Hindi Seva Mandal's (Estd. 1950)

Shri Sant Gadge Baba College of Engineering and Technology,

Bhusawal – 425203. Dist. – Jalgaon (M. S.)

Ref. No. SSGBCOET/2025-26/ 424

Date: 07.05.2026

Notification

It is hereby notified that the syllabus of S. Y. B.Tech Electronics and Computer Engineering as recommended by the Board of Studies in the meeting dated 18.04.2026 and duly approved by the Academic Council in its recent meeting held on 25.04.2026

The approved syllabus shall be implemented from the Academic Year 2026-27 for all concerned semesters of the S. Y. B.Tech Electronics and Computer Engineering.

All Heads of Departments, faculty members, and students are hereby informed to take note of the same and implement the syllabus accordingly.

Dr. G A Kulkarni
Head & Chairman,
BoS, E&C Engineering

Dr. G A Kulkarni
Member Secretary
Academic Council

Prof. Dr. R B Barjibhe
Principal
Chairman, Academic Council

S.G.B. College of Engg. & Tech. Bhusawal 425 203

Hindi Seva Mandal's

Shri Sant Gadge Baba

College of Engineering and Technology,

Near Z. T. C., Bhusawal. District-Jalgaon, Maharashtra, India, Pin-425203

An Autonomous Institute with Accreditation by NAAC with A+ Grade

Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere

www.ssgbcoet.com

Bachelor of Technology (B. Tech.) in Electronics and Computer Engineering

Programme Curriculum for Second Year

With Effect from the Academic Year 2026-27

4 Year Full time Programme Choice Based Credit System (CBCS) and Grading System Outcome Based Education Pattern Aligned with National Education Policy (NEP) 2020

Second Year Structure 25-26 as per NEP 2020

Semester III											
Course Category	**Category under NEP**	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				**No. of Credits**
				L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	
PCC	Programme Core Course	BTEC25PC301	Engineering Mathematics-III	3	--	--	20	20	60	100	**3**
PCC	Programme Core Course	BTEC25PC302	Analog Circuit Design	3	--	--	20	20	60	100	**3**
PCC	Programme Core Course	BTEC25PC303	Digital Electronics and Logic Design	2	--	--	20	20	60	100	**2**
MDM	Multidisciplinary Minor Bucket	BTEC25MD304	MDM-I	3	--	--	20	20	60	100	**3**
OE	Open Elective Bucket	BTEC25OE305	A. Introduction to Python B. Introduction to AI C. Data Structure D. Engineering Measurement	3	--	--	20	20	60	100	**3**
PCC	Programme Core Course Lab	BTEC25PC306L	Analog Circuit Design Lab	--	--	2	50	--	50	100	**1**
PCC	Programme Core Course Lab	BTEC25PC307L	Digital Electronics and Logic Design Lab	--	--	2	50	--	50	100	**1**
OE	Open Elective	BTEC25OE308L	Open Elective Lab	--	--	2	50	--	50	100	**1**
HSSM	Entrepreneurship	BTEC25HM309	Case Study/EDP Programme/ Start Up Activity	--	--	4	50	--	--	50	**2**
HSSM	Humanities Social Science and Management	BTEC25HM410	Basics of Human Rights	1	--	--	50	--	--	50	**1**
VEC	Value Education Course	BTEC25VEC311	Indian Constitution- Value Education	1	--	--	50	--	--	50	**1**
CEP	Community Engineering Project	BTEC25CEP312	Field Visit/Special Study/ Internship/ Social Activity Project/ Community Initiative	--	--	4	50	--	--	50	**2**
			Total	**16**	**0**	**14**	**450**	**100**	**450**	**1000**	**23**

Second Year Structure 25-26 as per NEP 2020

Semester IV											
Course Category	**Category under NEP**	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				**No. Of Credits**
				L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	
PCC	Programme Core Course	BTEC25PC401	Database Management System	3	--	--	20	20	60	100	**3**
PCC	Programme Core Course	BTEC25PC402	Principles of Communication System	3	--	--	20	20	60	100	**3**
PCC	Programme Core Course	BTEC25PC403	Microcontrollers	2	--	--	20	20	60	100	**2**
MDM	Multidisciplinary Minor Bucket	BTEC25MD404	MDM-II	3	--	--	20	20	60	100	**3**
OE	Open Elective Bucket	BTEC25OE405	A. Numerical Methods and Computer Programming B. Analysis and Design of Algorithm C. Probability Theory and Random Processes D. Introduction to Java	2	--	--	20	20	60	100	**2**
AEC	Programme Core Course Lab	BTEC25AE406L	Database Management System Lab	--	--	2	50	--	50	100	**1**
AEC	Programme Core Course Lab	BTEC25AE407L	Microcontrollers Lab	--	--	2	50	--	50	100	**1**
VSEC	Open Elective Course Lab	BTEC25VSE408L	Open Elective Lab	--	--	2	50	--	50	100	**1**
VSEC	Vocational & Skill Enhancement Course	BTEC25VSE409	Workshop/Skill Activity/Course/Seminar	--	--	2	50	--	--	50	**1**
VEC	Value Education Course	BTEC25VEC410	Universal Human Values-II	3	--	--	20	20	60	100	**3**
HSSM	Entrepreneurship	BTEC25HM411	Mini Project/ Case Study/EDP Programme/ Start Up Activity	--	--	4	50	--	--	50	**2**
VEC	Value Education Course	BTEC25VEC412	Life of Shri Sant Gadge Baba	1	--	--	--	--	--	--	**AU**
VEC	Value Education Course	BTEC25VEC413	Moral and Ethical Development	1	--	--	50	--	--	50	**1**
			Total	**18**	**00**	**12**	**420**	**120**	**510**	**1050**	**23**

Semester-III

BTEC25PC301	Engineering Mathematics-III	Credit 3

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
03	--	20	20	60

• Course Description:

Engineering Mathematics-III is a compulsory course to all second year engineering students of the institute in the Semester-III and is a continuation of previous year courses viz. Engineering Mathematics-I and Engineering Mathematics-II. This course intends to provide engineering students a coherent and balanced account of major mathematical techniques and tools.

• Course Objectives:

1	Linear differential equations of higher order using analytical methods and numerical methods applicable to Control systems and Network analysis.
2	Transforms such as Fourier transform, Laplace transform and applications to Communication systems and Signal processing.
3	Vector differentiation and integration required in Electromagnetic and Wave theory.
4	Complex functions, conformal mappings, contour integration applicable to Electrostatics, Digital filters, Signal and Image processing.

• Course Outcomes:

CO1	Solve higher order linear differential equation using appropriate techniques for modelling and analyzing electrical circuits.
CO2	Solve problems related to Fourier transform, Laplace transform and applications to Communication systems and Signal processing.
CO3	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
CO4	Perform vector differentiation and integration, analyze the vector fields and apply to Electromagnetic fields.
CO5	To identify and analyze engineering problem using various numerical method.
CO6	To identify and formulate engineering problem using Partial Differential Equation and Partial differential equation.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	--	--	--	--	--	--	--	--	--	1	--
CO2	3	2	1	--	--	--	--	--	--	--	--	--	1	--
CO3	3	2	1	--	--	--	--	--	--	--	--	--	1	--
CO4	3	2	1	--	--	--	--	--	--	--	--	--	1	--
CO5	3	2	1	--	--	--	--	--	--	--	--	--	1	--
CO6	3	2	1	--	--	--	--	--	--	--	--	--	1	--

UNIT-I Laplace Transform [09 Hours]

Definition – conditions for existence; Transforms of elementary functions; Properties of Laplace transforms -Linearity property, first shifting property, second shifting property, transforms of functions multiplied by tn, scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives; Evaluation of integrals by using Laplace transform; Transforms of some special functions-periodic function, Heaviside-unit step function, Dirac delta function.

UNIT-II Inverse Laplace Transform [09 Hours]

Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients.

UNIT-III Fourier Transform: [09 Hours]

Definitions-integral transforms; Fourier integral theorem (without proof); Fourier sine and cosine integrals; Complex form of Fourier integrals; Fourier sine and cosine transforms; Properties of Fourier transforms; Parsevals identity for Fourier Transforms.

UNIT-IV Partial Differential Equations and their Applications [09 Hours]

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagranges linear equations); Method of separation of variables-applications to find solutions of one dimensional heat flow equation (), and one dimensional wave equation.

UNIT-V Functions of Complex Variables [09 Hours]

Analytic functions; Cauchy-Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form; Cauchy sintegral theorem; Cauchy sintegral formula; Residues; Cauchys residue theorem (All theorems without proofs).

Text Books:

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2. Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand and CO. Pvt. Ltd., New Delhi.
3. A course in Engineering Mathematics (Volume III) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
4. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley and Sons, New York.
2. A Text Book of Engineering Mathematics by Peter O Neil, Thomson Asia Pvt. Ltd., Singapore.
3. Advanced Engineering Mathematics by C. R. Wylie and L. C. Barrett, Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Integral Transforms and their Engineering Applications by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
5. Integral Transforms by I. N. Sneddon, Tata McGraw-Hill, New York

BTEC25PC302 Analog Circuit Design Credit 3

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
03	--	20	20	60

• Course Description:

To provides a comprehensive introduction to designing and analyzing analog electronics, focusing on MOSFET/BJT transistor-level circuits, amplifier design, frequency response, feedback systems.

• Course Objectives:

1	To brief about Semiconductor devices BJT, JFET and MOSFET, its characteristics, parameters and applications.
2	To discuss BJT, FET, MOSFET DC Configurations and its analysis.
3	To explain various MOSFET Circuits.
4	To introduce concepts of feedbacks in amplifiers and oscillators.
5	To impart skills to evaluate the performance of voltage regulator and SMPS Circuits.

• Course Outcomes:

CO1	Compare the characteristics and parameters of JFET towards its applications.
CO2	Compare the characteristics and parameters of MOSFET towards its DC circuits.
CO3	Explain various MOSFET circuits and their applications.
CO4	Explain MOSFET amplifiers with and without feedback and MOSFET oscillators, for given specifications.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	--	1	--	--	--	--	--	--	2	3	--
CO2	3	2	2	--	--	--	--	--	--	--	--	1	2	1
CO3	3	2	3	--	--	--	--	--	2	2	--	1	3	2
CO4	3	3	2	--	--	--	--	--	2	2	--	2	2	2

UNIT-I Bipolar Junction Transistor [09 Hours]

BJT: construction, working, characteristics, Transistor as switch, Transistor configurations, current gain equation, stability factor.

BJT Biasing and basic amplifier configurations: Need for biasing BJT, Transistor biasing methods, Transistor as amplifier, Single Stage Amplifier, RC coupled Amplifiers, Effects of bypass and coupling capacitors, Frequency response of CE amplifier.

UNIT-II Junction Field Effect Transistor and MOSFET [09 Hours]

JFET: JFET and its characteristics, Pinch off voltage, Drain saturation current, JFET amplifiers, CS, CD, CG amplifiers.

MOSFET: Overview of DMOSFET, EMOSFET, n-MOSFET, p-MOSFET and CMOS devices, MOSFET as an Amplifier and Switch, Biasing in MOSFET. CMOS Inverter, Comparison of FET with MOSFET and BJT w.r.t. to device and Circuit parameter.

UNIT-III Power amplifiers: [09 Hours]

Introduction, classification of power amplifiers -A, B, AB, C and D, transformer coupled class A amplifier, Class B push pull and complementary symmetry amplifier, calculation of efficiency of (transformer coupled class A amplifier, Class B push pull), calculation of power output, power dissipation.

UNIT-IV Feedback amplifiers and Oscillators: [09 Hours]

Feedback Amplifiers: Principle of Negative feedback in electronic circuits, Voltage series, Voltage shunt, Current series, Current shunt types of Negative feedback, typical transistor circuit effects of Negative feedback on Input and Output impedance, Voltage and Current gains.

Oscillators: Principle of Positive feedback, Barkhausen criteria for oscillation, resonant frequency calculation of (General form of LC oscillator, RC Phase Shift oscillator, Wein bridge oscillator, Hartley and Colpitts oscillators).

UNIT-V Voltage Regulator & Switched Mode Power Supply (SMPS) [09 Hours]

Transistor application: Discrete transistor voltage Regulation, series voltage regulator, shunt voltage regulator.

IC Voltage Regulators: Three terminal voltage regulator, Variable voltage regulator. Introduction to Switch Mode Power supply (SMPS), Block diagram of SMPS, Types of SMPS**.**

Text/Reference Books:

1. A. Neamen, Semiconductor Physics and Devices (IRWIN), Times Mirror High Education Group, Chicago), 1997.

2. E. S. Yang, Microelectronic Devices, McGraw Hill, Singapore, 1988.

3. Brijesh Iyer, S. L. Nalbalwar, R. Dudhe, "Electronics Devices & Circuits", Synergy Knowledge ware Mumbai, 2017. ISBN: 9789383352616

4. B. G. Streetman, Solid State Electronic Devices, Prentice Hall of India, New Delhi,1995.

5. J. Millman and A. Grabel, Microelectronics, McGraw Hill, International, 1987.

6. A. S. Sedra and K. C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.

7. R. T. Howe and C. G. Sodini, Microelectronics: An integrated Approach, Prentice Hall International, 1997.

8. V. K. Mehta, Rohit Mehta, Principles of Electronics, S. Chand and Company

9. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition.

BTEC25PC303 Digital Electronics and Logic Design Credit 2

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
02	--	20	20	60

• Course Description:

This course covers the fundamentals of digital electronics, focusing on the design, analysis, and optimization of digital circuits using Boolean algebra, logic gates, and hardware description languages (like Verilog). Students learn to implement combinational circuits (adders, multiplexers) and sequential circuits.

• Course Objectives:

1	To familiarize the students with the foundational knowledge of binary systems, Boolean algebra, and logic gates to analyze, design, and troubleshoot combinational and sequential circuits.
2	To lay the base for further studies in areas such as modern computing systems, controlling everything from smartphones to advanced computers.

• Course Outcomes:

CO1	Use the number system and binary codes.
CO2	Understand the classification of logic families and minimization of equations.
CO3	Design combinational circuits.
CO4	Use the Flip-Flops for applications as registers, counters. Design Sequential Circuits.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	--	--	--	--	--	--	1	--	1	2	--
CO2	2	2	2	--	1	--	--	--	--	--	--	--	2	--
CO3	2	3	3	1		1	--	--	--	--	--	--	3	--
CO4	2	2	2	--	--	--	--	--	--	2	--	2	2	--

UNIT-I Number System and Data Representation [06 Hours]

Represents and converts data using binary, octal, decimal, hexadecimal, and specialized codes like Gray and BCD. Binary arithmetic: Signed binary numbers, Binary codes: Excess-3, Gray, BCD, ASCII, parity bit hamming code.

UNIT-II Characteristics of digital IC's, TTL logic and CMOS logic - Logic gates [06 Hours]

Universal gates, Boolean algebra, Demorgan's theorems, Minimization of logic functions using K-map, Canonical forms, minterms, maxterms, don't care conditions, code converters.

UNIT-III Combinational Logic Circuits Design [06 Hours]

Arithmetic circuits, half and full adder, half and full subtractor, binary parallel adder, IC7483, BCD adder, BCD subtractor, Excess-3 adder digital comparator, Multiplexers, Demultiplexers, decoders, Arithmetic logic unit (ALU-74181).

UNIT-IV Sequential logic circuits [06 Hours]

1 Bit Memory Cell, Clocked Flip-Flops (SR, JK, MSJK, D, T), excitation table, design of ripple counters and synchronous counters using flip-flops, Shift register, universal register and application. Moore Mealy machines, state diagram, state table.

UNIT-V Memory and Programmable Logic [06 Hours]

Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM. Programmable logic devices: detail architecture, study and designing combinational circuits using PLDs type (PAL, PLA, or PROM).

Text Books:

1. R. P. Jain, Modern digital electronics, 3rd edition, 12th reprint Tata McGraw Hill Publication, 2007.
2. M. Morris Mano, Digital Logic and Computer Design‖ 4th edition, Prentice Hall of India, 2013.
3. Anand Kumar, Fundamentals of digital circuits‖ 1st edition, Prentice Hall of India, 2001.
4. Lala Parag K. Digital System Design using PLD's, BS Publications/BSP Books, 2024.

Reference Books:

1. S. B. Batra, Digital Electronics and Logic Design, PHI Learning
2. Charles H. Roth, Fundamentals of Logic Design, Jaico Publishing

BTEC25OE305A Introduction to Python Credit 3

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
03	--	20	20	60

• Course Description:

An Introduction to Python course provides a foundational understanding of programming, covering basic syntax, data types, control flow (loops, conditionals), functions, and file handling. It focuses on writing, testing, and debugging simple scripts, often using IDEs like Visual Studio Code, preparing students for data analysis or software development.

• Course Objectives:

1	Introduction to Python Applications and Current Development.
2	Providing an understanding of the role computation in solving problems.
3	Teaching Types, Operators and Expressions, Data Structures Lists.
4	Learning Operations on File and Databases in Python.
5	Position students so that they can compete for research projects and excel in subjects with programming.

• Course Outcomes:

CO1	Understanding Python Applications and Current Development.
CO2	Select appropriate Logic to solve specific, complex problems.
CO3	Experience with an interpreted Language.
CO4	Represent real-world scenarios using Python.
CO5	Analyze the ethical, societal, and economic implications of Python.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	--	--	--	--	1	--	--	--	1	2	--
CO2	3	3	3	2	--	--	--	1	--	--	--	1	2	--
CO3	3	3	3	2	--	--	--	1	--	--	--	1	2	--
CO4	3	3	3	2	--	--	--	1	--	--	--	1	2	--
CO5	3	3	3	2	2	--	--	1	--	--	--	1	2	1

UNIT-I **[09 Hours]**

Introduction to Python, History of Python, Features of Python, Python Identifiers, Python Character Set, Keywords and Indentation, Comments, Command Line Arguments, Assignment Operator, Operators and Expressions, print() Function, input() Function, eval() Function, Python Data Types: int, float, complex, Variables, Mutable vs Immutable variables, Decision Statements: Boolean Type, Boolean Operators, if statement, else statement, Nested Conditionals Statements, Multi-way Decision Statements (elif statement).

UNIT-II **[09 Hours]**

Loop Control Statements: While loop, range() Function, For Loop, Nested Loops, Infinite Loop, Break Statement, Continue Statement, Pass Statement, Introduction to Strings, String Operations: Indexing and Slicing, Lists: Operations on List: Slicing, Inbuilt Functions for Lists, List Processing: Searching and Sorting, Dictionaries: Need of Dictionary, Operations on Directories: Creation, Addition, Retrieving Values, Deletion; Tuples, operations on Tuples, Inbuilt Functions for Tuples.

UNIT-III **[09 Hours]**

Introduction to Sets, operations on sets. Python Functions, Inbuilt functions, Main function, User Defined functions, Defining and Calling Function, Parameter Passing, Actual and Formal Parameters, Default Parameters, Global and Local Variables, Recursion, Passing Functions as Data, Lamda Function, Modules, Importing Own Module, Packages.

UNIT-IV **[09 Hours]**

Operations on File: Reading text files, read functions, read(), readline() and readlines(), writing Text Files, write functions, write() and writelines(),Manipulating file pointer using seek, Appending to Files. Python Object Oriented: Overview of OOP, Classes and objects, Accessing attributes, Built-In Class Attributes, Methods, Class Inheritance: super(), Method Overriding, Exception Handling, Try-except-else clause, Python Standard Exceptions, User-Defined Exceptions.

UNIT-V **[09 Hours]**

Databases in Python: Create Database Connection, create, insert, read, update and delete Operation, DML and DDL Operation with Databases. Python for Data Analysis: numpy: Creating arrays, Using arrays and Scalars, Indexing Arrays, Array Transposition, Universal Array Function, Array Processing, Array Input and Output Pandas: Series, Data Frame Matplotlib: Python for Data Visualization, Visualization Section.

Text/Reference Books:

1. Ashok Namdev Kamthane, Programming and Problem Solving with Python, McGraw Hill Education Publication, 2018.
2. John Guttag, Introduction to Computation and Programming using Python, Springer, Revised and Expanded version (Referred by MIT), 2013.
3. Lutz, M., Learning Python: Powerful Object-Oriented Programming; Reilly Media, Inc., 2013.
4. Michael T Goodrich and Robertto. Thamassia, Micheal S Goldwasser, Data Structures and Algorithms in Python, Wiley, 2016.
5. Y. Daniel Liang, Introduction to Programming Using Python, Pearson, 2013.
6. Reema Thareja, Python Programming Using Problem Solving Approach, Oxford Publications, 2017.
7. Dr. R. Nageswara Rao, Allen B. Downey, Core Python Programming, Think Python, O'Reilly Media, 2012.
8. Kenneth A. Lambert, The Fundamentals of Python: First Programs, Cengage Learning, 2011.

BTEC25OE305B Introduction to AI Credit 3

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
03	--	20	20	60

• Course Description:

An Introduction to AI course provides a foundational overview of artificial intelligence, covering core concepts, history, and applications such as machine learning, deep learning, and neural networks. The curriculum generally explores intelligent agents, problem-solving through search, knowledge representation, and ethical implications of AI technologies.

• Course Objectives:

1	Introduction to AI, Stages of AI, Applications and Current Development.
2	Providing a foundation in AI goals, methods, and agent types.
3	Teaching informed/uninformed search algorithms for game playing and optimization.
4	Learning how to represent knowledge, logic, and reasoning.
5	Introducing techniques for learning from data and Natural Language Processing.

• Course Outcomes:

CO1	Understanding AI Agents and AI Applications.
CO2	Select appropriate search, AI, or machine learning techniques to solve specific, complex problems.
CO3	Implement and test AI algorithms for heuristic searching and game playing.
CO4	Represent real-world scenarios using formal logic and knowledge representation techniques.
CO5	Analyze the ethical, societal, and economic implications of AI, including, safety, and security.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	--	--	--	--	--	--	--	--	--	--	--	2	3
CO2	2	2	--	--	--	--	--	--	--	--	--	3	2	3
CO3	2	2	1	2	--	--	--	--	--	--	--	2	3	--
CO4	1	3	1	2	--	--	--	--	--	--	--	1	3	--
CO5	2	2	--	--	--	--	--	--	--	--	--	1	3	3

UNIT-I Introduction to AI [09 Hours]

Introduction: What Is AI? The Foundations of Artificial Intelligence, the History of Artificial Intelligence, the State of the Art. Intelligent Agents: Agents and Environments Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT-II Problem Solving [09 Hours]

Problem-solving: Solving Problems by Searching, Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions, Defining Constraint Satisfaction Problems, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems. Adversarial Search, Games, Optimal Decisions in Games, Alpha–Beta Pruning.

UNIT-III Knowledge Representation [09 Hours]

Knowledge & Reasoning: The AI Knowledge Cycle, The relationship between Knowledge and Intelligence, Core Methods of Knowledge Representation: Logic Based Systems, Structured Requirements, Probabilistic Models and Distributed Representations. Types of Knowledge in AI, Knowledge representation issues, Representation & mapping, Approaches to knowledge representation, Issues in knowledge representation. Applications of Knowledge Representation in AI, Propositional Logic , First-Order Logic, Applications of First-Order Logic in AI, Challenges of First-Order Logic, Deductive and inductive reasoning, Forward and Backward Reasoning, Matching, Control knowledge.

UNIT-IV Probabilistic Reasoning [09 Hours]

Probabilistic Reasoning: Representing knowledge in an uncertain domain, The semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics, Planning: Overview, Components of a planning system, Goal stack planning, Hierarchical planning and other planning techniques.

UNIT-V Introduction to Natural Language Processing (NLP) and Expert Systems [09 Hours]

Introduction to NLP working, NLP preprocessing, 5 phases of NLP Learning and It's Forms, Expert Systems.

Text/Reference Books:

1. Deepak Khemani, A, First Course in Artificial Intelligence, McGraw Hill Publications
2. Rich, E. and Knight K.: Artificial Intelligence, Tata McGraw-Hill Publications
3. Peter Norvig, Artificial Intelligence: A Modern Approach, Third Edition.
4. Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley.

BTEC25OE305C	Data Structure	Credit 3

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
03	--	20	20	60

• Course Description:

• Course Objectives:

1	Explain fundamental concepts of data, data types, data structures, and Abstract Data Types (ADT), and analyses algorithms in terms of time and space complexity.
2	Solve computational problems by applying appropriate data structures such as arrays, hash tables, stacks, queues, and linked lists.
3	Implement tree and graph data structures, including binary trees, binary search trees, heaps, and adjacency matrix representations, and perform related operations and traversals.
4	Demonstrate proficiency in searching and sorting algorithms, including sequential, binary search, skip lists, insertion sort, selection sort, and radix sort, along with file handling techniques.
5	Select and implement suitable data structures and algorithms to develop efficient, maintainable, scalable software solutions.

• Course Outcomes:

CO1	Analyze, evaluate and choose the appropriate data structure and algorithm to solve a given problem and will also be able to compare algorithms with respect to time and space complexity.
CO2	Design and implement the data structures such as linked list, stack, queue tree and graphs by using C as the programming language using static or dynamic implementations.
CO3	Able to understand and analyze elementary algorithms: sorting, searching and hashing
CO4	Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to develop solutions for particular problems

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2	1	2	2	2	2	1	3	3	1
CO2	3	3	3	3	3	2	2	1	1	2	2	3	3	3
CO3	3	3	3	3	3	1	2	2	2	2	1	3	3	2
CO4	3	3	3	3	3	2	2	2	1	2	3	3	3	3

UNIT-I Introduction [09 Hours]

Data, Data types, Data structure, Abstract Data Type (ADT), representation of Information, characteristics of an algorithm, program, analyzing programs.

Arrays and Hash Tables: Concept of sequential organization, linear and non-linear data structures, storage representation, array processing.

Hash Tables, Direct address tables, Hash tables, Hash functions, Open addressing, Perfect hashing.

UNIT-II Stacks and Queues [09 Hours]

Introduction, stack and queue as ADT, representation and implementation of stack and queue using sequential and linked allocation, Circular queue and its implementation, Application of stack for expression evaluation and expression conversion, recursion.

UNIT-III Linked Lists [09 Hours]

Concept of linked organization, singly and doubly linked list, and dynamic storage management, circular linked list, operations such as insertion, deletion, concatenation, traversal of linked list, dynamic memory management, garbage collection.

UNIT-IV Trees [09 Hours]

Basic Tree terminology, binary trees and their representation, insertion and deletion of nodes in binary trees, binary search tree and its traversal, Balanced Trees, Terminology.

UNIT-V Searching and Sorting [09 Hours]

Sequential, binary searching, skip lists – dictionaries, linear list representation, skip list representation, operations-insertion, deletion, and searching. Insertion sort, selection sort, radix sort, and File handling.

Reference Books:

1. Horowitz and Sahani, Fundamentals of Data Structures, Universities Press, 2nd Edition, 2008.
2. Thomas Cormen, Introduction to Algorithms, PHI Publication, 2nd Edition, 2002.
3. Venkatesan and Rose, Data Structures, Wiley Publication, 1st Edition, 2015.
4. Goodrich & Tamassia, Data Structures and Algorithms in C++, Wiley Publication, 2nd Edition, 2011.
5. R. G. Dromey, How to Solve it by Computer, 2nd Impression, Pearson Education. 6. Kyle Loudon, Mastering Algorithms with C: Useful Techniques from Sorting to Encryption, O'Reilly Media, 1st Edition, 1999.

Text Books:

1. Mark Allen Weiss, Data structures and algorithms analysis in C++, Pearson Education, 4th Edition, 2013.
2. S. Lipschutz, Data Structures, McGraw-Hill Publication, Revised 1st Edition, 2014.
3. Y. Langsm, M. Augenstin, A. Tanenbaum, Data Structure using C and C++, Prentice Hall India Learning Private Limited, 2nd Edition, 1998.
4. Trembley and Sorenson, Introduction to Data Structures, PHI Publication, 2nd Revised Edition, 1983.
Vishal Goyal, Lalit Goyal, A Simplified Approach To Data Structure, SPD Publication, 1st Edition, 2014.

BTEC25OE305D Engineering Measurements Credit 3

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
03	--	20	20	60

• Course Description:

The Engineering Measurements course covers the principles, techniques, and instruments used to measure physical quantities, focusing on sensor operation, signal conditioning, data acquisition, and error analysis. Students learn to calibrate, select, and apply instruments for measuring displacement, force, torque, pressure, temperature, flow, and vibration in engineering systems.

• Course Objectives:

1	To Follow standard measurements and measuring instruments.
2	To recognize the instruments for each measurement and their connections.

• Course Outcomes:

CO1	Interpret the characteristics of measuring instrument.
CO2	Use various test and measuring instrument.
CO3	Interpret working of various types of sensors and transducers.
CO4	Measure physical quantities using various types of transducers and sensors.
CO5	Maintain signal conditioning and data acquisition systems.
CO6	Perform calibration, troubleshoot instruments, and work in teams.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	--	--	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--	--	--
CO3	2	3	2	2	3	--	--	--	--	--	--	--	--	--
CO4	2	3	3	2	3	--	--	--	--	--	--	--	--	--
CO5	2	2	2	3	3	--	--	--	1	--	--	--	--	--
CO6	1	2	2	3	3	--	--	--	3	--	--	--	--	--

UNIT-I Fundamentals of Measurements and Characteristics [09 Hours]

Basics of Measurements: Accuracy, Precision, resolution, reliability, repeatability, validity, Errors and their analysis, Standards of measurement. Bridge Measurement: DC bridges-wheatstone bridge, AC bridges-Kelvin, Hay, Maxwell, Schering and Wien bridges. Electronic Instruments for Measuring Basic Parameters: Amplified DC meter, AC Voltmeter, Electronic multi-meter, Digital voltmeter.

UNIT-II Testing and measuring Instrument [09 Hours]

Cathode Ray Oscilloscope (CRO): Introduction, uses of CRO: Time and frequency measurement, Voltage measurement, Lissagous patterns for phase and unknown frequency measurement.

Digital Storage Oscilloscope (DSO): Introduction, block diagram, operation and uses of digital storage oscilloscope (DSO): Time and frequency measurement, voltage measurement, store and recall mode.

Function generator: Introduction, block diagram, operation and uses of function generator: Sine, square, Triangular waveforms.

UNIT-III [09 Hours]

Signal Analysis: Wave Analyzer, Spectrum Analyzer. Frequency Counters: Simple Frequency Counter; Measurement errors; extending frequency range of counters.

Classification: selection of transducers strain gauges, LVDT, Temperature transducers, piezoelectric, photosensitive transducers, Hall Effect transducers, proximity devices.

UNIT-IV Data Acquisition System [09 Hours]

Signal conditioning: Introduction, types, block diagram and working of AC and DC signal conditioning circuits.

Data Acquisition Systems (DAS): Introduction, block diagram, working and applications of DAS. An Introduction to Computer-Controlled Test Systems. IEEE-488 GPIB Bus.

UNIT-V Industrial Measurement and Industrial Applications [09 Hours]

Measurement of vibration, electrical telemetry thickness, humidity, thermal conductivity and gas analysis emission computerized tomography, smoke and fire detection, burglar alarm, object counter level measurement, on /off timers, RTC, sound level meter, tachometer, VAW meter.

Text Books:

1. A course in Electrical and Electronic Measurement and Instrumentation" by A. K. Sawhney, Dhanpat Rai and Co.)
2. Electronic Instrumentation, H. S. Kalsi-TMH Publications
3. Modern Electronics Instrumentation & Measurement Techniques, by Albert D.Helstrick and William D. Cooper, Pearson Education.
4. C. S Rangan, G. R Sarma, and V. S. V Mani; Instrumentation Devices and Systems; Tata McGraw-Hill
5. Doeblin and Ernest; Measurement Systems Application and Design; 2004, Tata McGraw-Hill.

Reference Books:

1. Electronics Instruments and Instrumentation Technology-Anand, PHI 4.
2. Doebelin, E. O., Measurement systems, McGraw Hill, Fourth edition, Singapore, 1990.

BTEC25PC306L Analog Circuit Design Lab Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

Student aims to understand, design and analyze the basic applications of the many circuits‟ namely transistor amplifiers, oscillators, realize circuit etc.

• Course Objectives:

1	Enable the students to understand the various types of Transistorize circuits.
2	To verify practically the response of various special purpose electron devices.
3	To design and test different amplifier and oscillator circuits using BJT.

• Course Outcomes:

CO1	To design and test BJT circuits.
CO2	To design and test different amplifier and oscillator circuits using BJT.
CO3	To study the simplification of circuits.
CO4	To realize different circuits.
CO5	To design and test BJT, FET characteristics.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	--	--	--	--	--	--	--	--	--	2	--
CO2	3	2	2	--	--	--	--	--	--	--	--	--	2	--
CO3	2	1	1	--	--	--	--	--	--	--	--	--	1	1
CO4	3	2	2	--	--	--	--	--	--	--	--	--	2	--
CO5	2	1	1	--	1	--	--	--	--	--	--	--	2	--

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Input and output characteristics of transistor CB configuration.
2. Input and output characteristics of transistor CE configuration.
3. Frequency response of RC amplifier.
4. FET characteristics.
5. MOSFET characteristics.
6. Design of RC Phase Shift Oscillator
7. Frequency response of voltage series feedback amplifier
8. Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
9. Study the Hartley oscillators and observe the effect of variation of C on oscillator frequency
10. Study the Colpitts oscillators and observe the effect of variation of C on oscillator frequency

BTEC25PC307L Digital Electronics and Logic Design Lab Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

The Digital Circuit and Logic Design Lab provides hands-on experience in designing, simulating, and implementing combinational and sequential digital circuits.

• Course Objectives:

1	To introduce basic logic gates, universal gates (NAND/NOR), and teach the design, simulation, and implementation of combinational logic circuits.
2	To enable the construction and analysis of latches, flip-flops, registers, and counters and to develop skills for building circuits on breadboards and debugging them using trainers.

• Course Outcomes:

CO1	Verify truth tables of basic and universal logic gates.
CO2	Design and implement combinational circuits (adders, subtractors, multiplexers) using logic gates.
CO3	Construct and analyze sequential circuits (flip-flops, registers, counters).
CO4	Design circuits based on Boolean expressions and optimize using K-maps.
CO5	Understand the classification and characteristics of memories. Designing combinational circuits using PLDs.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	--	--	1	1	1	1	1	2	1
CO2	3	3	2	2	2	--	--	1	1	1	1	1	2	1
CO3	3	3	2	2	2	--	--	1	1	1	1	1	2	1
CO4	3	3	2	2	3	--	--	1	1	1	1	1	3	1
CO5	3	3	2	2	2	--	--	1	1	1	1	1	2	1

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Verify truth tables of Basic Gates and Universal Gates using ICs (e.g., 7400, 7402, 7408, and 7432).
2. Realize basic gates (AND, OR, NOT, XOR) using only NAND or NOR gates.
3. Construct half and full adders using basic or universal gates. Design of 4-bit adder (IC7483).
4. Design Binary to Gray code, Gray to Binary (IC7486) converters.
5. Verify the truth table of 2-bit and 4-bit (IC 7485) magnitude comparators.
6. Implement MUX (IC74151) and DEMUX (IC74154) circuits.
7. Implement Encoder and Decoder, such as IC 7447 and 7445.
8. Verify the truth tables of JK, D flip-flops using ICs (7474, 7476).
9. Design and verify 4-bit Synchronous/Asynchronous (Ripple) counters and Decade counters
10. Read/Write Operation on Static RAM (SRAM).

BTEC25OE308L Introduction to Python Lab Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

This Python Lab course provides hands-on experience with fundamental to advanced Python programming, focusing on syntax, data structures (lists, tuples, sets, dictionaries), functions, modules, and file handling. Students develop, debug, and execute programs for engineering, data science, and web applications. It emphasizes problem-solving through practical exercises like searching, sorting, and object-oriented programming (OOP).

• Course Objectives:

1	To be able to introduce core programming basics and various Operators of Python programming language.
2	To demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries.
3	To understand about Functions, Modules and Regular Expressions in Python Programming.
4	Implement and test different Python Programs.
5	Identifying Python applications for real Life situations.

• Course Outcomes:

CO1	Implementing and testing Python Programs.
CO2	Student should be able to understand the basic concepts of scripting and the contributions of scripting language.
CO3	Ability to explore python data structures like Lists, Tuples, Sets and dictionaries.
CO4	Understanding applicability to real world solutions.
CO5	Ability to create practical and contemporary applications using Functions, Modules and Regular Expressions.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	--	--	3	--	--	--	--	--	--	--	--	3
CO2	2	3	--	3	3	--	--	--	--	--	--	--	--	3
CO3	3	3	1	3	3	--	--	--	--	--	--	--	--	3
CO4	3	3	--	3	3	--	--	--	--	--	--	--	--	3
CO5	--	--	--	--	--	--	--	--	--	3	--	--	--	--

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Install Python and explore various popular IDE like IDLE, PyCharm, and Anaconda.

• To perform various number operations like:

2. Find maximum from a list of numbers
3. GCD of two number
4. Square root of a number
5. Check number is prime or not.
6. Print first N prime numbers
7. Remove duplicate numbers from list
8. Print the Fibonacci series.

• To perform various operations on Strings like creation, deletion, concatenation.

9. Create a List L = [10, 20, 30].
• Write programs to perform following operations:
10. Insert new numbers to list L.
11. Delete numbers from list L.
12. Sum all numbers in list L.
13. Sum all prime numbers in list L.
14. Delete the list L.
15. Create a Dictionary D= {'Name': 'Allen', 'Age': 27, 5:123456}.

• Write programs to perform following operations:

16. Insert new entry in D.
17. Delete an entry from D.
18. Check whether a key present in D.
19. Update the value of a key.
20. Clear dictionary D.
21. Two assignments on Sets to perform various operation like union, intersection, difference etc.
22. Two assignments related to searching operation like linear search, binary search.
23. Three assignments related to sorting like selection sort, bubble sort, insertion sort.
24. Demonstrate the use of dictionary for measuring student marks in five subjects and you have to find the student having maximum and minimum average marks.
25. Two assignment on usage of different available packages like random package to perform
26. Print N random numbers ranging from 100 to 500.
27. Print 10 random strings whose length between 3 and 5.
28. Two assignments on usage of package such as Numpy, Pandas.
29. Implement and demonstrate the functions of a simple calculator.
30. One assignment on implementing object oriented concept such as classes, inheritance, and polymorphism.
31. One assignment on file handling that how data is read and written to a file.

• Examples are (not limited to)

1. WAP to add two numbers in python
2. WAP to declare variables and display types of respective variables
3. WAP to demonstrate type casting in python
4. WAP to demonstrate Logical operators
5. WAP to find out greatest of 3 numbers
6. WAP to find whether given number is odd or even
7. Write a C program to check whether a character is uppercase or lowercase alphabet.

8. WAP to find whether given input is number or character
9. WAP to display even numbers from 1-10
10. WAP to add odd numbers from 1-10
11. Write a Python program to get the Fibonacci series between 0 to 50.
12. Write a Python program to remove the characters which have odd index values of a given string
13. Write a Python script to sort (ascending and descending) a dictionary by value
14. Write a Python script to check if a given key already exists in a dictionary.
15. Write a Python script to merge two Python dictionaries
16. Write a Python program to add an item in a tuple.
17. Write a Python program to create a tuple with different data types
18. Write a Python program to sum all the items in a list
19. Write a Python program to get the largest number from a list.
20. Write a Python program to add member(s) in a set.
21. Write a Python program to reverse the order of the items in the array
22. Write a Python program to create an array of 5 integers and display the array items. Access individual element through indexes.
23. Write a Python function to find the Max of three numbers.
24. Write a Python program to reverse a string. Sample String: "1234abcd" Expected Output: "dcba4321"
25. Write a Python function to calculate the factorial of a number (a non-negative integer). The function accepts the number as an argument

BTEC25OE308L Introduction to AI Lab Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

The Introduction to AI Lab provides practical, hands-on experience in implementing fundamental artificial intelligence algorithms, typically using Python. Students apply techniques such as search strategies, game playing, logic-based reasoning, and introductory machine learning to solve real-world problems and develop intelligent agents.

• Course Objectives:

1	Provide hands-on experience in developing intelligent agents.
2	Implementing fundamental search algorithms, and applying machine learning techniques to solve real-world problems.

• Course Outcomes:

CO1	Solve various kinds of problems using AI techniques.
CO2	Solve basic AI based problems using any programming language.
CO3	Understand to implement the various kinds of AI based algorithms.
CO4	Apply AI techniques to real-world problems to develop intelligent systems.
CO5	To understand problems related to AI.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	2	--	--	--	--	--	--	2	3	--
CO2	--	--	--	2		--	--	--	--	--	--	2	--	3
CO3	3	2	3	2	2	--	--	--	--	--	--	2	3	--
CO4	3	--	3	--	2	--	--	--	--	--	--	2	3	--
CO5	3	2	3	2	2	--	--	--	--	--	--	2	3	3

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Understanding Java/Python/C++/Lisp/PROLOG
2. Study of Real Life AI Systems
3. Study of Linear search/sequential searching algorithm
4. Study of Binary search Algorithm
5. Study of Breadth-first search (BFS) Algorithm
6. Study of Depth First Search Algorithm
7. Solve 8 Queens Problem in Python
8. To study the travelling salesman problem
9. To Study Libraries for NLP
10. To Study Text Preprocessing in NLP

BTEC25OE308L Data Structure Lab Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

The Data Structure Lab course provides practical, hands-on experience implementing fundamental linear and non-linear data structures (arrays, linked lists, stacks, queues, trees, graphs) using C/C++. It focuses on solving computational problems, analyzing algorithm efficiency (time/space complexity), and applying techniques like sorting, searching, and hashing to improve software performance.

• Course Objectives:

1	To bridge the gap between theoretical data structure concepts and practical implementation.
2	Enabling students to design, analyze, and implement linear (arrays, linked lists, stacks, queues) and non-linear (trees, graphs) data structures.

• Course Outcomes:

CO1	Ability to understand a systematic approach to organizing, writing, and debugging C/C++ programs using data structures concepts.
CO2	Ability to implement linear data structures (arrays, stacks, queues, linked lists) and their operations using C/C++ programs.
CO3	Ability to implement non-linear data structures (trees, graphs) and their operations (traversals, searching).
CO4	Ability to implement and analyze sorting and searching algorithms (linear, binary search, bubble sort, selection sort, etc.) in the context of specific engineering problems.
CO5	Ability to solve problems by identifying and applying the most suitable data structure and algorithm for a given real-world problem.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	--	--	1	--	--	--	--	--	--	--	--	--
CO2	3	2	3	--	2	--	--	--	--	--	--	--	--	--
CO3	3	3	3	2	3	--	--	--	--	--	--	--	--	--
CO4	3	3	2	2	2	--	--	--	--	--	--	--	--	--
CO5	2	3	3	3	3	1	--	--	--	--	--	--	--	--

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Write a program to implement a stack using arrays.
2. Write a program to evaluate a given postfix expression using stacks.
3. Write a program to convert a given infix expression to postfix form using stacks.
4. Write a program to implement a circular queue using arrays.
5. Write programs to implement Single linked list.
6. Write programs to implement Double linked list.
7. Write a program to create a binary search tree (BST) and various operations
8. Write a program to implement hashing with Linear Probing Technique
9. Write a program to implement Insertion sort.
10. Write a program to implement Quick sort

BTEC25OE308L Engineering Measurements Lab Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

This laboratory course familiarizes students with the principles of measurement, including the construction, operation, and calibration of instruments used to measure physical parameters such as length, angle, pressure, temperature, force, torque, and vibration. The course emphasizes the analysis of measurement uncertainty, reduction of experimental errors, and the application of measurement techniques to real-world engineering problems.

• Course Objectives:

1	To Understand measurement systems and acquire hands-on experience.
2	To learn calibration techniques, to analyses error and uncertainty and to develop data acquisition skills.

• Course Outcomes:

CO1	Demonstrate the operation and use of various instruments (Vernier calipers, micrometers, dial gauges) for linear and angular measurements.
CO2	Calibrate measuring instruments using calibration standards (e.g., slip gauges, dead weight testers) and determine the uncertainty in measurements.
CO3	Analyze and apply sensors and transducers to measure pressure, force, torque, flow, and temperature.
CO4	Evaluate the static and dynamic performance characteristics of measuring instruments.
CO5	Interpret experimental data to form valid conclusions, including applying statistical techniques for error reduction.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	--	--	--	--	--	--	--	--	--	--	--	--
CO2	2	2	--	3	--	--	--	--	--	--	--	--	--	--
CO3	2	3	--	3	--	--	--	--	--	--	--	--	--	--
CO4	2	2	1	2	3	--	--	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--	--	--	--	--	--	--	--

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Study of measure the unknown Resistance by Wheatstone's bridge.
2. Study of measure the unknown capacitance by Schering bridge.
3. Study of CRO.
4. Study of DSO.
5. Study of measure the linear displacement using LVDT.
6. Study of measure the temperature of the given liquid using RTD.
7. Study characteristics of LDR and Photodiode/Phototransistor.
8. Interpret the performance of Portable Data Acquisition System.
9. Study of measure the speed using Tachometer.
10. Use of simulation software and PCB fabrication.

BTEC25HM309	Case Study/EDP Programme/Start Up Activity	Credit 2

TEACHING SCHEME		EXAMINATION SCHEME		
PR (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
04	--	--	50	--

• Course Description:

Students are expected to identify electronics components and their use. This course will also help students to build confidence to handle the measuring and testing equipment.

• Course Objectives:

1	To Study Different electronics components.
2	To Understand Industrial Applications of Electronics Components.
3	To Implement and Test ideas with electronics components.
4	To Understand how to convert ideas into product.
5	To seek information about various products/ startups/Small Scale industries.

• Course Outcomes:

CO1	Understand Industrial Applications of study.
CO2	Gaining confidence about converting ideas into product.
CO3	Understanding electronics components.
CO4	Enhanced awareness about various products/ startups/Small Scale industries.
CO5	Understanding Market Scenario.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	3	--	2	3	--	--	3	--	--	--	2	2
CO2	3	2	3	--	2	3	--	--	3	--	--	--	2	2
CO3	3	1	3	--	2	3	--	--	3	--	--	--	2	2
CO4	3	2	3	--	2	3	--	--	3	--	--	--	2	2
CO5	3	1	3	--	2	3	--	--	3	--	--	--	2	2
CO6	3	--	3	--	2	3	--	--	3	--	3	2	2	2

• Guidelines:

1. To Identify and study different electronics components and measuring instruments.
2. Study and use of Bread Board Trainer Kit.
3. Soldering of Electronic components on PCBs.
4. Mini Hobby Project.

BTEC25HM310 Basics of Human Rights Credit 1

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
01	--	--	50	--

• Course Description:

A "Basics of Human Rights" course provides a foundational understanding of the universal rights and freedoms to which all individuals are entitled, regardless of nationality, race, religion, or gender.

• Course objective:

1	To train the young minds facing the challenges of the pluralistic society and the rising conflicts and tensions in the name of particularistic loyalties to caste, religion, region and culture.
2	To give knowledge of the major "signposts" in the historical development of human rights, the range of contemporary declarations, conventions, and covenants.
3	To enable them to understand the basic concepts of human rights (including also discrimination, equality, etc.), the relationship between individual, group, and national rights.
4	To develop sympathy in their minds for those who are denied rights.
5	To make the students aware of their rights as well as duties to the nation.

• Course Outcomes:

CO1	Students will be able to understand the history of human rights.
CO2	Students will learn to respect others caste, religion, region and culture.
CO3	Students will be aware of their rights as Indian citizen.
CO4	Students will be able to understand the importance of groups and communities in the society.
CO5	Students will be able to realize the philosophical and cultural basis and historical perspectives of human rights.

• Mapping of course out comes with program outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO2	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO3	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO4	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO5	1	1	1	1	1	3	3	2	2	1	2	--	--	--

UNIT-I Basic Concepts: **[03 Hours]**

The Basic Concepts: Individual, group, civil society, state, equality, justice, Human Values, Human rights and **Human Duties:** Origin, Contribution of American bill of rights, French revolution, Declaration of independence, Rights of citizen, Rights of working and exploited people.

UNIT-II Fundamental rights and economic programme: **[03 Hours]**

Fundamental rights and economic programme, Society, religion, culture, and their inter relationship, Impact of social structure on human behavior.

Social Structure and Social Problems: Social and communal conflicts and social harmony, rural poverty, unemployment, bonded labor.

UNIT-III Migrant worker **[03 Hours]**

Migrant workers and human rights violations, human rights of mentally and physically challenged, State, Individual liberty, Freedom and democracy.

NGOs and human rights in India: Land, Water, Forest issues.

UNIT-IV Human rights in Indian constitution and law: **[03 Hours]**

Human rights in Indian constitution and law: i) The constitution of India: Preamble ii) Fundamental rights iii) Directive principles of state policy iv) Fundamental duties v) Some other provisions.

UNIT-V Universal declaration: **[03 Hours]**

Universal declaration of human rights and provisions of India, Constitution and law, National human rights commission and state human rights commission.

Text/Reference Books:

1. Shastry, T. S. N., India and Human rights: Reflections, Concept Publishing Company India (P Ltd.), 2005.
2. Nirmal, C. J., Human Rights in India: Historical, Social and Political Perspectives (Law in India), Oxford India.

BTEC25VEC311 Indian Constitution-Value Education Credit 1

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
01	--	--	50	--

• Course Description:

The Indian Constitution-Value Education course provides a foundational understanding of the Indian Constitution's principles, focusing on inculcating values like justice, liberty, equality, and fraternity. It covers key features, including fundamental rights, duties, and directive principles, aimed at fostering active, responsible citizenship and understanding democratic governance.

• Course objective:

1	Understand the historical background and philosophy behind the framing of the Indian Constitution.
2	Explain the structure of the Indian government and its functioning at Union and State levels.
3	Comprehend the Fundamental Rights, Directive Principles, and Fundamental Duties of Indian citizens.
4	Analyze the distribution of powers, emergency provisions, and the role of constitutional bodies.
5	Develop awareness of constitutional values, governance ethics, and responsibilities as citizens of India.

• Course Outcomes:

CO1	Explain the historical evolution and salient features of the Indian Constitution.
CO2	Describe the structure, powers, and functions of various organs of the government.
CO3	Interpret the Fundamental Rights, Directive Principles, and Fundamental Duties of citizens.
CO4	Analyze the functioning of constitutional bodies and evaluate governance mechanisms.
CO5	Demonstrate responsible citizenship by applying constitutional values and principles in real life.

• Mapping of course outcomes with program outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO2	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO3	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO4	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO5	1	1	1	1	1	3	3	2	2	1	2	--	--	--

UNIT-I Introduction to the Constitution of India [03 Hours]

Historical Background and Making of the Constitution, Constituent Assembly: Composition, Committees, and Drafting Process, Preamble: Meaning, Components, and Significance, Salient Features of the Indian Constitution, Sources and Influences from Other Constitutions.

UNIT-II Structure of the Union and State Governments [03 Hours]

Union Government: President, Vice-President, Prime Minister, Council of Ministers, Parliament: Composition, Powers, and Functions, State Government: Governor, Chief Minister, State Legislature, Judiciary: Supreme Court, High Courts, and Subordinate Courts, Federal System: Centre-State Relations and Inter-State Relations.

UNIT-III Fundamental Rights, Directive Principles, and Duties [03 Hours]

Fundamental Rights: Nature, Scope, and Limitations (Articles 12–35), Directive Principles of State Policy: Meaning, Classification, and Implementation (Articles 36–51), Fundamental Duties: Origin, List, and Importance (Article 51A), Relationship between Rights, Duties, and DPSPs, Role of Judiciary in Protecting Fundamental Rights.

UNIT-IV Constitutional Bodies and Governance [03 Hours]

Election Commission of India, Finance Commission, NITI Aayog, and Comptroller and Auditor General (CAG), Union Public Service Commission (UPSC) and State PSCs, National Human Rights Commission, Women's Commission, and other statutory bodies, Local Self-Government: 73rd and 74th Amendments-Panchayati Raj and Municipalities.

UNIT-V Amendments, Emergency, and Constitutional Values [03 Hours]

Procedure for Constitutional Amendments (Article 368), Major Amendments (1st, 42nd, 44th, 73rd, 74th, 86th, 101st), Emergency Provisions (Articles 352–360): Types and Effects, Constitutional Values and Ethics in Governance, Role of Citizens in Upholding Constitutional Morality and National Integration.

Text/Reference Books:

1. D. D. Basu**,** Introduction to the Constitution of India*,* LexisNexis.
2. M. Laxmikanth**,** Indian Polity*,* McGraw Hill.
3. Subhash Kashyap**,** Our Constitution*,* National Book Trust.
4. P. M. Bakshi, the Constitution of India.
5. Granville Austin, the Indian Constitution: Cornerstone of a Nation.
6. Durga Das Basu, Shorter Constitution of India.

BTEC25CEP312 Field Visit/Special Study/Internship/ Social Activity Project/ Community Initiative Credit 2

TEACHING SCHEME		EXAMINATION SCHEME		
PR (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
04	--	--	50	--

• Course Description:

The primary objective of this course is to bridge technical education with social responsibility by applying engineering skills to real-world community problems. It aims to foster civic engagement, leadership, empathy, and sustainable development while enhancing students' problem-solving skills and awareness of local challenges and requirements.

• Course Objectives:

1	To Understand about applying engineering skills for social needs.
2	To enhance problem solving skills.
3	To seek information about real-world community problems and industrial expectations.
4	To address real world problems with engineering principles.
5	To foster civic engagement and leadership.

• Course Outcomes:

CO1	Understand social Applications of study
CO2	Addressing real-world community problems
CO3	Solving real world problems
CO4	Enhanced awareness about social expectations about technology
CO5	Understanding about civic engagement and leadership

• Guidelines:

Students can do an Industrial Training of 4 to 6 weeks after Second semester which will be evaluated in third semester. They are expected to learn novel skills during the training period. They can also join online/offline EDP Program/ Start Up activity session. Students can also participate in social activity/ visit/ undertake case study of relevant industry/technology. Students will submit a report of any one of this activity and will give presentation at the end of semester.

Semester-IV

BTEC25PC401	Database Management System	Credit 3

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
03	--	20	20	60

• Course Description:

• Course Objectives:

1	Fundamentals of Database Management Systems and types of DBMS used in data analysis.
2	Understand various ways to organize, maintain and retrieve - efficiently, and effectively-information from different DBMS.
3	Design and maintenance of the database systems.
4	Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.
5	Position students so that they can compete for research projects and excel in subjects with DBMS.

• Course Outcomes:

CO1	Master the basic concepts of relational DBMS and its types.
CO2	Perform various types of operations on relational databases using DDL, DML, DCL in SQL.
CO3	Understand the concept of how non-relational databases differ from relational databases from a practical perspective.
CO4	Master the basic concepts of designing NoSQL database management system.
CO5	Able to Identify what type of NoSQL database to implement based on business requirements.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	--	--	--	--	--	--	--	--	--	2	2
CO2	3	2	2	--	--	--	--	--	--	--	--	--	2	3
CO3	2	1	1	--	--	--	--	--	--	--	--	--	2	2
CO4	2	1	1	--	--	--	--	--	--	--	--	--	2	2
CO5	2	1	1	--	--	--	--	--	--	--	--	--	2	2

UNIT-I Introduction to Databases [09 Hours]

Introduction to Data and Database, Significance of Database Management System, Various Types of DBMS-relational and non-relational, Data Independence-The Three Levels Of Architecture-The External Level-Conceptual Level - Internal Level-Client/Server Architecture-System Structure , Instance and schema.

UNIT-II Relational Database Management System [09 Hours]

Data Models and Types, ER to Relational Mapping, Structure of Relational Databases, Creation and Manipulation of Database using Basic SQL (DDL, DML, DCL, TCL), Normalization -Anomalies-Functional Dependency, Normal forms-1NF, 2NF, 3NF, Boyce-Codd Normal Form.

UNIT-III Non-Relational Database Management System [09 Hours]

NOSQL Systems-Introduction to NoSQL, Disadvantages of NoSQL technology, NOSQL Systems, weakness of RDBMS, CAP theorem, Types of NoSQL Databases, Key-value database-Key values database, More elements of key values database, Properties of Key-value store, Redis implementation (Basic CRUD operation)

UNIT-IV Columnar & Document Databases [09 Hours]

Columnar Databases with Apache Cassandra-Characteristics of a columnar database, Concepts of columnar databases, Cassandra Introduction and its use-cases, implement a columnar database using Apache Cassandra Introduction to Document databases, Document databases with MongoDB-Implement a document database with MongoDB.

UNIT-V Graph and Future databases [09 Hours]

Graph Databases-Graph databases, graph traversal and graph problems, graph data structures edge list, adjacency matrix, properties of graph model. Implementation and systems-Reliable, maintainable and scalable, Different information systems, NEO4J implementation (Basic CRUD operation), Introduction to Advance Databases-PostgreSQL.

Text Books:

1. Abraham Silberchatz, Henry K.Forth, Sudharshan, "Database system Concepts", 6th edition, McGraw Hill, 2010.
2. Guy Harrison, "Next Generation Databases", Apress, 2015.
3. Eric Redmond, Jim R Wilson, "Seven Databases in Seven Weeks", LLC. 2012

Reference Books:

1. K. Pakhira, "Database Management System", Phi Learning Pvt. Ltd., 2012
2. MongoDB: The Definitive Guide, 2nd Edition, Powerful and Scalable Data Storage, By Kristina Chodorow, Publisher: O'Reilly Media
3. MongoDB Basics-EelDavid Hows,Peter Membrey,coPlugge, Publisher Apress-Ebook(free) https://it-ebooks.info/book/4527/

BTEC25PC402 Principles of Communication System Credit 3

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
03	--	20	20	60

• Course Description:

The "Principles of Communication Systems" course provides a foundational understanding of how information is transmitted, covering analog modulation techniques, signal analysis, and noise performance. Key topics include Amplitude Modulation (AM), Frequency Modulation (FM).

• Course Objectives:

1	To introduce the concepts of analog communication systems.
2	To equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.
3	To understand the concepts of modulation and demodulation techniques of angle modulation. (frequency and phase)

• Course Outcomes:

CO1	Understand and identify the fundamental concepts and various components of analog communication systems.
CO2	Understand the concepts of modulation and demodulation techniques.
CO3	Design circuits to generate modulated and demodulated wave.
CO4	Equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.
CO5	Understand the concepts of modulation and demodulation techniques of angle modulation (frequency and phase).
CO6	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	--	1	--	--	3	--	--	1	3	--
CO2	3	2	1	1	--	1	--	--	3	--	--	1	3	--
CO3	3	1	3	--	--	--	--	--	3	--	--	1	3	--
CO4	3	2	1	1	--	1	--	--	3	--	--	1	3	--
CO5	3	2	1	1	--	1	--	--	3	--	--	1	3	--
CO6	3	2	1	1	--	1	--	--	3	--	--	1	3	--

UNIT-I Introduction to Communication System [09 Hours]

Block schematic of communication system, Simplex and duplex systems, Modes of communication: Broadcast and point to point communication, Necessity of modulation, Classification of modulation, sampling theorem and pulse analog modulation, multiplexing: TDM, FDM.

UNIT-II Amplitude Modulation [09 Hours]

Introduction, Mathematical analysis and expression for AM, Modulation index, Frequency spectrum and bandwidth of AM, Power calculations, Generation of AM using nonlinear property, Low and high level modulation, Balance Modulator. Types of AM: DSB-FC, DSB-SC, SSB-SC, ISB and VSB.

UNIT-III Angle Modulation [09 Hours]

Introduction, Mathematical analysis of FM and PM, Modulation index for FM and PM, Frequency spectrum and bandwidth of FM, Narrow band and wide band FM, Direct and indirect methods of FM generation, Pre emphasis and de-emphasis, Comparison of AM, FM and PM.

UNIT-IV Radio Receivers and Demodulators [09 Hours]

Introduction, Performances characteristic of receivers: Sensitivity, Selectivity, Fidelity, Image frequency and IFRR, Tracking and Double spotting, TRF, Super heterodyne receivers, RF amplifier, Local oscillator and mixer, IF amplifier, AGC.

UNIT-V AM and FM Detectors and noise [09 Hours]

AM Detectors: Envelop detector and practical diode detector.
FM Detectors: Slope detector, phase discriminator and ratio detector.
Noise: Introduction, Sources of noise, Classification of noise, Noise calculations (thermal noise), SNR, Noise figure, Noise Factor, Noise Temperature.

Text/Reference Books:

1. Kennedy, "Electronics Communications Systems", McGraw-Hill New Delhi-1997, 4th Edition.
2. Anokh Singh, "Principles of communication engineering" S. Chand
3. Roddy and Coolen, "Electronic communication" PHI
4. Taub and Schilling "Principles of communication systems" Tata McGraw Hill
5. Beasley and Miller, "Modern Electronic Communication", Prentice-Hall India-2006, 8th Edition.
6. Wayne Tomasi, "Electronic Communication Systems", Pearson Education-2005, 5th Edition.
7. R. G. Gupta, "Audio & Video Systems" Tata McGraw-Hill NewDelhi-2008.

BTEC25PC403	Microcontrollers	Credit 2

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
02	--	20	20	60

• Course Description:

This course provides comprehensive knowledge on designing, programming, and interfacing Microcontroller 8051 for embedded systems. It covers architecture, Assembly or Embedded C programming, I/O port interfacing, timers, interrupts, and serial communication (UART). Practical, hands-on projects involving sensors, motors, and displays are typical, aiming to develop real-world applications.

• Course Objectives:

1	Introduction to 8051 Microcontroller and Family
2	Study the architecture and addressing modes of 8051.
3	Impart knowledge about assembly language programs of 8051
4	Helps to understand the importance of different peripheral devices & their interfacing to 8051.
5	Helps to understand Applications of Microcontroller in different products

• Course Outcomes:

CO1	Understanding 8051 Microcontroller and Family
CO2	Selecting appropriate Microcontroller for product development
CO3	Experience with Assembly Language or Embedded C Programming
CO4	Understanding Interrupts of 8051
CO5	Project Implementation using 8051

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	--	--	--	--	--	--	--	--	--	--	2	1
CO2	2	2	3	2	3	1	--	--	--	--	--	--	2	1
CO3	2	2	3	1	3	--	--	--	--	--	--	--	2	1
CO4	2	2	2	2	2	--	--	--	--	--	--	--	2	1
CO5	1	2	3	3	3	2	--	--	--	--	--	--	2	1

UNIT-I **[06 Hours]**

Introduction to Microcontroller 8051 Brief History, Classification of MCS-51family based on their features (8051, 8052, 8031, 8751, AT89C51), Pin configuration, Processor Architecture and Instruction Set: Registers of 8051, Memory, Inbuilt RAM, Register banks, stack, on-chip and external program code memory ROM, power reset and clocking circuits, I/O port structure.

UNIT-II **[06 Hours]**

Instruction set and programming, Time Delay Generation, I/O Port Programming, Addressing modes, Arithmetic Instructions and Programs, Logic Instructions and Programs, Single Bit Instructions and Programming.

UNIT-III **[06 Hours]**

Counter/Timer Programming in the 8051, Programming the 8051 Timers, TMOD, MODE 1 and MODE 2 Programming, Counter Programming, 8051 Serial Communication, Basics of Serial Communication, Asynchronous Serial Communication and Programming Introduction to serial communication, Data Programming, RS232 standard, RS422 Standard, 1488 and 1489 standard, GPIB, Max 232/233 Driver, Serial communication programming to receive and Transfer data serially.

UNIT-IV **[06 Hours]**

Interrupt Programming, 8051 Interrupts, Interrupt Vs Polling, Interrupt Service Routine, Steps in executing Interrupt, Six Interrupts in the 8051, Programming the Timer Interrupts, Programming the Serial Communication Interrupt, Interrupt Priority in the 8051.

UNIT-V **[06 Hours]**

Real World Interfacing, Interfacing LED, Switch, 7 Segment LED, LCD, ADC, Sensors and Stepper Motor, Keypad Matrix with 8051.

Text Books:

1. Mazidi, M. A., Mazidi, J. G., and McKinlay, R. D. (2006). The 8051 microcontroller and embedded systems: using Assembly and C (Vol. 626). Pearson/Prentice Hall.
2. Predko, M. (1999). Programming and customizing the 8051 microcontroller. McGraw-Hill, Inc.
3. Vahid, F., and Givargis, T. D. (2001). Embedded system design: a unified hardware/software introduction. John Wiley & Sons. Optional Materials:

Reference Books

1. Ayala, K. J. (2010). The 8051 Microcontroller and Embedded Systems: Using Assembly and C. Cengage Learning.
2. Ayala, K. J. (1995). The 8051 microcontroller. Penram, India.

BTEC25OE405A	Numerical Methods and Computer Programming	Credit 2

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
02	--	20	20	60

• Course Description:

The Numerical Methods and Computer Programming course teaches computational techniques to approximate solutions for mathematical problems (roots, integration, differential equations) that lack analytical solutions.

• Course Objectives:

1	To understand different numerical techniques used for solving algebraic and transcendental equations.
2	To mold students professionally by course contents and sufficient problem solving and programming exercises and understand procedure-oriented, object-oriented programming concepts. Capable of writing C and C++ programs efficiently.

• Course Outcomes:

CO1	Able to solve algebraic and transcendental equations by using numerical techniques and will be able to compare different numerical techniques used for this purpose and also will be able to choose a proper one as per the requirement of the problem.
CO2	Able to solve a system of linear equations with any number of variables using different direct and iterative numerical techniques.
CO3	Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values.
CO4	Prepare them to write computer programs for the numerical computational techniques.
CO5	Understand application of the NMCP course in many engineering core subjects like signal processing, digital communication, numerical techniques in electromagnetics etc.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	--	2	--	--	--	--	--	--	--	--	--
CO2	3	3	2	2	3	--	--	--	--	--	--	--	--	--
CO3	2	2	3	2	3	--	--	--	--	--	--	--	--	--
CO4	3	3	2	1	2	--	--	--	--	--	--	--	--	--
CO5	3	3	3	2	3	--	--	--	--	--	--	--	--	--

UNIT-I Introduction to Computational Methods and Errors [06 Hours]

Computational Methods: General principles of computational techniques, Introduction, common ideas and concepts of computational methods, various computational techniques.

Errors: Types and sources of errors, Concept in error estimation, Error propagation, Error due to floating point, Representation of errors, Elementary uses of series in calculation of errors.

UNIT-II Solutions of Transcendental/Polynomial Equations & System of Linear Equation [06 Hours]

Solution of Transcendental / Polynomial Equations: Finding root of polynomial equations deploying computational methods such as Bisection, Regula-falsi, Newton-Raphson, Seccant, Successive approximation.

System of linear equation: Solving linear equations deploying computational methods such as Gauss elimination, Gauss Jordan, Partial pivoting, Matrix triangularisation (LU decomposition), Cholesky, Gauss Seidel and Jacobi methods.

UNIT-III Interpolations and Polynomial Approximation [06 Hours]

Least square approximation, Orthogonal polynomials Chebyshev polynomials, Finite difference operator and their relations, Forward, backward, central and divided difference, Newton's forward divided difference, Backward difference interpolation, Sterling interpolation, Lagrange sinterpolation polynomials, Spline interpolation, Least square approximation.

UNIT-IV [06 Hours]

Computer organization, Functional Units, basic I/O devices and storage media, computer software, computer languages, Problem Solving Approaches: Notion of an algorithm, stepwise methodology of developing algorithm, flowchart and computer program, introduction to computer operating systems: DOS, WINDOWS, UNIX/LINUX.

UNIT-V Object Oriented Programming [06 Hours]

Software Evaluation, Object oriented programming paradigm, Basic concepts of object oriented programming, Benefits of OOP, Object oriented languages.

Applications of OOP Beginning with C++: Structure of C++ program, Creating the source file, Compiling & linking, Basic data types, User defined data types, Symbolic constants, Declaration of variables, Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution operator, Type cast operator.

Functions in C++: Function prototyping, Inline functions, Function overloading, Friend and virtual functions. Classes and Objects: Specifying a class, Defining member functions, C++ program with class, Arrays within a class, Memory allocation for objects, Constructors, Multiple constructor in class, Dynamic initialization of objects, Dynamic constructor, Destructors.

Text Books:

1. S. S. Sastry, "Introductory Methods of Numerical Analysis", PHI, 1990, 3rdedition.

2. V. Rajaraman, "Computer Oriented Numerical Methods, PHI, New Delhi", 2000, 3rdEdition.

3. E. V. Krishnamurthy, and Sen S. K., "Numerical Algorithm: Computations in Science and Engineering", Affiliated East West, New Delhi, 1996.

4. Horton, "Beginning C++: The Complete Language", Shroff Pub., Navi Mumbai, 1998.

Reference Books:

1. D. Ravichandran, "Programming with C++", TMH

2. E. Balagurusamy, "Object-Oriented Programming with C++", TMH, New Delhi, 2001, 2nd Edition

3. YeshwantKanetkar, "Let us C++, BPB Pub.", Delhi, 2002, 4th Edition.

4. StroupstrupBjarne, "C++ Programming Language", Addison Wesley, 1997, 3rd Edition.

BTEC25OE405B Analysis and Design of Algorithm Credit 2

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
02	--	20	20	60

• Course Description:

This course covers fundamental techniques for creating efficient algorithms and analyzing their complexity (time and space). It focuses on algorithmic paradigms-such as divide-and-conquer, greedy methods, dynamic programming, and backtracking-to solve complex problems, while teaching methods to prove correctness and evaluate performance using asymptotic notations.

• Course Objectives:

1	Explain fundamental algorithm design, analysis, and performance evaluation concepts using asymptotic notations and recurrence solving techniques.
2	Solve computational problems by applying algorithmic paradigms such as divide-and-conquer, greedy, dynamic programming, backtracking, and branch-and-bound.
3	Implement algorithms for searching, sorting, shortest path, matrix operations, and combinatorial optimization, and evaluate their time and space complexity.
4	Compare algorithmic strategies for problem-solving and justify the choice of technique based on efficiency and problem constraints.
5	Classify problems into complexity classes P, NP, and NP-complete, and apply polynomial-time reductions to analyses computational hardness.

• Course Outcomes:

CO1	Evaluate the correctness and analyze complexity of algorithms.
CO2	Implement various algorithmic design techniques and solve classical problems.
CO3	Design solutions for real world problems by identifying, applying and implementing appropriate design techniques.
CO4	Design solutions for real world problems by reducing to classical problems.
CO5	Analyze the impact of various implementation choices on the algorithm complexity.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	1	--	--	1	--	1	--	--	3	2
CO2	3	2	2	--	--	--	--	1	--	1	--	--	3	2
CO3	3	2	3	2	--	--	--	1	--	1	--	--	3	2
CO4	2	2	3	2	1	--	--	1	--	1	--	--	3	2
CO5	2	2	3	1	1	--	--	1	--	1	--	--	3	2

UNIT-I Introduction to Algorithms [06 Hours]

Introduction: Definition, Properties of Algorithms, Expressing Algorithm, Flowchart.

Algorithm Design Techniques: Performance Analysis of Algorithms, Types of Algorithm's Analysis, Order of Growth, Asymptotic Notations.

Recursion: Recurrences Relation, Substitution Method, Iterative Method, Recursion Tree, Master Theorem.

UNIT-II Divide and Conquer [06 Hours]

Introduction, Binary Search, Merge Sort, Quick Sort, Strassen's Matrix Multiplication.

UNIT-III Backtracking [06 Hours]

Backtracking: Concept, N–Queens Problem, Four–Queens Problem, Eight–Queen Problem, Hamiltonian Cycle, Sum of Subsets Problem, Graph Coloring Problem.

Branch and Bound: Introduction, Travelling Salesperson Problem, 15-Puzzle Problem, Comparisons between Backtracking and Branch and Bound.

UNIT-IV Greedy Algorithms [06 Hours]

Introduction to Greedy Technique, Greedy Method, Optimal Merge Patterns, Huffman Coding, Knapsack Problem, Activity Selection Problem, Job Sequencing with Deadline, Minimum Spanning Tree, Single-Source Shortest Path Algorithms.

UNIT-V Dynamic Programming [06 Hours]

Introduction, Characteristics of Dynamic Programming, Component of Dynamic Programming, Comparison of Divide-and-Conquer and Dynamic Programming Techniques, Longest Common Sub-sequence.

Shortest Path: Bellman Ford, Floyd Warshall, Application of Dynamic Programming.

NP Completeness: Introduction, the Complexity Class P, the Complexity Class NP, Polynomial-Time Reduction, the Complexity Class NP-Complete.

Text Books:

1. T. Cormen, Introduction to Algorithms, PHI Publication, 2nd Edition, 2002.

Reference Books:

1. Aho, Ullman, Data Structure and Algorithms, Addison-Wesley Publication, 1st Edition, 1983.

2. Michel Goodrich, Roberto Tamassia, Algorithm Design – Foundation, Analysis and Internet Examples, Wiley Publication, 2nd Edition, 2006.

3. George T. Heineman, Gary Pollice, Stanley Selkow, Algorithms in a Nutshell, A Practical Guide, O'Reilly Media, 2nd Edition, 2016.

4. Ellise Horowitz, Sartaj Sahni, S. Rajasekaran, Fundamentals of Computer Algorithms, University Press (India) Private Ltd, 2nd Edition, 2008.

5. Sara Base, Computer algorithms: Introduction to Design and Analysis, Addison-Wesley Publication, 2nd Edition, 1988.

BTEC25OE405C Probability Theory and Random Processes Credit 2

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
02	--	20	20	60

• Course Description:

The "Probability Theory and Random Processes" course provides a foundational understanding of modeling uncertainty and analyzing time-dependent random phenomena. It covers probability axioms, random variables (discrete/continuous), distributions, moments, and random processes, including Markov chains, stationary, and spectral analysis.

• Course Objectives:

1	To develop basic of probability and random variables.
2	To provide mathematical background and sufficient experience so that the student can read, write, and understand sentences in the language of probability theory.

• Course Outcomes:

CO1	Understand representation of random signals.
CO2	Investigate characteristics of random processes.
CO3	Make use of theorems related to random signals.
CO4	To understand propagation of random signals in LTI systems.
CO5	Able to solve probabilistic problems in engineering.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	--	1	1	--	--	--	--	--	--	--	--	--
CO2	3	3	2	2	1	--	--	--	--	--	--	--	--	--
CO3	3	3	2	2	2	--	--	--	--	--	--	--	--	--
CO4	2	3	2	2	1	--	--	--	--	--	--	--	--	--
CO5	2	3	3	2	1	--	--	--	--	--	--	--	--	--

UNIT-I **[06 Hours]**

Introduction to Probability: Definitions, Sets, fields, sample space and events; axiomatic definition of probability.

Combinatorics: Probability on finite sample spaces, Joint and conditional probabilities, independence, total probability; Bayes‟ rule and applications. Random variable definition, Conditions for a Function to be a Random Variable, Discrete and Continuous.

UNIT-II **[06 Hours]**

Distribution and density functions: Distribution and Density functions, Properties, Binomial, Uniform, Exponential, Gaussian, and Conditional Distribution and Conditional Density function and its properties, problems.

Operation on One Random Variable: Expected value of a random variable, function of a random variable, moments about the origin, central moments, variance and skew, characteristic function, moment generating function.

UNIT-III **[06 Hours]**

Multiple Random Variables and Operations on Multiple Random Variables Multiple Random Variables: Joint Distribution Function and Properties, Joint density Function and Properties, Marginal Distribution and density Functions, conditional Distribution and density Functions, Statistical Independence, Distribution and density functions of Sum of Two Random Variables.

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, and Jointly Gaussian Random Variables: Two Random Variables case Properties.

UNIT-IV **[06 Hours]**

Stochastic Processes-Temporal Characteristics: The Stochastic process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Statistical Independence

Concept of Stationarity: First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, Nth-Order and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions and its properties. Linear system Response: Mean and Mean-squared value, Autocorrelation, Cross-Correlation Functions.

UNIT-V **[06 Hours]**

Stochastic Processes-Spectral Characteristics: The Power Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum and Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Spectral characteristics of system response: power density spectrum of response, cross power spectral density of input and output of a linear system.

Text Books:

1. T. Veerrajan, “Probability, Statistics and Random Processes”, Third Edition, McGraw Hill.
2. Probability and Random Processes by Geoffrey Grimmett, David Stirzaker
3. Probability, random processes, and estimation theory for engineers by Henry Stark, John
4. William Woods. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
5. Papoulis A. and S. Unnikrishnan Pillai, “Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.

Reference Books:

1. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, UBS Publishers
3. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

BTEC25OE405D Introduction to Java Credit 2

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
02	--	20	20	60

• Course Description:

An Introduction to Java course provides foundational knowledge of the Java language, covering syntax, object-oriented programming (OOP) principles, data structures, and basic algorithms.

• Course Objectives:

1	To introduce the object oriented programming concepts.
2	To understand object oriented programming concepts, and apply them in solving problems.
3	To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.
4	To introduce the implementation of packages and interfaces.
5	To introduce the concepts of exception handling and multithreading.
6	To introduce the design of Graphical User Interface using applets and swing controls.

• Course Outcomes:

CO1	Able to solve real world problems using OOP techniques.
CO2	Able to understand the use of abstract classes.
CO3	Able to solve problems using java collection framework and I/o classes.
CO4	Able to develop multithreaded applications with synchronization.
CO5	Able to develop applets for web applications and Able to design GUI based applications.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	2	1	1	3	1	1	2	3	3
CO2	3	3	3	3	3	2	1	1	3	1	1	2	3	3
CO3	3	3	3	3	3	2	1	1	3	2	1	2	3	3
CO4	3	3	3	3	3	2	1	1	3	2	1	2	3	3
CO5	3	3	3	3	3	2	1	1	3	2	1	2	3	3

UNIT-I Object-Oriented Programming Concepts [06 Hours]

Features of OOPS, Objects, Classes, Data abstraction, Data encapsulation, Inheritance Polymorphism Package Introduction to Java, Features of Java, Basics of Java, Data types, variable, expression, operators, constant, Structure of Java Program.

UNIT-II JAVA Fundamentals [06 Hours]

Execution Process of java Program, JDK Tools, Command Line Arguments, Array and String, Single Array & Multidimensional Array, String, String Buffer, Built In Packages and Classes, java.util: Scanner, Date, Math etc, java.lang.

UNIT-III Classes, Objects and Methods [06 Hours]

Class and Object, Object reference, Constructor: Constructor Overloading, Method: Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Nested class, Inner class, and Anonymous inner class.

UNIT-IV Inheritance, Package and Collection [06 Hours]

Overview of Inheritance, inheritance in constructor, Inheriting Data members and Methods, Multilevel Inheritance-method overriding Handle multilevel constructors, Use of super and final keyword Interface: Creation and Implementation of an interface, Interface reference Interface inheritance, Dynamic method dispatch Abstract class, Comparison between Abstract Class and interface, Access control Packages Concept Creating user defined packages Java Built in packages, Import statement, Static import Collection, Collection Framework, Interfaces: Collection, List, Set Navigation: Enumeration, Iterator, List Iterator, Classes: Linked List, Array List, Vector, Hash Set.

UNIT-V File and Exception Handling [06 Hours]

Exception: Exception and Error, Use of try, catch, throw, throws and finally, built in Exception, Custom exception, Throwable Class. File Handling, Overview of Different Stream (Byte Stream, Character stream), Readers and Writers class, File Class, File Input Stream, File Output Stream, Input Stream Reader and Output Stream Writer class, File Reader and File Writer class, Buffered Reader class.

Text/Reference Books:

1. Programming with JAVA-E Balguru samy
2. The Complete Reference-JAVA Herbert Schildt
3. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
4. Java Programming and Object-oriented Application Development, R. A. Johnson, Ceng
5. https://docs.oracle.com/javase/tutorial/java/concepts/index.html

BTEC25AE406L Database Management System Lab Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

The Database Management System (DBMS) Lab course provides practical, hands-on experience in designing, querying, and managing relational databases, typically using SQL, MySQL, or Oracle. It covers Entity-Relationship (ER) modeling, normalization, DDL/DML/DCL commands, and PL/SQL programming to implement robust, secure database applications, transaction management, and concurrency control.

• Course Objectives:

1	To explain basic database concepts, applications, data models, schemas and instances.
2	To demonstrate the use of constraints and relational algebra operations. IV. Describe the basics of SQL and construct queries using SQL.
3	To emphasize the importance of normalization in databases.
4	To facilitate students in Database design
5	To familiarize issues of concurrency control and transaction management.

• Course Outcomes:

CO1	Apply the basic concepts of Database Systems and Applications.
CO2	Use the basics of SQL and construct queries using SQL in database creation and interaction.
CO3	Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
CO4	Analyze and Select storage and recovery techniques of database system.
CO5	Enforce entity integrity, referential integrity, key constraints, domain constraints on database.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3	--	--	--	--	--	--	2	--	--
CO2	3	3	3	2	2	--	--	--	--	--	--	3	--	--
CO3	2	3	3	3	3	--	--	--	--	--	--	2	--	--
CO4	2	3	2	2	2	--	--	--	--	--	--	2	--	--
CO5	2	3	2	2	2	--	--					3	--	

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Draw E-R diagram and convert entities and relationships to relation table for a college database.
2. Perform the following:
a. Viewing all databases,
b. Creating a Database,
c. Viewing all Tables in a Database,
d. Creating Tables (With and Without Constraints),
e. Inserting/Updating/Deleting Records in a Table,
3. Perform the following:
a. Altering a Table,
b. Dropping/Truncating/Renaming Tables,
c. Backing up / restoring a Database.
4. For a given set of relation schemes, create tables and perform the following-
a. Simple Queries,
b. Simple Queries with Aggregate functions,
c. Queries with Aggregate functions (group by and having clause),
5. Perform queries with Date functions and String Functions
6. Perform queries with Math Functions, Join Queries- Inner Join, Outer Join and Subqueries-With IN clause, With EXISTS clause
7. Implement a columnar database using Apache Cassandra
8. Implement a document database with MongoDB
9. Design and Implement any 5 query using MongoDB
10. Write a case study for various types of NoSQL databases.

BTEC25AE407L	Microcontrollers Lab	Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

This course provides comprehensive knowledge about Assembly or Embedded C programming, I/O port interfacing, timers, interrupts, and serial communication (UART). Practical, hands-on projects involving sensors, motors, and displays are typical, aiming to develop real-world applications.

• Course Objectives:

1	Understanding Keil (IDE) and Flash Magic
2	Introduction to 8051 Applications and Selection Criterion
3	Understanding Delays and Understanding Ports Programming
4	Helps to understand the importance of different peripheral devices & their interfacing to 8051.
5	Helps to understand Applications of Microcontroller in different products

• Course Outcomes:

CO1	Understanding IDE for 8051 Microcontroller
CO2	Selecting appropriate Microcontroller for product development
CO3	Experience with Assembly Language or Embedded C Programming
CO4	Understanding Interfacing of Different Devices/ Peripherals with 8051
CO5	Project Implementation using 8051

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	--	--	2	--	--	--	2	2	--	3	3
CO2	--	2	2	2	2	2	--	--	--	2	--	2	2	2
CO3	2	2	2	2	--	2	--	--	--	2	2	--	3	3
CO4	2	2	--	--	--	--	--	--	--	2	2	--	3	3
CO5	--	--	2	2	2	2	--	--	--	2	--	2	2	2

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Understanding Keil Compiler and Flash Magic
2. Data Transfer Programming
3. Data Transfer Programming
4. Arithmetic and Logic Operations Programming
5. Port Programming
6. Port Programming
7. Program to Interface LED
8. Program to Interface Switch
9. Program to Interface 7 Segment LED
10. Program to Interface LCD
11. Program to Interface ADC and Sensor
12. Program to Interface Stepper Motor

BTEC25VSE408L Numerical Methods and Computer Programming Lab Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

This laboratory course provides hands-on experience in translating mathematical formulas and numerical algorithms into working computer programs. Students learn to handle approximation errors, implement iterative techniques, perform interpolation, and solve linear/nonlinear systems of equations, numerical integration, and ordinary differential equations (ODEs). The lab emphasizes practical aspects of programming to analyse data and simulate physical systems.

• Course Objectives:

1	To enable students to design flowcharts and write algorithms for numerical methods.
2	To teach a programming language (like C or MATLAB) to perform scientific calculations.

• Course Outcomes:

CO1	Solve algebraic and transcendental equations using numerical methods like Bisection, Regula-Falsi, and Newton-Raphson.
CO2	Solve linear systems of equations using direct and iterative methods.
CO3	Numerically solve ordinary differential equations (ODEs) using methods such as Euler and Runge-Kutta.
CO4	Prepare them to write computer programs for the numerical computational techniques.
CO5	Evaluate numerical integration and differentiate functions numerically.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	--	3	--	--	--	--	--	--	--	--	--
CO2	3	3	2	1	3	--	--	--	--	--	--	--	--	--
CO3	3	3	3	2	3	--	--	--	--	--	--	--	--	--
CO4	3	3	3	2	3	--	--	--	--	--	--	--	--	--
CO5	2	3	3	3	3	1	1	--	--	--	--	--	--	--

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Solution of simultaneous non-linear equations using Newton Raphson method.
2. Numerical solution of characteristic value problem by Power method.
3. Numerical Solution of initial value problem using RungaKutta method
4. Numerical Solution of wave equation by suitable method
5. Numerical Solution of Laplace equation in two variables by suitable method
6. To find the average of two numbers and print them out together with their average.
7. Program to check whether the entered number is less than 25.
8. Program to calculate the sum and multiplication using if Statement.
9. Program to find the greater of two number.
10. Program to print the give number is odd / even using switch case statement.

BTEC25VSE408L Analysis and Design of Algorithm Lab Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

This Lab focuses on practical implementation of algorithm design techniques, including Divide and Conquer, Greedy Methods, Dynamic Programming, and Backtracking.

• Course Objectives:

1	To provide practical exposure to designing, implementing, and analyzing efficient algorithms.
2	Students learn to apply techniques like Divide and Conquer, Greedy Methods, and Dynamic Programming to solve complex problems while measuring time/space complexity.

• Course Outcomes:

CO1	Calculate time and space complexity of algorithms.
CO2	Implement sorting/searching techniques (Divide & Conquer).
CO3	Apply Greedy Method to solve problems.
CO4	Implement Dynamic Programming solutions.
CO5	Apply Backtracking and Branch & Bound

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	--	--	3	--	--	--	--	--	--	--	--	--
CO2	2	2	3	3	3	--	--	--	--	--	--	--	--	--
CO3	2	2	3	3	3	--	--	--	--	--	--	--	--	--
CO4	3	3	3	3	3	--	--	--	--	--	--	--	--	--
CO5	2	2	3	3	3	--	--	--	--	--	--	--	--	--

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Implementation of Divide and Conquer Technique implementation
2. Implementation of Greedy Technique
3. Implementation of Dynamic Programming
4. Implementation of Back-Tracking Technique
5. Implementation of Selecting Min. / Max. K^{th} smallest element
6. Implementation of Warshall's Algorithm
7. Implementation of Prim's Algorithm
8. Implementation of Kruskal's Algorithm
9. Implementation of Dijkstra's Algorithm
10. Implementation of Floyd-Warshall's Algorithm

BTEC25VSE408L	Probability Theory and Random Processes Lab	Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

This laboratory course provides hands-on experience in simulating random experiments, generating random numbers, and computing probability distributions. It bridges theoretical probability concepts with real-world applications in engineering.

• Course Objectives:

1	To provide practical training in creating models for random experiments, random variables, and stochastic processes.
2	To apply probabilistic techniques to engineering scenarios, such as noise modeling, reliability analysis, and signal analysis.

• Course Outcomes:

CO1	To generate, plot, and analyze probability density functions and cumulative distribution functions for various discrete and continuous random variables.
CO2	To determine the statistical properties of random processes, such as the autocorrelation function and spectral density, to check for wide-sense stationarity and ergodicity.
CO3	To apply random signal modeling techniques to simulate and analyze Gaussian noise and Poisson processes in communication systems.
CO4	To evaluate the effect of filtering on random signals and calculate the output power spectral density of an LTI system.
CO5	Able to solve probabilistic problems in engineering.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	--	--	2	1	--	--	--	--	2	--	--	--	--
CO2	--	2	3	--	--	--	--	--	--	3	--	3	--	--
CO3	3	--	--	2	1	--	--	--	--	--	2	--	--	3
CO4	2	3	--	1	--	--	--	--	--	--	--	--	--	2
CO5	3	--	--	2	1	--	--	--	--	--	--	2	--	3

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. Write a program to find probability of tossing a coin and rolling a die through large no. of experimentation.
2. To generate Uniform, Gaussian and Exponential distributed data for given mean and variance.
3. Write a program to generate M trials of a random experiment having specific number of outcomes with specified probabilities.
4. To find estimated and true mean of Uniform, Gaussian and Exponential distributed data.
5. To find density and distribution function of a function of random variable Y = 2X + 1, where X is gaussian random variable.
6. Estimate the mean and variance of Y = 2X + 1, where X is a gaussian random variable.
7. Plot Joint density and distribution function of sum of two Gaussian random variable (Z = X + Y).
8. Estimate the mean and variance of a R.V. Z = X + Y, Where X and Y are also random variables.
9. Simulation of Central Limit Theorem.
10. Tossing dice and calculating probabilities with specific code examples using Scilab.

BTEC25VSE408L	Introduction to Java Lab	Credit 1

TEACHING SCHEME	EXAMINATION SCHEME	
PR (Hrs./Week)	CA (PR)	ESE (PR)
02	50	50

• Course Description:

The Introduction to Java Lab provides hands-on experience in developing Java applications, covering foundational concepts like syntax, object-oriented programming (OOP), data structures, exception handling, and GUI development using IDEs like Eclipse or IntelliJ. Students learn to write, debug, and run programs focusing on practical applications and software development skills.

• Course Objectives:

1	Teach fundamental Object-Oriented Programming (OOP) concepts, syntax, and principles.
2	Enabling students to create, debug, and run Java applications.

• Course Outcomes:

CO1	Ability to understand the compilation process of Java, role of JVM as an emulator and various types of instructions.
CO2	Ability to learn and apply concepts of Java programming, exceptional handling and inheritance.
CO3	Ability to understand the use of multi-threading, AWT components and event handling mechanism in Java.
CO4	Ability to understand the concepts of I/O streams, IDBC, object serialization, sockets, RMI, JNI, Collection API interfaces, Vector, Stack, Hash table classes, list etc.

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	3	--	--	--	3	2	2	3	--	--
CO2	3	2	2	2	3	--	--	--	3	2	2	3	--	--
CO3	3	2	2	2	3	--	--	--	3	2	2	3	--	--
CO4	3	2	2	2	3	--	--	--	3	2	2	3	--	--

• List of Practicals: (At least 08 experiments should be performed from the following list)

1. WAP to find the average and sum of the N numbers Using Command line argument.
2. WAP to Demonstrate Type Casting.
3. WAP to find the number of arguments provide at runtime.
4. WAP to Test the Prime number.
5. WAP to calculate the Simple Interest and Input by the user.
6. WAP to create a Simple class to find out the area and perimeter of rectangle and box using super and this keyword.
7. WAP to find G. C. D of the number.
8. WAP to design a class account using the inheritance and static that show all function of bank (withrowal, deposite).
9. WAP to find the factorial of a given number using Recursion.
10. WAP to design a class using abstract Methods and Classes.
11. WAP to design a String class that perform String Method (Equal, Reverse the string, change case).
12. WAP to handle the Exception using try and multiple catch block.
13. WAP that Implement the Nested try Statements.
14. WAP to create a package that access the member of external class as well as same package.
15. WAP that import the user define package and access the Member variable of classes that Contained by Package.
16. WAP that show the partial implementation of Interface.
17. WAP to handle the user defined Exception using throw keyword.
18. WAP to create a thread that Implement the Runable interface.
19. WAP to Implement Interthread communication.
20. WAP to create a class component that show controls and event handling on that controls.(math calc).
21. WAP to Draw the line, Rectangle, oval,text using the graphics method.
22. WAP to create a Menu using the frame.
23. WAP to create a Dialogbox.
24. WAP to implement the flow layout And Border Layout.
25. WAP to Implement the GridLayout, CardLayout.
26. Wap of Awtdemo2 given by me.
27. WAP to demonstrate System clock.
28. WAP to create Frame that display the student information.

BTEC25VSE409 Workshop/Skill Activity/Course/Seminar Credit 1

TEACHING SCHEME		EXAMINATION SCHEME		
PR (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
02	--	--	50	--

• Course Description:

The course 'Seminar' is intended to enable students to read, understand, present and prepare report about an academic document. The learner shall search in the literature including peer reviewed journals, conference, books, project reports etc., and identify an appropriate paper/thesis/report in her/his area of interest, in consultation with her/his seminar guide. This course can help the learner to experience how a presentation can be made about a selected academic document and also empower her/him to prepare a technical report.

• Course Objectives:

1	To do literature survey in a selected area of study.
2	To understand an academic document from the literate and to give a presentation about it.
3	To prepare a technical report.

• Course Outcomes:

CO1	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply).
CO2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
CO3	Prepare a presentation about an academic document (Cognitive knowledge level: Create).
CO4	Give a presentation about an academic document (Cognitive knowledge level: Apply).
CO5	Prepare a technical report (Cognitive knowledge level: Create).

• Mapping of Course Outcome with Program Outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	--	2	1	--	--	--	--	3	--	--
CO2	3	3	2	3	--	2	1	--	--	--	--	3	--	--
CO3	3	2	--	--	3	--	--	1	--	2	--	3	--	--
CO4	2	--	--	--	2	--	--	1	--	3	--	3	--	--
CO5	3	3	3	3	2	2	--	2	--	3	--	3	--	--

• Syllabus and Guidelines:

The topic for a UG seminar should be current and broad based rather than a very specific research work. It's advisable to choose a topic for the Seminar to be closely linked to the final year project area. A topic/paper relevant to the discipline shall be selected by the student during the semester break. Topic/Paper shall be finalized in the first week of the semester and shall be submitted to the department.

BTEC25VEC410 Universal Human Values-II Credit 3

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
03	--	20	20	60

• Course Description:

The Universal Human Values (UHV) course is a foundational, dialogue-based program focused on self-exploration to understand harmony within oneself, family, society, and nature. It promotes a holistic worldview, ethical living, and sustainable happiness by distinguishing between physical needs and right understanding, aiming to transform students into responsible, ethical individuals.

• Course objective:

1	Introduce the foundational principles of value education, emphasizing self-exploration and the pursuit of happiness and prosperity.
2	Develop an understanding of the human being as a co-existence of self and body, and explore the harmony within.
3	Foster awareness of harmonious relationships in the family and society, grounded in trust, respect, and mutual understanding.
4	Promote ecological awareness by understanding harmony in nature and the interconnectedness of all living and non-living systems.
5	Encourage ethical and professional responsibility through holistic understanding and application of human values in personal and professional life.

• Course Outcomes:

CO1	Explain the concept of value education and apply self-exploration as a method for personal growth and well-being.
CO2	Differentiate between the needs of the self and the body, and demonstrate practices that promote self-regulation and health.
CO3	Demonstrate understanding of harmonious relationships in family and society based on trust, respect, and mutual fulfilment.
CO4	Analyse the principles of harmony in nature, recognizing the co-existence and self-regulation among the four orders of nature.
CO5	Apply ethical principles in professional contexts, showing competence in humanistic values and sustainable practice.

• Mapping of course outcomes with program outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO2	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO3	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO4	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO5	1	1	1	1	1	3	3	2	2	1	2	--	--	--

UNIT-I Introduction to Value Education [09 Hours]

Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity-the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Happiness and Prosperity-Current Scenario, Method to Fulfill the Basic Human Aspirations.

UNIT-II Harmony in the Human Being [09 Hours]

Understanding the Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self Harmony of the Self with the Body, Programme to Ensure Self-regulation and Health.

UNIT-III Harmony in the Family and Society [09 Hours]

Harmony in the Family–the Basic Unit of Human Interaction, Values in Human-to-Human Relationship 'Trust'-the Foundational Value in Relationship, 'Respect'-as the Right Evaluation, Understanding Harmony in the Society, Vision for the Universal Human Order.

UNIT-IV Harmony in the Nature (Existence) [09 Hours]

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.

UNIT-V Implications of the Holistic Understanding–a Look at Professional Ethics [09 Hours]

Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education ,Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

Text/Reference Books:

1. A Foundation Course in Human Values and Professional Ethics, R. R Gaur, R Asthana, G. P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. Teachers Manual for A Foundation Course in Human Values and Professional Ethics, R. R Gaur, R Asthana, G. P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN978-93-87034-53-2
3. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan VidyaPrakashan, Amarkantak, 1999.
4. Human Values, A. N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
5. The Story of Stuff (Book).
6. The Story of My Experiments with Truth- by Mohandas Karamchand Gandhi
7. Small is Beautiful-E. F Schumacher.
8. Slow is Beautiful-Cecile Andrews
9. Economy of Permanence-J. C Kumarappa
10. Bharat Mein Angreji Raj-Pandit Sunderlal
11. Rediscovering India- by Dharampal
12. Hind Swaraj or Indian Home Rule-by Mohandas K. Gandhi
13. India Wins Freedom-Maulana Abdul Kalam Azad
14. Vivekananda-Romain Rolland (English)
15. Gandhi-Romain Rolland (English)

BTEC25HM411	Mini Project/ Case Study/EDP Programme/ Start Up Activity	Credit 2

TEACHING SCHEME		EXAMINATION SCHEME		
PR (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
04	--	--	50	--

• Course Description:

Students are expected to learn novel skills and develop some hardware or software application. This course will create student's inclination towards entrepreneurship and start up by understanding the industrial applications of electronics components. This course will also help students to aware about how to convert ideas into product, how to setup startup and how industry functions.

• Course Objectives:

1	To Understand about literature collection Process.
2	To Understand about problem formulation.
3	To Understand Industrial Applications of Electronics Components.
4	To Implement and Test ideas with electronics components.
5	To Understand presentation skills.

• Course Outcomes:

CO1	Understanding phases in project/product implementation.
CO2	Understand Industrial Applications of study.
CO3	Gaining confidence about converting ideas into product.
CO4	Understanding electronics components.
CO5	Enhanced awareness about various products/ startups/Small Scale industries.

• Syllabus and Guidelines:

Students will undertake mini project which is spread over a period of one semester. The student selects a topic of his/her interest and then performs literature survey, formulates the problem formally and then implements it.

BTEC25VEC412	Life of Shri Sant Gadge Baba	Audit

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
01	--	--	--	--

• Course Description:

A course on the Life of Shri Sant Gadge Baba focuses on the 20th-century saint and social reformer's philosophy of selfless service (Karmayoga), cleanliness campaigns, and advocacy against social evils. It covers his journey as a mendicant, educational initiatives, and the impact of his "Ten Commandments" on rural India.

• Course Objectives:

1	Understand the early life, background, and spiritual journey of Sant Gadge Baba.
2	Explore his contributions to social reform, sanitation, and upliftment of marginalized communities.
3	Analyze the philosophical and ethical principles guiding his actions and teachings.
4	Appreciate his role in promoting cleanliness, education, and humanitarian values.
5	Reflect on the relevance of his legacy in contemporary social and civic contexts.

• Course Outcomes:

CO1	Describe the life events and spiritual evolution of Sant Gadge Baba.
CO2	Identify his key contributions to social reform and public welfare.
CO3	Interpret the ethical and philosophical foundations of his teachings.
CO4	Evaluate the societal impact of his work and its historical significance.
CO5	Apply his values to current civic and educational initiatives.

• Mapping of course outcomes with program outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO2	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO3	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO4	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO5	1	1	1	1	1	3	3	2	2	1	2	--	--	--

UNIT-I Early Life and Background [02 Hours]

Birth and childhood in Shendgaon, Maharashtra, Personal hardships and spiritual awakening, Influence of Bhakti movement and saint traditions.

UNIT-II Social Reform and Public Service [02 Hours]

Village sanitation campaigns and shramdaan (voluntary labor), Promotion of education, dharmashalas, and public welfare institutions, Advocacy for equality and justice.

UNIT-III Philosophical and Ethical Teachings [02 Hours]

Emphasis on service over rituals, Ethical values: humility, compassion, and selflessness, Kirtans and public discourses as tools for reform.

UNIT-IV Legacy and Impact [02 Hours]

Influence on leaders like Dr. B.R. Ambedkar, Enduring inspiration for NGOs and civic movements, Recognition by government and society.

UNIT-V Contemporary Relevance [02 Hours]

Cleanliness drives and Swachh Bharat parallels, Moral education and civic responsibility, Integration of Gadge Baba's values in modern curricula.

Textbooks/Reference Books:

1. Sant Gadge Baba. (2015). Pune: Government of Maharashtra, Directorate of Cultural Affairs.
2. Sant Gadge Baba: Vyakti ani Karya. (2012). Nagpur: Maharashtra Rajya Sahitya ani Sanskruti Mandal.
3. Gadge Baba: Samajik Krantiche Praneta. (2016). Amravati: Sant Gadge Baba Amravati University Press.
4. Samaj Sudharak Sant Gadge Baba. (2014). Mumbai: Popular Prakashan.
5. Saints of Maharashtra. (2010). New Delhi: National Book Trust, India.
6. Bhakti Movement in India. (2009). New Delhi: Oxford University Press.

BTEC25VEC413 Moral and Ethical Development Credit 1

TEACHING SCHEME		EXAMINATION SCHEME		
TH (Hrs./Week)	TU (Hrs./Week)	MSE	CA	ESE
01	--	--	50	--

• Course Description:

A course on Moral and Ethical Development explores how individuals differentiate right from wrong, analyzing the cognitive, social, and emotional processes behind ethical reasoning.

• Course Objectives:

1	Understand the basic concepts and significance of morality and ethics.
2	Explore major theories of moral and ethical development.
3	Examine the role of social, emotional, and cultural influences on moral behaviour.
4	Apply ethical frameworks to analyze real-life dilemmas.
5	Promote moral reasoning and ethical awareness in personal and professional contexts.

• Course Outcomes:

CO1	Define key concepts in morality and ethics.
CO2	Describe and compare major theories of moral development.
CO3	Analyze factors influencing ethical behaviour.
CO4	Evaluate ethical dilemmas using appropriate frameworks.
CO5	Demonstrate strategies to foster moral and ethical growth.

• Mapping of course outcomes with program outcomes:

CO-PO/PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO2	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO3	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO4	1	1	1	1	1	3	3	2	2	1	2	--	--	--
CO5	1	1	1	1	1	3	3	2	2	1	2	--	--	--

UNIT-I Introduction to Morality and Ethics [03 Hours]

Definitions and distinctions, Importance in society and education, Sources of moral values.

UNIT-II Theories of Moral Development [03 Hours]

Piaget, Kohlberg, Gilligan, Social learning and moral reasoning.

UNIT-III Influences on Moral Development [03 Hours]

Role of family, peers, culture, Emotional and cognitive factors.

UNIT-IV Ethical Frameworks and Application [03 Hours]

Utilitarianism, Deontology, Virtue Ethics, Case studies and ethical decision-making.

UNIT-V Contemporary Ethical Issues and Moral Education [03 Hours]

Ethics in technology, environment, and society, Strategies for moral education.

MULTIDISCIPLINARY COURSES OF ELECTRONICS AND COMPUTER ENGINEERING OFFERED TO THE OTHER DEPARTMENTS									
Course Category	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**			**No. of Credits**
			L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**
MDM	BTEC25MD304	Digital Electronics and Logic Design	03	--	--	20	20	60	100	3
MDM	BTEC25MD404	Microcontrollers	03	--	--	20	20	60	100	3
MDM	BTEC25MD505	Advanced Microcontrollers	03	--	--	20	20	60	100	3
MDM	BTEC25MD509L	Advanced Microcontrollers Lab	--	--	02	50	--	50	100	1
MDM	BTEC25MD604	Internet of Things	02	--	--	20	20	60	100	2
MDM	BTEC25MD705	Real Time Operating System	02	--	--	20	20	60	100	2

LIST OF COURSES FOR B.TECH HONORS ELECTRONICS AND COMPUTER ENGINEERING (Swayam/NPTEL)									
Course Category	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**			**No. of Credits**
			L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**
HO	BTEC25HO33	Artificial Intelligence: Search Methods for Problem Solving https://nptel.ac.in/courses/106106226	03	--	--	20	20	60	100	3
HO	BTEC25HO44	Analog IC Design https://nptel.ac.in/courses/117106030	03	--	--	20	20	60	100	3
HO	BTEC25HO55	Mathematical Foundations for Machine Learning https://nptel.ac.in/courses/106108702	03	--	--	20	20	60	100	3
HO	BTEC25HO66	Digital IC Design https://nptel.ac.in/courses/108106158	03	--	--	20	20	60	100	3
HO	BTEC25HO77	Programming with Generative AI https://nptel.ac.in/courses/106108703	03	--	--	20	20	60	100	3
HO	BTEC25HO88	Electronics equipment integration and Prototype building https://nptel.ac.in/courses/108108157	03	--	--	20	20	60	100	3

ADDITIONAL CRITERIA FOR DOUBLE MINOR (SPECIALIZATION)										
Category under NEP	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				**No. of Credits**
			L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	
DMS	BTEC25DM333	Analog Circuit Design	03	--	--	20	20	60	100	3
DMS	BTEC25DM444	Principles of Communication System	03	--	--	20	20	60	100	3
DMS	BTEC25DM555	Network Analysis and Synthesis	03	--	--	20	20	60	100	3
DMS	BTEC25DM666	Digital Communication	03	--	--	20	20	60	100	3
DMS	BTEC25DM777	Microwave Engineering	03	--	--	20	20	60	100	3

ADDITIONAL CRITERIA FOR HONORS WITH RESEARCH										
Category under NEP	**Course Code**	**Course Title**	**Teaching Scheme**			**Evaluation Scheme**				**No. of Credits**
			L	**T**	**P**	**CA**	**MSE**	**ESE**	**Total**	
HR	BTEC25HR777	Research Project Stage-II	--	--	18	--	--	100	100	09
HR	BTEC25HR888	Research Project Stage-III	--	--	18	--	--	100	100	09