operations.
7. Write a python program to demonstrate lists, tuples and its operations.
8. Write a python program to demonstrate Sets and its operations.
9. Write a python program to demonstrate Dictionaries and its operations.
10. Write a python program to demonstrate Files and its Operations.

30 Periods**Total: 60 Periods**

LEARNING RESOURCES:

TEXT BOOKS:

1. Reema Thareja, “Python Programming using Problem Solving Approach”, OXFORD University Press, 2017.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist“, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016.

REFERENCES:

1. Ashok Namdev Kamthane, Amit Ashok Kamthane, “Programming and Problem Solving with Python”, Mc-Graw Hill Education, 2018.
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd, 2016.
3. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.

Sl. No.	Description of Equipment	Required numbers (For batch of 30 students)
1	Standalone desktops with Python [Open Source]	30 Nos



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Course code	21ME16T	Semester		I			
Category	ENGINEERING SCIENCE COURSE (ESC)			L	T	P	C
Course Title	ENGINEERING GRAPHICS (COMMON FOR ALL BRANCHES)			1	3	0	4

COURSE OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

PREREQUISITE:

- Engineering Drawing Skills

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
At the end of the course students are able to		
C106.1	<i>Familiarize</i> with the fundamentals and standards of Engineering graphics.	K2
C106.2	<i>Develop</i> freehand sketching of basic geometrical constructions and multiple views of objects.	K3
C106.3	<i>Draw</i> orthographic projection of lines and plane surfaces.	K3
C106.4	<i>Construct</i> projection of solids, Section and development of surfaces.	K3
C106.5	<i>Visualize</i> isometric and perspective projections	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
C106. 1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C106. 2	3	3	-	-	-	-	-	-	-	-	-	1	1	-	-	-
C106. 3	3	3	2	-	-	1	-	1	-	1	-	1	1	-	-	-
C106. 4	3	3	2	-	-	1	-	1	-	1	-	1	1	-	-	-
C106. 5	3	3	2	-	-	1	-	1	-	1	-	1	1	-	-	-
C106	3	3	2	-	-	1	-	1	-	1	-	1	1	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

CONCEPTS AND CONVENTIONS (Not for Examination)**1**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREEHAND SKETCHING**7+12**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square, Triangle and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three-Dimensional objects – Layout of views– Freehand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE**6+12**

Orthographic projection– principles-Principal Planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method. Applications – Drawing interpretation and process planning, circuit design.

UNIT III PROJECTION OF SOLIDS**5+12**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method, auxiliary plane method. Applications – Engineering design, automotive modelling, X-rays.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES**5+12**

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Applications – Design of piping, Fabrication, body building, defect analysis.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS**6 + 12**

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones– combination of two solid objects in simple vertical positions – Perspective projection of simple solids–Prisms, pyramids and cylinders by visual ray method and vanishing point method. Applications–constructions, photography, animation and image processing.

Total: 90 Periods

LEARNING RESOURCES:

TEXT BOOKS:

1. Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2010.
2. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 51th Edition, 2019.

REFERENCES:

1. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2015.
2. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
4. Luzzader, Warren.J. and Duff, John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
5. N S Parthasarathy and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
6. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 3rd Edition, 2013.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to Semester End Examination on Engineering Graphics:

1. There will be five questions, each of either-or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. Students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day



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Course code	21BS17P	Semester	I				
Category	BASIC SCIENCE COURSE (BSC)			L	T	P	C
Course Title	PHYSICS AND CHEMISTRY LABORATORY (COMMON FOR ALL BRANCHES)			0	0	4	2

COURSE OBJECTIVES:

- To test basic understanding of physics of materials including properties of matter, thermal and optical properties.
- To encourage the students to familiarize with experimental determination of velocity of ultrasonic waves and band gap determination.

PREREQUISITE:

- Basic measurement skills

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C107.1	<i>Estimate</i> the various water quality parameters like alkalinity, hardness (total, temporary, & permanent), dissolved oxygen content, and chloride content.	K2
C107.2	<i>Investigate</i> the metals and ions present in any given sample using various analytical techniques.	K2
C107.3	<i>Analyze</i> the properties such as conductance of solutions, and redox potentials.	K2
C107.4	<i>Determine</i> various moduli of elasticity and also various thermal and optical properties of materials.	K2
C107.5	<i>Determine</i> the velocity of ultrasonic waves, band gap determination and viscosity of liquids.	K2

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
C107.1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
C107.2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
C107.3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
C107.4	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
C107.5	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
C107	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

PHYSICS LABORATORY
LIST OF EXPERIMENTS
 (Any SIX Experiments)

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young's modulus
3. Lee's disc Determination of thermal conductivity of a bad conductor
4. Laser- Determination of the wave length of the laser using grating, Estimation of laser parameters
5. Optical fibre -Determination of Numerical Aperture and acceptance angle
6. Ultrasonic interferometer - determination of the velocity of sound and compressibility of Liquids
7. Determination of Band gap of a semiconductor
8. Spectrometer- Determination of wavelength using gating

Total: 30 Periods

REFERENCES:

1. Physics Practicals, Department of Physics, Vel Tech High Tech Dr.Rangarajan Dr.Sakunthala Engineering College 2021
2. Wilson J.D. and Hernandez C.A., "Physics Laboratory Experiments", Houghton Mifflin Company, New York 2005

Lab Requirements

Sl. No.	Description of Equipment	Required numbers (For batch of 30 students)
1.	Torsional Pendulum, stop clock, suspension metallic wire: two different thickness, two identical cylindrical mass, screw gauge, wooden scale	5
2.	Uniform bending: 1-meter wooden scale, two-knife edges, travelling microscope, two weight hanger with slotted weights, screw gauge, Vernier calliper, pin	5
3.	Non-uniform bending: 1 meter wooden scale, two-knife edges, travelling microscope, weight hanger with slotted weights, screw gauge, Vernier calliper, pin	5
4.	Diode laser (green or red), fiber optic cable, movable arrangement with a screen for measuring spot size (zig), meter scale, stand	5
5.	He-Ne/Diode laser (red), Green diode laser, Grating, Screen, Iron stand (3 Nos), 1m wooden scale, thread.	5
6.	Ultrasonic interferometer apparatus with high frequency wave generator, cell, micrometer, PZ crystal, water or other liquids	5
7.	450 inclined glass plate set-up, two optically plane glass plates, sodium vapour lamp, travelling microscope, thin wire/thin strip of paper	5
8.	Post office box, 5V power supply, thermometer, galvanometer, semiconductor (thermistor), variable temperature bath set-up (oil, temperature controller, vessel, hot plate.	5

CHEMISTRY LABORATORY
LIST OF EXPERIMENTS
(Any SIX Experiments)

1. Determination of permanent, total and temporary hardness of water sample.
2. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
3. Determination of DO Content of water sample by Winkler's method.
4. Determination of chloride content of water sample by Argentometric method.
5. Determination of strength of given HCl using pH meter.
6. Estimation of Fe^{2+} by Potentiometric titration.
7. Determination of molecular weight of PVA using Ostwald viscometer.
8. Estimation of Iron content in water sample using spectrophotometer (1,10 – Phenanthroline/thiocyanate method).
9. Conductometric titrations of strong acid Vs strong base.
10. Determination of strength of acid in a mixture using conductivity meter.
11. Corrosion experiment-weight loss method.
12. Estimation of sodium and potassium present in water using flame photometer.

Total: 30 Periods

LEARNING RESOURCES:

TEXT BOOKS:

1. Jeffery G.H., Bassett J., Mendham J. and Denny vogel's R.C, "Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
2. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980.
3. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of practical organic chemistry", LBS Singapore (1994).

Lab Requirements

Sl. No.	Description of Equipment	Required numbers (For batch of 30 students)
1.	PH meter	10 nos
2.	Conductivity meter	10 nos
3.	Potentiometer	10 nos
4.	Flame photometer	2 nos
5.	Electronic Balance (Four digit)	1 no
6.	Hot Air Oven	1 no
7.	Spectrophotometer	2 nos
8.	Magnetic stirrer	2 nos



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Course code	21ME18P	Semester	I				
Category	ENGINEERING SCIENCE COURSE (ESC)			L	T	P	C
Course Title	ENGINEERING PRACTICES LABORATORY (COMMON FOR ALL BRANCHES)			0	0	4	2

COURSE OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering

PREREQUISITE:

- Basic knowledge of engineering skills

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
At the end of the course students will be able to		
C108. 1	Demonstrate on Smithy operations, Foundry operations models and machine assembly practice of centrifugal pump and air-conditioner	K2
C108. 2	Experiment with pipe connections and plumbing works	K3
C108. 3	Make use of welding equipment to join the structures.	K3
C108. 4	Explain carpentry components, for the joint used in roofs, doors, windows and furniture.	K5
C108. 5	Develop sheet metal models, fitting models and do basic machining operations	K6

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
C108. 1	3	-	-	-	-	2	2	-	2	1	1	2	-	-	-	-
C108. 2	3	-	-	-	-	2	2	-	2	1	1	2	-	-	-	-
C108. 3	3	-	-	-	-	2	2	-	2	1	1	2	-	-	-	-
C108. 4	3	-	-	-	-	2	2	-	2	1	1	2	-	-	-	-
C108. 5	3	-	-	-	-	2	2	-	2	1	1	2	-	-	-	-
C108	3	-	-	-	-	2	2	-	2	1	1	2	-	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

I CIVIL ENGINEERING PRACTICE**12****Buildings:**

- a) Study of plumbing and carpentry components of residential and industrial buildings, Safety aspects.

Plumbing Works:

- a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers and elbows in household fittings.
- b) Study of pipe connections requirements for pumps and turbines.
- c) Preparation of plumbing line sketches for water supply and sewage works.
- d) Hands-on-exercise:
Basic pipe connections-Mixed pipe material connection-Pipe connections with different joining components
- e) Demonstration of plumbing requirements of high-rise buildings

Carpentry using Power Tools only:

- a) Study of the joints in roofs, doors, windows and furniture.
- b) Hands-on-exercise:
Wood work, joints by sawing, Planning and cutting.

II MECHANICAL ENGINEERING PRACTICE**18****Welding:**

- a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
- b) Gas welding practice

Basic Machining:

- a) Simple Turning and Taper turning
- b) Drilling Practice

Sheet Metal Work:

- a) Forming & Bending:
- b) Model making – Trays and funnels.
- c) Different type of joints.

Machine assembly practice:

- a) Study of centrifugal pump
- b) Study of air conditioner

Demonstration on:

- a) Smithy operations, upsetting, swaging, setting down and bending. Example –Exercise – Production of hexagonal headed bolt.
- b) Foundry operations like mould preparation for gear and step cone pulley.
- c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

Total: 30 Periods

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE

14

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of an electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE

16

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

Total: 30 Periods

LEARNING RESOURCES:

TEXT BOOKS:

1. Chapman, W.A.J. Workshop Technology, Edward Arnold, 2001.

REFERENCES:

1. Raghuwanshi B.S., Workshop Technology Vol. I & II, DhanpathRai & Sons.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2 Edn, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.
4. JeyapooanT. and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Sl.No.	Description of Equipment	Required Numbers (for batch of 30 students)
Part I: Civil Engineering Practices		
(a)	Plumbing Work:	
1)	Pipe Vice	15 Nos.
2)	Die Holder with Die set	15 Nos.
(b)	Wood Work	
1)	Tri Square	15 Nos.
2)	Hand Saw	15 Nos.
3)	Carpentry bench wise	15 Nos.
4)	Firmer Chisel	15 Nos.
5)	Motrin Chisel	15 Nos.
6)	Iron Jack	15 Nos.
7)	Mallet	15 Nos.
8)	Bench hold fastens	15 Nos.
9)	Wooden Bench Hook	15 Nos.
10)	Wood Cutting Machine	2 Nos.
Part II: Mechanical Engineering Practices		
(a)	Welding Work:	
1)	Arc welding unit	5 Nos.
2)	Gas welding unit	2 Nos.
(b)	Basic Machining Work:	
1)	Lathe Machines	5 Nos.
2)	Drilling Machines	5 Nos.
(c)	Assembly Work:	
1)	Centrifugal pump	2 Nos.
2)	Air-conditioner unit	2 Nos.
3)	Household mixer	2 Nos.
(d)	Sheet Metal Work:	
1)	Steel rule	2 Nos.
2)	Bend snips	5 Nos.
3)	Straight snips	5 Nos.
4)	Scriber	5 Nos.
5)	Divider	5 Nos.
6)	Trammel	5 Nos.
7)	Prick Punches	5 Nos.
8)	Centre punches	5 Nos.
9)	Pliers	5 Nos.
10)	Ball pean hammer	5 Nos.
11)	Raising hammer	5 Nos.
12)	Riverting hammer	5 Nos.
13)	Square free hammer	5 Nos.
14)	Anvil	3 Nos.
15)	Swage block	3 Nos.
16)	Wige gauges	2 Nos.
(e)	Foundry Work	
1)	Cope and Drag Box	5 Nos.
2)	Pattern	5 Nos.
3)	Solid pattern	5 Nos.
4)	Split pattern	5 Nos.
5)	Runner	5 Nos.

6)	Riser	5 Nos.
7)	Sprue	5 Nos.
8)	Sand reamer	5 Nos.
9)	Trowel	5 Nos.
PART-III Electrical Practices		
1)	Assorted electrical components for house wiring	15 sets
2)	Electrical measuring instruments	10 sets
3)	Study purpose items: Iron box, fan and regulator, emergency lamp	One each
4)	Megger (250V/500V)	1 No.
5)	Power Tools: (a) Range Finder (b) Digital Live-wire detector	2 Nos 2 Nos
PART-IV Electronics Practices		
1)	Soldering guns	10 No.
2)	Assorted electronic components for making circuits	50 No.
3)	Small PCBs	10 No.
4)	Multi Meters	10 No.
5)	Study purpose items: Telephone, FM radio, low-voltage power supply	2 each

II SEMESTER CURRICULUM AND SYLLABI

Applicable to the students admitted to

**B.E- COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

R-2021: CBCS

**Academic year 2021-2022
onwards**



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R-2021: CBCS CURRICULA

II SEMESTER SYLLABI

LIST OF ABBREVIATIONS

S. No.	Abbreviations	Detailed Description
1	HSMC	Humanities & Social Science including Management Courses
2	BSC	Basic Science Courses
3	ESC	Engineering Science Courses
4	PCC	Professional Core Courses
5	PEC	Professional Elective Courses
6	OEC	Open Elective Courses
7	PROJ	Project Work
8	EEC	Employability Enhancement Courses
9	MC	Mandatory Courses

Category Based Credit Split-Up – Semester Wise

Semester	HSMC	BSC	ESC	PCC	PEC	OEC	Project /EEC	MC	Total Credit
1	3	12	10	-	-	-	-	-	25
2	3	7	3	10	-	-	-	-	23
3	-	4	3	13	-	-	-	0	20
4	-	4	-	19	-	-	1	-	24
5	-	-	-	14	3	3	1	-	21
6	-	-	-	16	3	-	2	0	21
7	-	-	-	13	3	3	2	-	21
8	-	-	-	-	6	-	6	-	12
Total Credits	6 (3.61%)	27 (16.27%)	16 (9.64%)	85 (50.60%)	15 (9.04%)	6 (3.61%)	12 (7.23%)	0 (0 %)	167



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**B.E. – Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
Curriculum (R2021)**

SEMESTER I										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
THEORY										
1	21EN11T	Communicative English	HSMC	40	60	100	3	0	0	3
2	21MA12T	Matrices and Differential Calculus	BSC	40	60	100	3	1	0	4
3	21PH13T	Engineering Physics I	BSC	40	60	100	3	0	0	3
4	21CY14T	Engineering Chemistry	BSC	40	60	100	3	0	0	3
5	21CS15IT	Problem Solving and Python Programming*	ESC	40	60	100	2	0	4	4
6	21ME16T	Engineering Graphics	ESC	40	60	100	4	0	0	4
PRACTICAL										
7	21BS17P	Physics and Chemistry Laboratory	BSC	40	60	100	0	0	4	2
8	21ME18P	Engineering Practices Laboratory	ESC	40	60	100	0	0	4	2
TOTAL										25

SEMESTER II										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
THEORY										
1	21EN21T	Technical English	HSMC	40	60	100	3	0	0	3
2	21MA22T	Vector Calculus and Complex Integration	BSC	40	60	100	3	1	0	4
3	21PH23T	Engineering Physics II	BSC	40	60	100	3	0	0	3
4	21EE24T	Basic Electrical, Electronics and Instrumentation Engineering	ESC	40	60	100	3	0	0	3
5	21CS25T	Data Structures	PCC	40	60	100	3	0	0	3
6	21IT26T	Programming in C	PCC	40	60	100	3	0	0	3
PRACTICAL										
7	21CS27P	Data Structures Laboratory	PCC	40	60	100	0	0	4	2
8	21IT28P	Programming in C Laboratory	PCC	40	60	100	0	0	4	2
TOTAL										23

SEMESTER III										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
THEORY										
1	21MA33T	Linear Algebra for Data science	BSC	40	60	100	3	1	0	4
2	21HE32T	Digital Logic Circuits	ESC	40	60	100	3	0	0	3
3	21ML33T	Python for Data Science	PCC	40	60	100	3	0	0	3
4	21HC34T	Database Management Systems	PCC	40	60	100	3	0	0	3
5	21HC53T	Computer Networks	PCC	40	60	100	3	0	0	3
6	21MC01T	Constitution of India	MC	40	60	100	2	0	0	0
PRACTICAL										
7	21ML37P	Python for Data Science Laboratory	PCC	40	60	100	0	0	4	2
8	21HC39P	Database Management Systems Laboratory	PCC	40	60	100	0	0	4	2
TOTAL										20

SEMESTER IV										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
THEORY										
1	21MA41T	Probability and Statistics	BSC	40	60	100	3	1	0	4
2	21HC42T	Design and Analysis of Algorithms	PCC	40	60	100	3	0	0	3
3	21ML43T	Machine Learning Essentials	PCC	40	60	100	3	0	0	3
4	21CS44T	Object Oriented Programming using Java	PCC	40	60	100	3	0	0	3
5	21CS45T	Operating Systems	PCC	40	60	100	3	0	0	3
6	21ML46T	Principles of Artificial Intelligence	PCC	40	60	100	3	0	0	3
PRACTICAL										
7	21ML47P	Machine Learning Laboratory	PCC	40	60	100	0	0	4	2
8	21CS48P	Object Oriented Programming Laboratory	PCC	40	60	100	0	0	4	2
9	21ML49P	Mini Project- I	EEC	40	60	100	0	0	2	1
TOTAL										24

SEMESTER V										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
THEORY										
1	21CS51T	Internet Programming	PCC	40	60	100	3	0	0	3
2	21ML52IT	Internet of Things*	PCC	40	60	100	2	0	4	4
3	21ML53T	Deep Learning Essentials	PCC	40	60	100	3	0	0	3
4	21MC02T	Environmental Sciences	MC	40	60	100	3	0	0	0
5	-	Open Elective I	OEC	40	60	100	3	0	0	3
6	-	Professional Elective I	PEC	40	60	100	3	0	0	3
PRACTICAL										
7	21CS55P	Internet Programming Laboratory	PCC	40	60	100	0	0	4	2
8	21ML56P	Deep Learning Laboratory	PCC	40	60	100	0	0	4	2
9	21ML57P	Technical Seminar	EEC	100	-	100	1	0	0	1
TOTAL										21

SEMESTER VI										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
THEORY										
1	21ML61T	Data Analytics	PCC	40	60	100	3	0	0	3
2	21ML62T	Computer Vision	PCC	40	60	100	3	0	0	3
3	21ML63T	Pattern Recognition	PCC	40	60	100	3	0	0	3
4	21ML64T	Speech Processing	PCC	40	60	100	3	0	0	3
5	-	Professional Elective II	PEC	40	60	100	3	0	0	3
PRACTICAL										
6	21ML65P	Data Analytics Laboratory	PCC	40	60	100	0	0	4	2
7	21ML66P	Computer Vision Laboratory	PCC	40	60	100	0	0	4	2
8	21ML67P	Mini Project II	EEC	40	60	100	0	0	2	1
9	21ML68P	Internship	EEC	-	100	100	0	0	2	1
TOTAL										21

SEMESTER VII										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
THEORY										
1	21ML71T	Data Visualization	PCC	40	60	100	3	0	0	3
2	21ML72IT	Programming Languages for AI*	PCC	40	60	100	2	0	4	4
3	21CS73IT	Cryptography and Network Security*	PCC	40	60	100	2	0	4	4
4	-	Open Elective II	OEC	40	60	100	3	0	0	3
5	-	Professional Elective III	PEC	40	60	100	3	0	0	3
PRACTICAL										
6	21ML74P	Data Visualization Laboratory	PCC	40	60	100	0	0	4	2
7	21ML75P	Project Work - Phase-I	PROJ	40	60	100	0	0	4	2
TOTAL										21

SEMESTER VIII										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
1	-	Professional Elective IV	PEC	40	60	100	3	0	0	3
2	-	Professional Elective V	PEC	40	60	100	3	0	0	3
PRACTICAL										
3	21ML81P	Project Work – Phase - II	PROJ	40	60	100	0	0	12	6
TOTAL										12

List of Professional Elective Courses

S. No.	Course Code	Engineering Stream Courses
1	21ML561PT	Data Warehousing and Data Mining
2	21ML562PT	Digital Image Processing
3	21ML563PT	Theory of Computation
4	21ML564PT	Computer Architecture
5	21ML565PT	Microcontroller and Embedded Systems
6	21ML661PT	Total Quality Management
7	21ML662PT	Gaming Technology
8	21ML663PT	Information Retrieval
9	21ML664PT	Software Project Management
10	21ML665PT	Wireless Adhoc and Sensor Networks
11	21ML761PT	Cloud Computing
12	21ML762PT	Quantum AI
13	21ML763PT	Artificial Intelligence of Things
14	21ML764PT	Knowledge Engineering
15	21ML765PT	Block Chain Technologies
16	21ML811PT	Agile Methodologies
17	21ML812PT	Cyber Security and Forensics
18	21ML813PT	Video Analytics
19	21ML814PT	Reinforcement Learning
20	21ML815PT	Business Intelligence
21	21ML821PT	Autonomous Systems and Drones
22	21ML822PT	AI for Natural Language Processing
23	21ML823PT	Applications of AI in Healthcare
24	21ML824PT	Applications of AI in Medical Image Analysis
25	21ML825PT	Robotics



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LIST OF OPEN ELECTIVE COURSES OFFERED BY INSTITUTION

S. No	COURSE CODE	OFFERING DEPARTMENT	NAME OF THE COURSE
1	21CS01OT	CSE	Bio Python
2	21CS02OT		Cyber Security
3	21CS03OT		Java Programming
4	21CS04OT		Data Base System Design
5	21IT01OT	IT	Business Intelligence
6	21HC52T		Data Analytics
7	21IT03OT		Augmented Reality and Virtual Reality
8	21IT04OT		Cloud Computing
9	21AI651PT	AI & DS	Advanced Python Programming
10	21AI31T		Introduction to Artificial Intelligence
11	21AI03OT		Machine Learning Techniques for Engineers
12	21AI04OT		Data Science
13	21EC01OT	ECE	Microcontroller System Design
14	21EC743PT		Digital Image Processing
15	21EC03OT		Internet of Things and Applications
16	21EC04OT		Automotive electronics
17	21ME01OT	MECHANICAL	Industry 4.0
18	21ME02OT		Robotics and Industrial Automation
19	21ME03OT		Reverse Engineering (3D Printing)
20	21ME04OT		Fundamentals of Electric and Hybrid Vehicles
21	21CE01OT	CIVIL	Traffic Engineering and Management
22	21CE02OT		Air pollution control Engineering
23	21CE03OT		Municipal solid waste management
24	21CE04OT		Safety in Civil Engineering Practices
25	21BT01OT	BIOTECHNOLOGY	Basics of Environmental Biotechnology
26	21BT02OT		Introduction to Biofuels and Bioenergy
27	21BT03OT		Lifestyle Diseases: A Biotechnological Approach
28	21BT04OT		Biology for Engineers
29	21CH01OT	CHEMICAL	Principles of Chemical Engineering
30	21CH02OT		Process Modelling and Simulation
31	21CH03OT		Energy Management and Audit
32	21CH04OT		Process Plant Utilities
33	21MB01OT	MBA	Business Intelligence
34	21MB02OT		Personality Development
35	21MB03OT		Entrepreneurship Development
36	21EN01OT	S & H	Foreign Language – French
37	21PH02OT		Fundamentals of Photovoltaic and its Applications
38	21CY03OT		Recent Trends in Batteries
39	21CY04OT		Green Chemistry



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Course code	21EN21T	Semester		II			
Category	HUMANITIES & SOCIAL SCIENCE INCLUDING MANAGEMENT COURSES (HSMC)			L	T	P	C
Course Title	TECHNICAL ENGLISH (Common for all Branches)			3	0	0	3

COURSE OBJECTIVES:

- To make the students of engineering and technology to enhance their ability on reading and comprehending the different texts
- To improve their creative and critical thinking so as to use in demanding contexts
- To equip the learners with the skills of writing convincing job Applications and effective reports
- To develop their speaking skills to make technical presentations and participate in group discussions
- To facilitate them to hone their soft skills

PREREQUISITE:

- Technical writing and basic English grammar.

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C201. 1	<i>Read</i> and understand general and technical texts	K2
C201. 2	<i>Apply</i> creative and critical thinking and communicate their ideas efficiently	K2
C201. 3	<i>Participate</i> in group discussions and deliver short speeches effectively	K3
C201. 4	<i>Write</i> effectively and persuasively in academic and workplace contexts	K3
C201. 5	<i>Experiment with</i> the future challenges confidently and successfully	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
C201. 1	-	-	-	-	-	-	-	-	1	3	-	2	-	-	-
C201. 2	-	-	-	-	-	-	-	-	1	3	-	2	-	-	-
C201. 3	-	-	-	-	-	-	-	-	1	3	-	2	-	-	-
C201. 4	-	-	-	-	-	-	-	-	1	3	-	2	-	-	-
C201. 5	-	-	-	-	-	-	-	-	1	3	-	2	-	-	-
C201	-	-	-	-	-	-	-	-	1	3	-	2	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

- UNIT-I TECHNICAL WRITING AND VISUAL CONVERSION 9**
- PRACTICAL**
- LISTENING** : Listening to pronunciation of longer words.
- SPEAKING** : Making out meaning of pictorial and graphical representations.
- TUTORIAL**
- READING** : Understanding logic and sequencing in reading inferring the exact meaning of text
- WRITING** : Extended Definition- Writing Instructions, Checklists & Recommendations- Reading short technical text from Journal.
- VOCABULARY**: Technical vocabulary- Regular and Irregular verbs.
-
- UNIT- II TECHNICAL WRITING AND GUIDELINES PREPARATION 9**
- PRACTICAL**
- LISTENING** : Comprehensive listening - Listening to telephonic conversations – short and long conversations from different domains, listening to various pre-recorded conversations and speeches.
- SPEAKING** : Delivering short speeches in the class.
- TUTORIAL**
- READING** : Technical reading on innovations and innovators.
- WRITING** : Conditional clauses, Numerical adjectives, Process Description
- VOCABULARY**: Collocation, Verbal Analogies.
-
- UNIT-III TECHNICAL PROCESS WRITING 9**
- PRACTICAL**
- LISTENING** : Listening to documentaries and making notes.
- SPEAKING** : Basic speaking practice based on BEC, IELTS, and TOFEL.
- TUTORIAL**
- READING** : longer text both general and technical –practice in speed reading
- WRITING** : Purpose statements, words are used as nouns and verbs- describing a process – use of sequence word - Interpretation of Graphs and Charts.
- VOCABULARY**: Sequence words –Misspelled words -Embedded sentences.
-
- UNIT- IV TECHNICAL WRITING AND BUSINESS LETTERS 9**
- PRACTICAL**
- LISTENING** : listening to native accents.
- SPEAKING** : Group Discussions - Process, Skills, Guidelines, Evaluation, Oral Presentation - Planning, Preparing, Organizing and Presenting.
- TUTORIAL**
- READING** : Reading for detailed comprehension.
- WRITING** : Cause and effect, impersonal passive voice, idioms and phrases, - Letter writing, job application, business correspondence (letters) – calling for quotations, placing order, complaint letters, preparing a memo, notice and e-mail itinerary.
- VOCABULARY**: clauses and If conditionals.

PRACTICAL**LISTENING** : TED /ink talks**SPEAKING** : Starting a Career — vision statement, preparing logo and tagline, making short term and long-term goals, setting plans.**TUTORIAL****READING** : Reading and understanding technical articles.**WRITING** : Degrees of comparison, editing, Email etiquette, Mispronounced words – Report writing survey, feasibility, industrial visit, reporting various incidents and accidents, Minutes of meeting.**VOCABULARY:** Reported speech.**Total: 45 Periods****LEARNING RESOURCES:****TEXT BOOKS:**

1. Department of English, Anna University, Chennai. Mindscapes: English for Technologists and Engineers. Orient Black Swan, Chennai.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Black Swan Publications, Chennai, 2011.

REFERENCE BOOKS:

1. Rizvi, M. Ashraf, “Effective Technical Communication”, Tata McGraw— Hill, 2006.
2. Ibbotson, Mark, “Cambridge English for Engineering”, Cambridge University Reference Press, 2008
3. Richard Johnson-Sheehan, “Technical Communication Today” 4th Edition Books Longman Publishing Group, 2011.
4. Richard Johnson-Sheehan, “Technical Communication Today” 4th Edition Books Longman Publishing Group, 2011
5. Porter, Patricia A., and Margaret Grant, “Communicating Effectively in English: Oral Communication for Non-Native Speakers”, 2nd Edition, Wadsworth, 1992.
6. Gopaldaswamy, Ramesh & Ramesh Mahadevan. ACE of Soft Skills: Attitude, Communication and Etiquette for Success, New Delhi: Pearson, 2010.

Extensive Reading:

Wells, H G. The Time Machine, Peacock, India, 2008.



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Course code	21MA22T	Semester	II				
Category	BASIC SCIENCE COURSE (BSC)			L	T	P	C
Course Title	VECTOR CALCULUS AND COMPLEX INTEGRATION (Common for all Branches)			3	1	0	4

COURSE OBJECTIVES:

- To improve their ability in vector calculus
- To expose to the ideas of analytic functions
- To solve differential equation using the concept of Laplace Transform.

PREREQUISITE:

- Mathematics skills at Sem-I level

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C202.1	<i>Apply</i> the vector calculus concepts to solve engineering problems.	K3
C202.2	<i>Apply</i> the concept of mapping to solve Linear equation.	K3
C202.3	<i>Apply</i> the complex integration problem ideas to solve engineering problems.	K3
C202.4	<i>Understand</i> the concepts of multiple integrals.	K2
C202.5	<i>Apply</i> the concepts of Laplace transformation to solve Differential Equations.	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C202.1	3	2	-	-	-	-	-	-	-	-	-	-
C202.2	3	2	-	-	-	-	-	-	-	-	-	-
C202.3	3	2	-	-	-	-	-	-	-	-	-	-
C202.4	2	2	-	-	-	-	-	-	-	-	-	-
C202.5	3	2	-	-	-	-	-	-	-	-	-	-
C202	3	2	-	-	-	-	-	-	-	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

SYLLABUS**No. of Credits: 4****UNIT I VECTOR CALCULUS****12**

Gradient, divergence, curl – Solenoidal and irrotational fields – Vector identities– Directional derivatives – Line, surface and volume integrals –Green's, Gauss divergence and Stoke's theorems (without proof) .

UNIT II ANALYTIC FUNCTIONS**12**

Limit of a complex functions-Derivative of $f(z)$ -Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions - Determination of harmonic conjugate – Milne-Thomson's method – Conformal mappings: $1/z$, az , $az+b$ and bilinear transformation.

UNIT III COMPLEX INTEGRATION**12**

Line integral – Cauchy's integral theorem (statements only) – Cauchy's integral formulae and its applications – Taylor's and Laurent's expansions (statements only) – Singularities – Poles and Residues – Cauchy's residue theorem (statement only) – Contour integration – Unit circle and semicircular contour.

UNIT IV MULTIPLE INTEGRALS**12**

Double integration in Cartesian and polar coordinates – Change of order of integration – Area as double integral – Triple integration in Cartesian coordinates – Conversion from Cartesian to polar – Volume as a double and Triple Integral.

UNIT V LAPLACE TRANSFORMS**12**

Definition-Conditions for existence- Transforms of elementary functions – Properties of Laplace Transform-Transforms of periodic functions – Transforms of derivatives and integrals– Inverse transforms – Convolution theorem– Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only- Unit step function and Unit impulse function [simple problems only]

Total: 60 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. B. S. Grewal, Higher **Engineering Mathematics**, Khanna Publishers, New Delhi, 42nd Edition, 2012.

REFERENCES:

1. E. Kreyszig, **Advanced Engineering Mathematics**, John Wiley & Sons. Singapore, 10th Edition, 2012.
2. M.K. Venkataraman, **Engineering Mathematics: Vol I and II**, National Publishing., Chennai 2001.
3. T. Veerarajan, **Engineering Mathematics**, Tata McGraw Hill Publishing Co, New Delhi, 2004.



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Course code	21PH23T	Semester	II				
Category	BASIC SCIENCE COURSE (BSC)			L	T	P	C
Course Title	ENGINEERING PHYSICS II Common for (CSE, IT, ECE, CHEMICAL, CIVIL, AI&DS, CSE(AI&ML))			3	0	0	3

COURSE OBJECTIVES:

- To equip the students with the knowledge of carrier concentration and doping in semiconductors.
- To familiarize the basics of Magnetic and Superconducting materials.
- To empower the students in understanding the importance of fluid properties.
- To elucidate the physics and instrumentation of spectrometry

PREREQUISITE:

- High School Maths and Physics

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C203.1	<i>Understand</i> basics of electronic states and energy band structure formation	K2
C203.2	<i>Understand</i> the importance of carrier concentration and doping in semiconductors	K2
C203.3	<i>Understand</i> physics of magnetic and superconducting materials.	K2
C203.4	<i>Understand the</i> importance of fluid properties.	K2
C203.5	<i>Understand</i> the physics of spectrometry and its instrumentation.	K2

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
C203.1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C203.2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C203.3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C203.4	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C203.5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C203	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

UNIT I SOLID STATE ELECTRONICS 9

Band theory of solids - Classification of solids on the basis of band theory - Classical free electron theory - expression for electrical conductivity - thermal conductivity - Wiedemann-Franz law - electrons in metals - Fermi-Dirac probability function - Position of Fermi level Temperature variation of carrier concentration - density of energy states - electron effective mass - concept of hole.

UNIT II SEMICONDUCTING MATERIALS AND DEVICES 9

Elemental and compound semiconductors - Intrinsic and extrinsic semiconductors - Properties. Carrier concentration in intrinsic, n-type and p-type semiconductors. Hall effect - experimental determination of Hall coefficient. Application - Hall and Peltier devices - Formation of p-n junctions - position of Fermi level in equilibrium - forward and reverse bias - p-n junction diode: I-V characteristics in forward and reverse bias - Photodiode - LDR, LED, and solar cell.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Introduction to magnetic materials - Domain theory of ferromagnetism, Hysteresis. Soft and Hard magnetic materials - Anti-ferromagnetic materials - Ferrites, magneto resistance material Superconducting phenomena - properties of superconductors - Meissner effect and isotope effect. Type-I and Type-II superconductors, High TC superconductors - Magnetic levitation and SQUIDS.

UNIT IV FLUID MECHANICS 9

Introduction to ideal and real fluids- Basic concepts of density and pressure in a fluid-Newtonian fluids, Non-Newtonian fluids - Capillarity – Surface tension - Experimental determination of surface tension by capillary rise method – Viscosity - Coefficient of viscosity - Role of temperature on surface tension and viscosity - Measurement of pressure by strain-gauge diaphragms.

UNIT V SPECTROMETRY 9

Theory of Infrared absorption spectrometry – Quantum treatment– Instrumentation – Infrared sources and detectors. Applications – Theory of Raman spectroscopy – excitation mechanism. Instrumentation – Sources and detectors. Nuclear Magnetic Resonance – Relaxation process in NMR – Free induction decay – Chemical Shift – Instrumentation and components of NMR.

Total: 45 Periods

LEARNING RESOURCES:

TEXT BOOKS:

1. N.Garcia, A. Damask and S.Schwarz “Physics for Computer Science Students”, SpringerVerlag, 2012.
2. Umesh Mishra and Jasprit Singh, “Semiconductor Device Physics and Design”, Springer, 2008.
3. C. Kittel , Introduction to solid state physics, Wiley. 2004
4. Yunus a. Çengel, john m. Cimbala Fluid Mechanics: fundamentals and applications Fourth edition Mc Graw Hill 2018
5. Aruldas Molecular Structure and Spectroscopy Prentice Hall 2007.

REFERENCES:

1. Arthur Beiser Concepts of Modern Physics; Tata McGraw – Hill Edition. 2003
2. Steven H. Simon, The Oxford Solid State Basics 1st Edition Oxford 2013
3. S O Pillai, Solid State Physics, New Age International 2006
4. Willard H H, Meritt L L Dean J A and Settle F A, “Instrumental Methods of Analysis”, CBS Publishers and Distributions, New Delhi, 2001.
5. C.N.Banwell Fundamentals of Molecular Spectroscopy , Fourth edition Tata Mc.Graw Hill
6. Bruce R. Munson, Alric P. Rothmayer, Theodore H. Okiishi, Wade W. Huebsch Fundamentals of fluid mechanics Wiley, 2012



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Course code	21EE24T	Semester		II			
Category	ENGINEERING SCIENCE COURSE (ESC)			L	T	P	C
Course Title	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING Common for (CSE, IT, AI&DS, BIOTECH, CIVIL, MECH, CSE(AI&ML))			3	0	0	3

COURSE OBJECTIVES:

- The course is intended to introduce the students to basic theorems and laws in DC and AC circuits.
- This course aims at giving adequate exposure to students on the principles of electrical machines.
- The course will enable the students to acquire knowledge on fundamentals and applications of various electronic devices and measuring instruments.

PREREQUISITE:

- Engineering Physics, Mathematics

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C204.1	<i>Impart</i> knowledge on electrical circuit components, laws and theorems.	K2
C204.2	<i>Analyze</i> the behavior of ac circuits components in power system	K3
C204.3	<i>Illustrate</i> the working of various ac machines, dc machines and special machines along with its characteristics.	K2
C204.4	<i>Infer</i> and <i>relate</i> the working and applications of various electronics devices and circuits.	K2
C204.5	<i>Categorize</i> the specific instruments for electrical measurements.	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
C204.1	3	2	-	-	-	-	-	-	2	-	1	1
C204.2	3	2	-	-	-	-	-	-	2	-	1	1
C204.3	3	2	-	-	-	-	-	-	2	-	1	1
C204.4	3	2	-	-	-	-	-	-	-	-	1	1
C204.5	3	2	-	-	-	-	-	-	2	-	1	1
C204	3	2	-	-	-	-	-	-	2	-	1	1

Note: 1: Slight, 2: Moderate, 3: Substantial

UNIT I DC CIRCUITS**9**

Basic circuit components (R, L & C) - Ohms Law - Kirchoff's Law – voltage and current division -source transformation-steady state solution of DC circuits - Nodal analysis, Mesh analysis-Thevenin's Theorem, Norton's Theorem, Maximum Power transfer -Superposition Theorem.

UNIT II AC CIRCUITS**9**

Introduction to AC circuits – waveforms and RMS value – power and power factor, Analysis of single-phase ac circuits consisting of RL and RLC combinations -Resonance- Balanced and Unbalanced three-phase circuits-Star and Delta connections.

UNIT III ELECTRICAL MACHINES**9**

Principles of operation and characteristics of DC machines, Construction and operation of Single-Phase transformer – Three phase transformer connections – Autotransformer. Construction and types of Single phase and Three phase Induction motor, Construction and working principle of Alternator, Stepper motors – Brushless DC Motors.

UNIT IV ELECTRONIC DEVICES & CIRCUITS**9**

Types of Materials – Silicon & Germanium - PN Junction diodes – Structure, Operation and Characteristics – Display devices-LED, Laser diodes – Zener diode - Bipolar Junction Transistor – Characteristics and applications –Amplifiers - Basics, types and applications, Oscillators-Basics, types and its applications—D/A and A/D converters.

UNIT V MEASUREMENTS & INSTRUMENTATION**9**

Introduction to transducers - Classification of Transducers: Resistive, Inductive, Capacitive Thermoelectric, piezoelectric, photoelectric, Hall effect. Types and principle of indicating Instruments – Multimeters, Wattmeter, instrument transformers (CT and PT), Oscilloscopes.

TOTAL: 45 PERIODS**LEARNING RESOURCES:****TEXT BOOKS:**

1. D P Kothari and I.J Nagarath, —Basic Electrical and Electronics Engineering, McGraw Hill Education (India) Private Limited, Third Reprint ,2016
2. Leonard S Bobrow, “Foundations of Electrical Engineering”, Oxford University Press, 2013
3. D.V.S. Moorthy, ‘Transducers and Instrumentation’, Prentice Hall of India Pvt Ltd, 2007.

REFERENCES:

1. Del Toro, “Electrical Engineering Fundamentals”, Pearson Education, New Delhi, 2007
2. John Bird, “Electrical Circuit Theory and Technology”, Elsevier, First Indian Edition, 2006
3. N K De, Dipu Sarkar, “Basic Electrical Engineering”, Universities Press (India)Private Limited 2016
4. David A. Bell, “Electronic devices and circuits”, Oxford University higher education,5th edition2008.
5. Allan S Moris, “Measurement and Instrumentation Principles”, Elseveir, First Indian Edition, 2006.



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Course code	21CS25T	Semester	II				
Category	PROFESSIONAL CORE COURSE (PCC)			L	T	P	C
Course Title	DATA STRUCTURES (Common to AI&DS, CSE, CSE (AI&ML))			3	0	0	3

COURSE OBJECTIVES:

- To understand the concept of ADTs
- To understand the structure of Linear data structures.
- To understand sorting, searching and hashing algorithms
- To apply Tree and Graph structures in real time applications.

PREREQUISITE:

- Programming knowledge in C

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C205.1	<i>Understand</i> the concepts of Abstract Data Types and Operations on it.	K2
C205.2	<i>Apply</i> the concepts of linear data structures in real time applications.	K3
C205.3	<i>Understand</i> the structure of Non-Linear Data Structure-Trees.	K2
C205.4	<i>Understand</i> the concepts of Graph and analyze its various applications.	K2
C205.5	<i>Apply</i> sorting algorithms in real time applications and understand the concept of hashing technique.	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
C205.1	3	2	1	-	-	-	-	-	-	-	-	1	3	2	3
C205.2	3	2	1	-	-	-	-	-	-	-	-	1	3	2	3
C205.3	3	2	1	-	-	-	-	-	-	-	-	1	3	2	3
C205.4	3	2	1	-	-	-	-	-	-	-	-	1	3	2	3
C205.5	3	2	1	-	-	-	-	-	-	-	-	1	3	2	3
C205	3	2	1	-	-	-	-	-	-	-	-	1	3	2	3

Note: 1: Slight, 2: Moderate, 3: Substantial

SYLLABUS**No. of Credits: 3****UNIT-I LINEAR DATA STRUCTURES – LIST 9**

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT-II LINEAR DATA STRUCTURES – STACKS, QUEUES 9

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.

UNIT- III NON-LINEAR DATA STRUCTURES – TREES 9

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees– binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree -Minimum Spanning Tree - Dijkstra’s Algorithm - Heap – Applications of heap.

UNIT-IV NON-LINEAR DATA STRUCTURES - GRAPHS 9

Definition – Representation of Graph – Types of graphs - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT-V SEARCHING, SORTING AND HASHING TECHNIQUES 9

Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort - Quick sort - Merge sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

Total: 45 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 2013.
2. Reema Thareja, “Data Structures Using C”, Second Edition , Oxford University Press, 2014.

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction To Algorithms”, Third Edition, Mcgraw Hill, 2009.
2. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education,2002.
3. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education 2004.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008, Biochemistry, 4th Edition, WH Freeman & Co., 2000.



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Course code	21IT26T	Semester	II				
Category	PROFESSIONAL CORE COURSE (PCC)			L	T	P	C
Course Title	PROGRAMMING IN C (Common for CSE, IT, ECE, BIOTECH, CHEM, CSE(AI&ML))			3	0	0	3

COURSE OBJECTIVES:

- To learn Introduction of Algorithm and Basic Structure of C Programming.
- To gain knowledge on Implementation of Arrays and Strings concept in C Programming.
- To understand the Basic functions and Pointer declaration in C Programming.
- To apply the concepts of Structures and Unions in an example program.
- To write a sample C program to implement file handling and accessing Graphic Library function.

PREREQUISITE:

- Basic Mathematics Skills

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C206.1	<i>Explain</i> the data types, syntax and control structures for solving different problems.	K2
C206.2	<i>Apply</i> the concepts of Arrays, Strings in 'C' language for user defined problems	K3
C206.3	<i>Make use of</i> functions and concepts of pointers in 'C' language	K3
C206.4	<i>Organize</i> data using structures and unions in 'C' Programs.	K3
C206.5	<i>Develop</i> and implement applications using File handling Process and Graphics.	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
C206.1	2	1	-	-	-	-	-	-	-	-	-	-	2	1	-	-
C206.2	3	2	1	-	-	-	-	-	-	-	-	-	3	2	-	-
C206.3	3	2	1	-	-	-	-	-	-	-	-	-	3	2	-	-
C206.4	3	2	1	-	-	-	-	-	-	-	-	-	3	2	-	-
C206.5	3	2	1	-	-	-	-	-	-	-	-	-	3	2	-	-
C206	3	2	1	-	-	-	-	-	-	-	-	-	3	2	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

UNIT-I INTRODUCTION TO PROGRAMMING 9

Basic Organization of a Computer - Introduction to Algorithm, Pseudo code, Flow Chart. Structure of 'C' program, compilation and linking processes - C Tokens: Keywords, Data Types, Constants, Variables - Declaration -Operator: precedence and associativity -Expressions - Input/Output statements -Assignment statements - Decision making statements Switch statement - Looping Statements-Bitwise operations- pre-processor-Syntax and Logical Errors in compilation solving simple scientific and statistical problems.

UNIT-II ARRAYS AND STRINGS 9

Arrays: Declaration, Initialization - One dimensional array: Assigning an array to another array - Equating an array with another array -Two dimensional Arrays: Declaration - usage of two-dimensional arrays - reading, storing and accessing elements in two dimensional arrays -String operations: Initialization of Strings - string library functions - command line arguments - Searching and Sorting of Strings.

UNIT-III FUNCTIONS AND POINTERS 9

Introduction to functions: Classification of functions - function definition - function call -function with inputs and outputs - recursive function -example programs: copy one string to another string using recursion, binary search using recursion -Pointer Fundamentals: Pointer Declaration - Passing Pointers to a Function- Operations on pointers: Pointer Arithmetic - Pointer comparisons -Array of pointer: Pointers and one-dimensional arrays- Pointers and multi-dimensional arrays.

UNIT-IV STRUCTURES AND UNIONS 9

Introduction to Structures: Defining structures - initializing structures -Array of Structures - Nested structures - Introduction to union Creating and using union variables - memory allocation of union - example programs: Store and display N employees information using Union- Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays.

UNIT-V FILE HANDLING AND GRAPHICS 9

Files: Introductions - Data hierarchy - Types of file processing- Sequential access: Reading data from sequential access file - Updating sequential access file - Random access: Reading data from random access file - Writing data randomly to random access file -C Graphics: libraries and functions - 2D shapes - 3D shapes - Examples.

Total: 45 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. Sumitabha Das, "Computer Fundamentals & C Programming", McGraw Hill, 2018.
2. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
3. Yashavant Kanetkar "Let usC", 15thedition.

REFERENCES:

1. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2. Byron S Gottfried and Jitendar Kumar Chhabra, “Programming with C”, Tata McGraw Hill Publishing Company, Third Edition, New Delhi, 2011.
3. Kernighan,B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2006.
4. Ashok N. Kamthane, “Computer programming”, Pearson Education, 2007.



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Course code	21CS27P	Semester	II				
Category	PROFESSIONAL CORE COURSE (PCC)			L	T	P	C
Course Title	DATA STRUCTURES LABORATORY (Common to AI&DS, CSE, CSE (AI&ML))			0	0	4	2

COURSE OBJECTIVES:

- To understand various data representation techniques in the real world.
- To implement linear and non-linear data structures.
- To analyze various algorithms based on their time and space complexity.
- To develop real-time applications using suitable data structure.
- To identify suitable data structure to solve various computing problems

PREREQUISITE:

- Basic C Programming Skills

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C207.1	<i>Understand</i> various data representation techniques in the real world.	K3
C207.2	<i>Implement</i> linear and non-linear data structures.	K3
C207.3	<i>Analyze</i> various algorithms based on their time and space complexity.	K3
C207.4	<i>Develop</i> real-time applications using suitable data structure.	K3
C207.5	<i>Identify</i> suitable data structure to solve various computing problems.	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO.No	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
C207.1	3	2	1	-	3	-	-	2	2	2	-	1	3	2	3
C207.2	3	2	1	-	3	-	-	2	2	2	-	1	3	2	3
C207.3	3	2	1	-	3	-	-	2	2	2	-	1	3	2	3
C207.4	3	2	1	-	3	-	-	2	2	2	-	1	3	2	3
C207.5	3	2	1	-	3	-	-	2	2	2	-	1	3	2	3

Note: 1: Slight, 2: Moderate, 3: Substantial

List of Experiment**No. of Credits: 2**

1. Array implementation of Stack and Queue ADTs
2. Array implementation of List ADT
3. Linked list implementation of List, Stack and Queue ADTs
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary Trees and operations of Binary Trees
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues.
9. Graph representation and Traversal algorithms
10. Applications of Graphs
11. Implementation of searching and sorting algorithms
12. Hashing – any two collision techniques

LEARNING RESOURCES:**TEXT BOOKS:**

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 2013.
2. Reema Thareja, “Data Structures Using C”, Second Edition, Oxford University Press, 2014.

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, Third Edition, McGraw Hill, 2009.
2. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education, 2002.
3. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education 2004.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008.

Sl. No.	Description of Equipment	Required numbers (For batch of 30 students)
1	Systems with Linux Operating System with GNU Compiler [Open Source]	30 Nos



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Course code	21IT28P	Semester	II				
Category	PROFESSIONAL CORE COURSE (PCC)			L	T	P	C
Course Title	PROGRAMMING IN C LABORATORY (Common for CSE, IT, ECE, BIOTECH, CHEM, CSE(AI&ML))			0	0	3	2

COURSE OBJECTIVES:

- To develop programs in C using basic constructs.
- To develop applications in C using strings, pointers, functions, structures
- To develop applications in C using file processing, Graphics

PREREQUISITE:

- Basic Mathematics Skills

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C208.1	<i>Utilize</i> decision making and looping statements for problem solving.	K3
C208.2	<i>Apply</i> the concepts of Arrays and String to solve problem statements.	K3
C208.3	<i>Examine</i> the dynamic behaviour of memory by the use of pointers.	K4
C208.4	<i>Develop</i> simple applications using Structures and unions.	K3
C208.5	<i>Design</i> and develop simple applications using File Processing and Graphics.	K6

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
C208.1	3	2	1	-	-	1	-	-	1	-	1	1	1	2
C208.2	3	2	1	-	-	1	-	-	1	-	1	1	2	1
C208.3	3	3	2	1	-	1	-	-	1	-	1	1	2	1
C208.4	3	2	1	-	-	1	-	-	1	-	1	1	2	1
C208.5	3	3	3	3	2	1	-	-	1	-	1	1	2	1
C208	3	2	2	3	2	1	-	-	1	-	1	1	2	1

Note: 1: Slight, 2: Moderate, 3: Substantial

LIST OF EXPERIMENT**No. of Credits: 4**

1. a) Write a C program to perform input / output of all basic data types.
b) Write a C program using decision making construct.
c) Write a program that finds if a given number, is a prime number.
2. a) Write a program to find whether the given year is a leap year or not?
(Hint: not every Centurion year is a leap. For example, 1700, 1800 and 1900 is not a leap year)
b) Write a program using looping statements.
c) Write a program to use swapping operations.
3. a) Write a C program for print pyramids and patterns.
b) Write a C program to generate Fibonacci series.
4. a) Write a C program to shut down or turn off the computer.
b) Write a C program to perform sorting operations.
5. Write a program using one dimensional and two-dimensional arrays.
6. From a given paragraph perform the following using built-in functions:
a) Count total number of vowels and consonants.
b) Capitalize the first word of each sentence.
c) Replace a given word with another word.
7. Write a program using user defined functions and recursive functions.
8. Write a C program using pointers functions.
9. Write a program using structures and unions.
10. Write a program using text files and binary files.
11. Write a program using string functions.
12. Write a program using dynamic memory allocation.

Total: 60 Periods

LEARNING RESOURCES:**TEXT BOOKS:**

1. Sumitabha Das, “Computer Fundamentals & C Programming”, McGraw Hill, 2018.
2. ReemaThareja, “Programming in c”, Oxford University Press, Second Edition, 2016
3. Yashavant P. Kanetkar, “Let Us C”, Sixteenth Edition, BPB Publications, 2018.

REFERENCES:

1. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2. Byron S Gottfried and Jitendar Kumar Chhabra, “Programming with C”, Tata McGraw Hill Publishing Company, Third Edition, New Delhi, 2011.
3. Kernighan,B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2006
4. Ashok N. Kamthane, “Computer programming”, Pearson Education, 2007.

Sl. No.	Description of Equipment	Required numbers (For batch of 30 students)
1.	Systems with Linux Operating System with GNU compiler[Open Source]	30

III SEMESTER CURRICULUM & SYLLABI

Applicable to the students admitted to

**B.E. – COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

2021: CBCS

Academic year 2022-2023

onwards



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**B.E. – Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
(R2021)**

SEMESTER III										
S. No.	Course Code	Course Title	Category	CIE Marks	SEE Marks	Total marks	Credits			
							L	T	P	C
THEORY										
1	21MA33T	Linear Algebra for Data science	BSC	40	60	100	3	1	0	4
2	21HE32T	Digital Logic Circuits	ESC	40	60	100	3	0	0	3
3	21ML33T	Python for Data Science	PCC	40	60	100	3	0	0	3
4	21HC34T	Database Management Systems	PCC	40	60	100	3	0	0	3
5	21HC53T	Computer Networks	PCC	40	60	100	3	0	0	3
6	21MC01T	Constitution of India	MC	40	60	100	2	0	0	0
PRACTICAL										
7	21ML37P	Python for Data Science Laboratory	PCC	40	60	100	0	0	4	2
8	21HC39P	Database Management Systems Laboratory	PCC	40	60	100	0	0	4	2
							TOTAL			20



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Course code	21MA33T	Semester	III				
Category	BASIC SCIENCE COURSE (BSC)			L	T	P	C
Course Title	LINEAR ALGEBRA FOR DATA SCIENCE (Common for AI&DS and CSE(AI&ML))			3	1	0	4

COURSE OBJECTIVES:

- To familiarize the concept of Linear algebra.
- To understand the properties of matrices.
- To Know determinant of a matrix and the solution of simultaneous linear equations.
- To learn linear dependence and linear independence in vector space.
- To learn concepts and matrix decomposition.

PREREQUISITE:

- Vector Calculus and Complex Integration

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C303. 1	<i>Apply</i> basic concepts of Matrix properties to solve linear equations.	K3
C303. 2	<i>Understand</i> the concepts of vector space and its properties to solve Data Searching problems.	K2
C303. 3	<i>Analyse</i> the characteristics of a linear system with Eigen values and vectors.	K3
C303. 4	<i>Analyse</i> the systems by vector space techniques.	K3
C303. 5	<i>Find</i> eigen values of a matrix using numerical techniques.	K2

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C303. 1	3	2	-	-	-	-	-	-	-	-	-	2
C303. 2	2	1	-	-	-	-	-	-	-	-	-	2
C303. 3	3	3	2	-	-	-	-	-	-	-	-	2
C303. 4	3	3	2	-	-	-	-	-	-	-	-	2
C303. 5	2	1	-	-	-	-	-	-	-	-	-	2

Note: 1: Slight, 2: Moderate, 3: Substantial

UNIT I MATRICES AND ITS APPLICATIONS**12**

Introduction to Matrices and Determinants – Properties(without proof), Rank of Matrix- system of linear equations-Consistency- Gauss elimination method-Gauss Jordon method- matrix inversion method- Cramer's rule.

UNIT II VECTOR SPACES**12**

Introduction to vectors- Vector spaces and sub spaces- Linear independence and Linear dependence- Vector spaces over Real and Complex fields- Basis and dimension, Orthogonality.

UNIT III LINEAR TRANSFORMATION**12**

Linear transformation-Matrix representation of linear transformation-Rank space and null space- Dimension Theorem-Eigenvalues and Eigenvectors of Linear transformation.

UNIT IV INNER PRODUCT SPACES**12**

Inner product- Properties-Orthogonal, Orthonormal vectors-Gram Schmidt orthogonalization - Least square approximation.

UNIT V EIGEN VALUE PROBLEMS AND MATRIX DECOMPOSITION**12**

Eigen value Problems : Power method, QR decomposition-LU decomposition- Singular value decomposition.

Total: 60 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. Friedberg A.H, Insel A.J. and Spence L, Linear Algebra, Prentice Hall of India, New Delhi, 2004.
2. Faires J.D. and Burden R., Numerical Methods, Brooks/Cole (Thomson Publications), New Delhi, 2002.
3. Fundamentals of Matrix Algebra, Gregory Hartman, Virginia Military Institute, Copyright Year: 2011, Publisher: APEX Calculus.

REFERENCES:

1. Kumaresan S, Linear Algebra - A geometric approach, Prentice Hall of India, New Delhi, Reprint, 2010.
2. Advanced Engineering Mathematics, (Seventh Edition), Peter V. O'Neil, Cengage Learning, 7th Edition 2011.
3. Introduction to linear algebra, (Fifth Edition), Gilbert Strang, Wellesley-Cambridge Press, 2016.
4. Sundarapandian V, Numerical Linear Algebra, Prentice Hall of India, New Delhi, 2008.
5. Bernard Kolman, David R. Hill, Introductory Linear Algebra, Pearson Educations, New Delhi, First Reprint, 2009.



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Course code	21HE32T	Semester	III				
Category	ENGINEERING SCIENCE COURSE (ESC)			L	T	P	C
Course Title	DIGITAL LOGIC CIRCUITS (Common to CSE, IT, AI&DS, CSE(AI&ML))			3	0	0	3

COURSE OBJECTIVES:

- To Simplify logic digital Circuits using Boolean Functions.
- To Design Combinational and Sequential logic Circuits.
- To Learn Memory and logic devices.
- To understand VHDL model for digital circuits.

PREREQUISITE:

- Higher Secondary level Boolean Algebra

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C302.1	<i>Simplify</i> logic functions using Boolean Algebra and K-map.	K3
C302.2	<i>Design</i> minimal combinational and sequential logic circuits.	K3
C302.3	<i>Understand</i> VHDL for digital circuits	K2

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
C302.1	3	3	3	-		-	-	-	-	-	-	1
C302.2	3	3	3	-	1	-	-	-	-	-	-	1
C302.3	3	3	3	-	1	-	-	-	-	-	-	1

Note: 1: Slight, 2: Moderate, 3: Substantial



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Course code	21ML33T	Semester	III				
Category	PROFESSIONAL CORE COURSE (PCC)			L	T	P	C
Course Title	PYTHON FOR DATA SCIENCE			3	0	0	3

COURSE OBJECTIVES:

- To describe the life cycle of Data Science and computational environments for data scientists using Python.
- To describe the fundamentals for exploring and managing data with Python.
- To examine the various data analytics techniques for labeled/columnar data using Python.
- To demonstrate a flexible range of data visualizations techniques in Python.
- To describe the various Machine learning algorithms for data modeling with Python.

PREREQUISITE:

- Basic Mathematics Skills
- Basic knowledge of Python

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C303.1	<i>Understand</i> the basic concept of Data Science.	K2
C303.2	<i>Make use of</i> knowledge on NumPy to write program on array operations.	K2
C303.3	<i>Understand</i> the concepts of Pandas.	K2
C303.4	<i>Write</i> program retrieve data from an index labeled Library using Pandas.	K3
C303.5	<i>Construct</i> code to combine two Datasets.	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
C303.1	2	1	-	-	-	-	-	-	-	-	-	-	1	1
C303.2	2	1	-	-	-	-	-	-	-	-	-	-	2	1
C303.3	2	1	-	-	-	-	-	-	-	-	-	-	2	1
C303.4	3	2	1	-	-	-	-	-	-	-	-	-	2	1
C303.5	3	2	1	-	-	-	-	-	-	-	-	-	2	1

Note: 1: Slight, 2: Moderate, 3: Substantial

SYLLABUS**No. of Credits: 3****UNIT I INTRODUCTION TO DATA SCIENCE****9**

Introduction to Data Science and its importance - Data Science and Big data-, The life cycle of Data Science- The Art of Data Science - Work with data – data Cleaning, data Munging, data manipulation. Establishing computational environments for data scientists using Python with IPython and Jupyter.

UNIT II TOWARDS DATA SCIENCE USING NUMPY**9**

Understanding Data Types in Python - The Basics of NumPy Arrays - Computation on NumPy Arrays: Universal Functions - Aggregations: Min, Max, and Everything in Between Computation on Arrays: Broadcasting-Comparisons, Masks, and Boolean Logic Fancy Indexing-Sorting Arrays.

UNIT III INTRODUCTION TO PANDAS**9**

Installing and Using Pandas, Introducing Pandas Objects, Data Indexing and Selection. Operating on Data in Pandas, Handling Missing Data.

UNIT IV DATA MANIPULATION**9**

Hierarchical Indexing Combining Datasets: Concat and Append, Combining Datasets: Merge and Join. Aggregation and Grouping, Pivot Tables, Vectorized String Operations, Working with Time Series- General Matplotlib Tips, Simple Line Plots, Simple Scatter Plots.

UNIT V DATA VISUALIZATION**9**

Visualizing Errors Density and Contour Plots, Histograms, Binnings, and Density, Customizing Plot Legends Customizing Colorbars, Multiple Subplots, Text and Annotation, Customizing Ticks Customizing Matplotlib: Configurations and Stylesheets, Geographic Data with Basemap.

Total: 45 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. Python Data Science Handbook-Essential Tools for Working with Data, Jake Vander Plas, O'Reilly Media, 2020.
2. Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly, 2018.

REFERENCES:

1. Python for Data Analysis, Wes Mckinney, O'Reilly Media, 2013.
2. Field Cady, "Data Science Hand Book", John Wiley & Sons, 2017.
3. Fundamentals of Data Science, Samuel Burns, Amazon KDP printing and Publishing, 2019.
4. Doing Data Science, Straight Talk from The Frontline, Cathy O'Neil and Rachel Schutt. O'Reilly. 2014.
5. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, "Practical Data Science Cookbook", Packt Publishing Ltd., 2014.
6. Nathan Yau, "Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics", Wiley, 2011.
7. Shai Vaingast, "Beginning Python Visualization Crafting Visual Transformation Scripts", Apress, 2nd edition, 2014.



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Course code	21HC34T	Semester	III			
Category	PROFESSIONAL CORE COURSE (PCC)		L	T	P	C
Course Title	DATABASE MANAGEMENT SYSTEMS (Common to CSE, AI&DS)		3	0	0	3

COURSE OBJECTIVES:

The objective of this course is to prepare the students

- To understand the fundamentals of data models and to represent a database system using ER diagrams and relational database design.
- To learn the SQL basics and to use the normalization process in the databases.
- To understand the fundamental concepts of transaction and recovery procedures and to have an introductory knowledge about Indexing, Query Processing and Cost estimation.

PREREQUISITE:

- Basic knowledge of Database fundamentals

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C304. 1	<i>Understand</i> the applications of database models on various parameters.	K2
C304. 2	<i>Analyze</i> ER model to Relational model and to perform database design effectively.	K2
C304. 3	<i>Understand</i> queries for normalization and optimization criterions.	K2
C304. 4	<i>Understand</i> various concurrency and recovery procedures.	K2
C304. 5	<i>Analyze</i> various indexing strategies in different database systems	K2

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
C304. 1	3	2	2	1	-	-	-	-	-	-	-	-	3	3
C304. 2	3	2	3	2	1	-	-	-	-	-	-	-	3	3
C304. 3	3	2	2	1	-	-	-	-	-	-	-	-	3	3
C304. 4	3	2	2	1	-	-	-	-	-	-	-	-	3	3
C304. 5	2	2	3	2	1	-	-	-	-	-	-	-	3	3

Note: 1: Slight, 2: Moderate, 3: Substantial

SYLLABUS**No. of Credits: 3****UNIT I INTRODUCTION TO RELATIONAL DATABASES****9**

Introduction, History and Purpose of Database System – Introduction to Big data– Database Schema and Instances- Views of data – Data Models – Database System Architecture – Introduction to relational databases Relational Model – Keys – Relational Algebra.

UNIT II BASICS OF SQL AND DATABASE DESIGN**9**

SQL fundamentals – Advanced SQL features, Triggers- Nested Queries and Embedded SQL, Dynamic SQL. Entity-Relationship model – ER Diagrams – Enhanced-ER Model – ER-to- Relational Mapping.

UNIT III NORMALIZATION TECHNIQUES**9**

Introduction and problem of data redundancy-Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form- Dependencies Preservation-Case Studies of database system.

UNIT IV TRANSACTIONS AND CONCURRENCY**9**

Transaction Concepts – ACID Properties – Schedules – Serializability – Transaction states- Concurrent Execution – Need for Concurrency – Types of Locks – Two Phase Locking – Deadlock detection– Transaction Recovery– Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT V IMPLEMENTATION TECHNIQUES**9**

Overview of Physical storage media, RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation- Introduction to Distributed databases and client/server databases.

Total: 45 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Concepts, Seventh Edition, Tata McGraw Hill, 2020.
2. Ramez Elmasri, Shamkant B. Navathe,- Fundamentals of Database Systems, Sixth Edition, Pearson, 2016.

REFERENCES:

1. Raghu Ramakrishnan, Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
2. G.K.Gupta, ”Database Management Systems, Tata McGraw Hill, 2011.
3. C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.



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Course code	21HC53T	Semester	III				
Category	PROFESSIONAL CORE COURSE (PCC)			L	T	P	C
Course Title	COMPUTER NETWORKS (Common to CSE, IT, CSE(AI&ML))			3	0	0	3

COURSE OBJECTIVES:

- Understand the division of network functionalities into layers.
- Be familiar with the components required to build different types of networks
- Be exposed to the required functionality at each layer
- Learn the flow control and congestion control algorithms

PREREQUISITE:

- Basic knowledge in Computer.

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C503.1	<i>Describe</i> the general principles of data communication.	K2
C503.2	<i>Analyze</i> the contents in a given data link layer packet, based on the layer concept.	K3
C503.3	<i>Analyze</i> and design routing algorithms	K3
C503.4	<i>Design</i> protocols for various functions in the network.	K3
C503.5	<i>Understand</i> the working of various application layer protocols	K2

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
C503.1	3	2	1	-	-	-	-	-	-	-	-	1	3	2
C503.2	3	2	1	-	-	-	-	-	-	-	-	1	3	2
C503.3	3	2	1	-	-	-	-	-	-	-	-	1	3	2
C503.4	3	2	1	-	-	-	-	-	-	-	-	1	3	2
C503.5	3	2	1	-	-	-	-	-	-	-	-	1	3	2

Note: - 1: Slight 2: Moderate 3: Substantial

UNIT I FUNDAMENTALS & LINK LAYER 9

Building a network – Requirements - Layering and protocols – OSI Model -Performance - Networking Devices: Hubs, Bridges, Switches, Routers, and Gateways – Performance Metrics - Link layer Services - Framing - Error Detection - Flow control – Signals – Bandwidth and Data Rate – Encoding – Multiplexing – Shift Keying – Transmission Media

UNIT II MEDIA ACCESS & INTERNETWORKING 9

Media access control - Ethernet (802.3) - Virtual LAN - Wireless LANs - 802.11– Bluetooth - Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP,ICMP)

UNIT III ROUTING 9

Routing Principles – Distance Vector Routing – Link State Routing - Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing (DVMRP, PIM).

UNIT IV TRANSPORT LAYER 9

Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management - Flow control - Retransmission – TCP Congestion control - Congestion avoidance (DECbit, RED) – QoS – Application requirements

UNIT V APPLICATION LAYER 9

Internet Architecture – Network software – Introduction to Sockets - Traditional applications - Electronic Mail (FTP, SMTP, POP3, IMAP, MIME, Telnet, SSH) – HTTP – Web Services – DNS - SNMP

Total: 45 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.

REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.



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Course code	21MC01T	Semester	III				
Category	MANDATORY COURSE (MC)			L	T	P	C
Course Title	CONSTITUTION OF INDIA			2	0	0	0

COURSE OBJECTIVES:

- To understand the importance of constitution.
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court, controller and auditor general of India and election commission of India.

PREREQUISITE:

- Civic Knowledge.

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C001.1	<i>Understand</i> historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration	K2
C001.2	<i>Understand</i> the directive principle of state policy, and strengthening of the constitutional institutions.	K2
C001.3	<i>Analyze</i> the role of Governor and Chief Minister, role of state election commission, the decentralization of powers.	K2
C001.4	<i>Understand</i> the Public Election Process.	K2
C001.5	<i>Know</i> the Special Provisions for Various category of People.	K2

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C001.1	-	-	-	-	-	3	-	2	-	-	-	1	-	-	-
C001.2	-	-	-	-	-	2	-	2	-	-	-	1	-	-	-
C001.3	-	-	-	-	-	2	-	2	-	-	-	1	-	-	-
C001.4	-	-	-	-	-	1	-	2	-	-	-	1	-	-	-
C001.5	-	-	-	-	-	1	-	2	-	-	-	1	-	-	-

Note: 1: Slight, 2: Moderate, 3: Substantial

- UNIT I INTRODUCTION TO INDIAN CONSTITUTION 6**
The Necessity of the Constitution, The Societies before and after the Constitution adoption. **Introduction to the Indian constitution**, The Making of the Constitution, The Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India.
- UNIT II FUNDAMENTAL RIGHTS AND DIRECTIVE PRINCIPLES 6**
Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building. Directive Principles of State Policy (Art. 36-51).
- UNIT III UNION EXECUTIVE AND STATE EXECUTIVE 6**
Parliamentary System, Federal System, Centre-State Relations. Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Parliamentary Terminologies. Supreme Court of India, State Executives – Governor, Chief Minister, State Cabinet, State Legislature, High Court and Subordinate Courts.
- UNIT IV ELECTIONS, AMENDMENTS AND EMERGENCY PROVISIONS 6**
Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments Important Constitutional Amendments. Emergency Provisions, types of Emergencies and its consequences.
- UNIT V DIRECTIVE PRINCIPLES & FUNDAMENTAL DUTIES 6**
Fundamental Duties (Art. 51A), Basic Features of Constitution & Constitutional special provisions: Special Provisions for SC and ST, OBC, Women, Children and Backward Classes.

Total: 30 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. N. Shukla, Constitution of India, Eastern Book Agency, 2014.
2. P. Jain, Indian Constitutional Law, Lexis Nexis, 2013.
3. M. Seervai, Constitutional Law of India, Universal Law Publishing Co., Reprint 2013.

REFERENCES:

1. Glanville Austin, Indian Constitution – cornerstone of the Nations, Oxford University Press, 1999.
2. M. Bakshi, The Constitution of India, Universal Law Publishing Co., 2014.
3. D. Basu, Shorter Constitution of India (14th Ed. 2008, reprint 2010).
4. M. Bakshi, The Constitution of India, Universal Law Publishing Co., 2014.
5. D. Basu, Shorter Constitution of India (14th Ed. 2008, reprint 2010).



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Course code	21ML37P	Semester	III				
Category	PROFESSIONAL CORE COURSE (PCC)			L	T	P	C
Course Title	PYTHON FOR DATA SCIENCE LABORATORY (CSE-AI&ML)			0	0	4	2

COURSE OBJECTIVES:

- To understand the python libraries for data science
- To understand the basic Statistical and Probability measures for data science.
- To learn descriptive analytics on the benchmark data sets.
- To apply correlation and regression analytics on standard data sets.
- To present and interpret data using visualization packages in Python

PREREQUISITE:

- Basic Programming Skill

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C307.1	<i>Develop</i> relevant programming abilities	K3
C307.2	<i>Demonstrate</i> knowledge of statistical data analysis techniques	K3
C307.3	<i>Exhibit</i> proficiency to build and assess data-based models.	K3
C307.4	<i>Demonstrate</i> skill in Data management & processing tasks using Python	K3
C307.5	<i>Apply</i> data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
C307.1	2	2	1	1	1	-	-	-	-	-	-	-	1	1
C307.2	3	2	1	1	1	-	-	-	-	-	-	-	2	1
C307.3	3	2	1	1	1	-	-	-	-	-	-	-	2	1
C307.4	3	2	1	1	1	-	-	-	-	-	-	-	2	1
C307.5	3	2	1	1	1	-	-	-	-	-	-	-	3	1

Note: 1: Slight, 2: Moderate, 3: Substantial

LIST OF EXPERIMENTS

1. Write a Python Program for Multiply matrices.
2. Write a NumPy program to find the number of elements of an array, length of one array element in bytes and total bytes consumed by the elements.
3. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.
4. Write a Python program for Basic plots using Matplotlib
 1. draw line charts
 2. to plot two or more lines
 3. to plot several lines
5. Implementing a Stack class using Python lists.
6. Write a Python Program to find frequency of each word in a string in Python Frequency Distributions.
7. Write a Python program to arrange the elements in sorted order using Bubble, Selection, Insertion and Merge sorting techniques.
8. Write a Python program for Variability of Data set.
9. Write a Python program to implement to combine any two datasets.
10. Implement a Python program to index a dataset with atleast four attributes.
11. Write a Python program to extract the visual character of an image data.
12. Write a program to calculate precision and decision of searching on a dataset.

Total: 60 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016. Ramez Elmasri, Shamkant B. Navathe,- Fundamentals of Database Systems, Sixth Edition,Pearson,2016.

REFERENCES:

1. Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press, 2014.
2. Data Science From Scratch: First Principles with Python, Second Edition by Joel Grus, 2019.

LAB REQUIREMENTS

Sl. No.	Description of Equipment	Required numbers (For a batch of 30 students)
1.	Hardware: Standalone System Software: Open-Source Python	30 Nos



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Course code	21HC39P	Semester	III			
Category	PROFESSIONAL CORE COURSE (PCC)		L	T	P	C
Course Title	DATABASE MANAGEMENT SYSTEMS LABORATORY (Common to CSE, AI&DS)		0	0	4	2

COURSE OBJECTIVES:

- To understand data definitions and data manipulation commands and to learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of data bases
- To be familiar with the use of a front-end tool.

PREREQUISITE:

- Basic Programming Skill

COURSE OUTCOMES:

CO. No.	Course Outcomes	Blooms level
On successful completion of this Course, students will be able to		
C309.1	<i>Write</i> data definitions and manipulation commands.	K2
C309.2	<i>Design</i> applications to test Nested and Join Queries	K3
C309.3	<i>Apply</i> PL/SQL for processing database	K3
C309.4	<i>Implement</i> applications that required as Front-end Tool	K3
C309.5	<i>Analyze</i> the use of Tables, Views, Functions and Procedures	K3

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

CO No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
C309.1	2	2	-	-	2	-	-	-	-	-	-	-	1	-
C309.2	3	2	1	-	1	-	-	-	-	-	-	-	2	-
C309.3	3	2	1	1	1	-	-	-	-	-	-	-	2	-
C309.4	3	2	1	-	-	-	-	-	2	1	-	-	2	1
C309.5	3	2	1	-	-	-	-	-	2	1	-	-	3	1

Note: 1: Slight, 2: Moderate, 3: Substantial

LIST OF EXPERIMENTS

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
2. Database Querying – Simple queries, Nested queries, Sub queries and Joins.
3. Creating an employee database to set various constraints and Creation of Views Indexes, Save point.
4. Database Programming: Implicit and Explicit Cursors
5. Write a PL/SQL block that handles all types of exceptions.
6. To create PL/SQL functions and to implement the stored procedures in SQL (Procedures and Functions).
7. To study the basics of front-end tools.
8. Creation of Database Triggers
9. Database Design using ER modeling, normalization and Implementation for any application
10. Creation of Database in MS Access.
11. Database connectivity using Front End Tools (Application Development using Oracle/ Mysql)
12. Case study of Big Data and NoSQL.

Total: 60 Periods**LEARNING RESOURCES:****TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Concepts, Seventh Edition, Tata McGraw Hill, 2020.
2. Ramez Elmasri, Shamkant B. Navathe,- Fundamentals of Database Systems, Sixth Edition, Pearson, 2016.

REFERENCES:

1. Raghu Ramakrishnan, Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
2. G.K.Gupta, ” Database Management Systems, Tata McGraw Hill, 2011.
3. C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.

LIST OF EQUIPMENT REQUIRED

Sl. No.	Description of Equipment	Required numbers (For batch of 30 students)
1.	Systems with MySQL	30 Nos
2.	Visual Studio	30 Nos
3.	Server	1 No