Dr. Vasantraodada Patil Shetkari Shikshan Mandal's

Padmabhooshan Vasantraodada Patil Institute of Technology,
Budhgaon, Sangli (MS) – 416304

(An Autonomous Institute)

Affiliated to

Dr. Babasaheb Ambedkar Technological University,
Lonere, Raigad

(Accredited by NAAC)

Department of Electronics and Computer Science

Curriculum for Second Year Undergraduate Degree Programme

B. Tech. in Electronics and Computer Science

In accordance with National Education Policy (NEP – 2020)

w. e. f.
Academic Year: 2026-27

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Department of Electronics and Computer Science

Curriculum Structure and Evaluation Scheme

(Academic Year 2026-27 Onwards)

S.Y. B. Tech **Semester III** **Electronics and Computer Science**

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					Total
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
0ECSESC201	Probability theory & Transforms	3	1	0	4	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSPCC202	Analog Electronics	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSPCC203	Data Structure and Algorithms	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSPCC204	Digital Electronics	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSMDM205	MDM -I	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSVEC206	Environmental Studies	2	0	0	2	ISE	50	20	-	-	50
0ECSHSSM207	Principles of Management	2	0	0	2	ISE	50	20	-	-	50
0ECSPCC208	Analog and Digital Electronics Lab	0	0	2	1	ISE	-	-	50	20	50
						ESE	-	-	50	20	50
0ECSPCC209	Data Structure and Algorithms Lab	0	0	2	1	ISE	-	-	50	20	50
						ESE			50	20	50
0ECSCEP210	CEP Lab	0	0	2	1	ISE	-	-	50	20	50
TOTAL		**19**	**1**	**6**	**23**					**Total Marks**	**850**
Total Contact Hours Per Week		**26**									

Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC	HSSM	IKS	VEC	RM	CEP	PR	OJT	CC	Total
Credit	-	4	11		3	-	-	-	2	-	2	-	1	-	-	-	23
Cumulative	**16**	**19**	**11**	-	**3**	-	**3**	**3**	**2**	**2**	**2**	-	**1**	-	-	**1**	**63**

Multidisciplinary Minor Bucket offered by Electronics and Computer Science

MDM-I (SEM – III)	0ECSMDM205	Analog and Digital Electronics

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Department of Electronics and Computer Science

Curriculum Structure and Evaluation Scheme

(Academic Year 2026-27 Onwards)

S.Y. B. Tech **Semester IV** **Electronics and Computer Science**

Course Code	Course Name	Teaching Scheme				Evaluation Scheme					Total
							Theory		Practical		
		L	T	P	Credit	Scheme	Max	Minimum Marks for Passing	Max	Minimum Marks for Passing	
0ECSPCC251	Signals and Systems	3	1	0	4	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSPCC252	Microcontrollers and Applications	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSPCC253	Database Management	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSPCC254	Java Programming	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSMDM255	MDM -II	3	0	0	3	ISE 1	10	40*	-	-	100
						MSE	20				
						ISE 2	10				
						ESE	60				
0ECSOE256	Open Elective -I	2	0	0	2	ISE	50	20	-	-	50
0ECSAEC257	Soft Skills	0	0	2	1	ISE	25	10	-	-	25
0ECSVEC258	Universal Human Values	2	0	0	2	ISE	50	20	-	-	50
0ECSVSEC259	Computational Lab	0	0	2	1	ISE	-	-	25	10	25
0ECSPCC260	Microcontrollers and Applications Lab	0	0	2	1	ISE	-	-	50	20	50
						ESE	-	-	50	20	50
0ECSPCC261	Database Management Lab	0	0	2	1	ISE	-	-	50	20	50
						ESE	-	-	50	20	50
TOTAL		**19**	**1**	**8**	**24**					**Total Marks**	**850**
Total Contact Hours Per Week		**28**									

Course Category	BSC	ESC	PCC	PEC	MDM	OE	VSEC	AEC	HSSM	IKS	VEC	RM	CEP	PR	OJT	CC	Total
Credit	-	-	15	-	3	2	1	1	-	-	2	-	-	-	-	-	24
Cumulative	**16**	**19**	**26**	-	**6**	**2**	**4**	**4**	**2**	**2**	**4**	-	**1**	-	-	**1**	**87**

Multidisciplinary Minor Bucket offered by Electronics and Computer Science

MDM-II (SEM – IV)	0ECSMDM255	Microcontrollers

Open Elective-I offered by Electronics and Computer Science

OE - I (SEM – IV)	0ECSOE256	Intellectual Property Rights

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0ECSESC201 Probability Theory & Transforms

Course Code	0ECSESC201			
Course Title	Probability Theory & Transforms			
Semester	III			
Prerequisites	Engineering Mathematics I and II			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	3	1	-	
Credit	**04**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10	20	10	60

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Apply** Fourier transform, Laplace transform and their inverse transforms for solving mathematical and engineering problems.	3
CO2	**Use** the different forms of Fourier series for representation of periodic signal.	3
CO3	**Apply** the knowledge of probability distributions, correlation and regression analysis to fit a suitable mathematical model for the given statistical data.	3
CO4	**Interpret** random signals and processes.	2

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Laplace Transform** Definition, Transforms of elementary functions. Properties of Laplace transforms, Inverse Laplace transforms, Partial fraction method and Convolution Theorem, Applications to find the solutions of linear differential equations.	7
2.	**Fourier Series** Periodic functions, Dirichlet's conditions, Definition, determination of Fourier coefficients (Euler Formulae), Expansion of functions, Even and odd functions, change of interval, Half range Fourier sine and cosine series.	6
3.	**Statistics and Probability Distribution** Basic concepts of set theory, Operations on sets, Definition of probability, Mean, Median, Mode, Standard Deviation, Probability Distribution Random variable, discrete random variable, continuous random variable, probability mass function, probability density function, Probability Distribution-Binomial, Poison and Normal.	7
4.	**Fourier Transform** Definitions, Fourier sine and cosine integrals; Fourier sine and cosine transforms; Properties of Fourier transforms; Parseval's identity for Fourier Transforms.	6

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5.	**Correlation and Regression Analysis** **Correlation**: - Introduction, Karl Pearson's correlation coefficient, Spearman's rank correlation coefficient **Linear Regression Analysis:** - Introduction, Lines of regression, Derivation of regression lines of y on x and x on y, Angle between the regression lines, Coefficients of regression.	6
6.	**Random Signal & process** Introduction, Mathematical definition of a random process, Stationary processes, Mean, Correlation &Covariance function, Ergodic processes, Power spectral density, Gaussian process	7
	Total Hours	**39**

Text Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Higher Engineering Mathematics	H. K. Das and Er. Rajnish Verma	S. Chand & Co. Pvt. Ltd.	3rd	2014
2.	A course in Engineering Mathematics (Vol III)	Dr. B. B. Singh	Synergy Knowledgeware	1st	2013
3.	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw-Hill Publications	1st	2006
4.	Probability, Statistics and Random Processes	T. Veerrajan	McGraw Hill	3rd	2008
5.	Probability and Random Processes	Geoffrey Grimmett, David Stirzaker	Oxford University Press	3rd	2020

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons	10th	2011
2.	A Text Book of Engineering Mathematics	Peter O' Neil	Thomson Asia Pte Ltd	5th	2003
3.	Advanced Engineering Mathematics	C. R. Wylie & L. C. Barrett	Tata Mcgraw-Hill Publishing Co.	6th	2003
4.	Probability and Random Processes with Applications to Signal Processing	H. Stark and J. Woods	Pearson Education	3rd	2002

* Minimum 10 tutorials based on above curriculum

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0ECSPCC202 Analog Electronics

Course Code	0ECSPCC202			
Course Title	**Analog Electronics**			
Semester	III			
Prerequisites	Basic Electronics and Electrical Engineering			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	03	--	--	
Credit	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10	20	10	60

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Explain** construction, operation, and characteristics of JFET and MOSFET devices.	2
CO2	**Analyze** FET configurations (CS, CD, CG) in amplification and switching applications.	4
CO3	**Analyze** Op-Amp circuits by designing amplifiers, integrator, differentiator, comparator and waveform generators.	4
CO4	**Evaluate** feedback concepts by design oscillator circuits for required frequency conditions	4
CO5	**Design** and analyze voltage regulator circuits using transistors and IC regulators	3

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**JFET Fundamentals** Introduction to JFET, Types, Construction, Operation, Static Characteristics Pinch-off voltage, Volt-Ampere characteristics, Common source amplifier. Practical limitations	6
2.	**MOSFET & FET Configurations** MOSFET basics and operation, n-channel Enhancement MOSFET (E-MOSFET) Characteristics & parameters, FET configurations: CS, CD, CG, Comparison of configurations, Common source amplifier, MOSFET as switch, Digital switching relevance, MOSFET as resistor/diode. MOSFET, Use of MOSFET in sensors, switching, power electronics. CMOS concept (basic idea only)	7
3.	**Operational Amplifiers** Block diagram of OP-AMP, Op-amp characteristics (AC & DC), and Op-amp parameters, Differential amplifier configurations, Analysis (dual-input balanced-output), Inverting & non-inverting amplifiers, Voltage follower. Noise & offset basics (intro only)	6

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4.	**OP-AMP Applications** Summing amplifier, averaging amplifier, scaling amplifier, Integrator, Differentiator, Differential amplifier, Analog signal conditioning, Comparator, Schmitt trigger, Square & triangular wave generator, Precision rectifiers, Sensor interfacing example. Sensor interfacing example. 555 Timer basics ,Sensor interfacing basics,	7
5.	**Feedback Amplifiers & Oscillators** Feedback: Concept and topologies. Effect on gain, bandwidth, stability, Cascade amplifiers Oscillators: Principle of oscillation .RC oscillators (Phase shift, Wien bridge), LC oscillators (Hartley, Colpitts). Crystal oscillator. Application in clock generation., Microcontroller relevance	7
6.	**Voltage Regulators** Transistor Regulators: Basic shunt voltage regulator using Zener diode, Series voltage regulator, Shunt voltage regulator, IC Regulators: Three-terminal regulators Variable voltage regulators. SMPS vs Linear regulator (concept only), ,Real-life power supply design	6
	Total Hours	**39**

Text Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Electronic Devices and circuits Theory	R. L. Boylstad, L. Nashlesky	Prentice Hall of India	9th	2006
2.	Op Amps and Linear Integrated Circuits	Ramakant A. Gaikwad	Pearson Education	8th	2000
3.	Electronic Devices	Thomas L. Floyd	Pearson Education	10th	2018
4.	Electronics Circuit Analysis and Design	Donald Neaman	Tata McGraw Hill	3rd	2010

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Linear Integrated Circuits	Salivahanan and Kanchana Bhaskaran	Tata McGraw Hill	1st	2008
2.	Linear Integrated Circuits	S. Salivahanan, N. Suresh Kumar, A. Vallavaraj	Tata McGraw Hill Education	2nd	2010
3.	Integrated Electronics	Jacob Millman, Christos C. Halkias	McGraw Hill Education	3rd	2010
4.	Design with Operational Amplifiers	Franco S	McGraw Hill.	4th	2014

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0ECSPCC203 Data Structure and Algorithms

Course Code	0ECSPCC203			
Course Title	Data Structure and Algorithms			
Semester	III			
Prerequisites	Programming for Problem Solving in C			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	3	--	--	
Credit	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10	20	10	60

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Apply** linear data structures concepts for dynamic memory management using list, stack and queue	3
CO2	**Apply** tree and graph traversal operations for data handling in nonlinear data structure.	3
CO3	**Analyze** various kinds of searching and sorting techniques to understand time complexity.	4
CO4	**Select** an appropriate algorithm to address the various data structure problems.	4

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Data Structures & Linked list** **Introduction**: Need of DS, Abstract Data Types, Types of Data Structures: Linear and Non-Linear, Operations on Data Structures: Traversing, Searching, Sorting, Deletion, Insertion. **Linear Data Structures**: Linked Lists, and Representation of Linear Lists in memory, traversing a Linked List, Searching a Linked List, Memory **Allocation**: Insertion of Node into a Linked List, Deletion of Node from Linked List, Circular Linked Lists, and Doubly Linked Lists.	7
2.	**Stacks** Introduction to Stacks, Memory Representation of stack using array and Link List, Operations: Push, Pop, Stack Full, Stack Empty, and Stack Overflow & Underflow. Stack Applications: Reversing a List, Expression Evaluation: Infix, Prefix, Postfix, Conversion, and Evaluation.	6
3.	**Queues** Introduction to Queues, Memory Representation of Queue using array, Types of Queues: Linear Queue, Circular Queue, Priority Queue, Queue Operations: Insert and Delete, Queue Full, Queue Empty, Applications of Queue	6

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4.	**Trees** Definitions-Degree of Tree / Node, Depth / Height of Tree, In-degree, Out-degree, Path, tree representation, properties of trees, Types of Tree: Binary tree, Binary tree representation, Binary Tree Properties, Binary Tree Implementation, Binary Tree Traversals: In-order, Pre-order, Post-order , BST, Applications of trees.	6
5.	**Graphs** Graph Introduction, Graph theory terminology, Directed Graph, Undirected Graph, Representation of graphs, Path Matrix, Traversing a graph: Breadth-First search, Depth-Final search, Adjacency Matrix of Directed and Undirected Graph, Applications.	6
6.	**Algorithms** Introduction to Algorithms, Asymptotic analysis Big-O, Big-Theta and other notations, Algorithm Analysis-Worst, Average and Best-case analysis, Types of Algorithms: Sorting: Bubble Sort, Insertion sort, Quick Sort, Selection sort, Merge-sort. **Searching**: Sequential and binary searches. Hashing Schemes, hashing functions, collision resolution techniques: open hashing, closed hashing	8
	Total Hours	**39**

Text Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Data Structures Using C	ISRD Group	The McGraw-Hill Companies (Tata McGraw)	First (Ace series)	Reprint: 2010
2.	Data Structures Using C & C++	Rajesh K. Shukla	Wiley India	1st	2012
3.	Data Structures: A programming Approach with C	Dharmender Singh Kushwaha and Arun Kumar Misra	PHI Learning	2nd	2014

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Schaum's Outline of Data Structures	Seymour Lipschutz	McGraw Hill Education, New Delhi	Indian reprint	2014
2.	Fundamentals of Data Structure	Ellis Horowitz & Sartaj Sahni	Tata McGraw-Hill / University Press	2nd	2008
3.	Data Structures and Algorithm Analysis in C	Mark Allen Weiss	Pearson Education	2nd	2014
4.	Data Structures Using C	Reema Thareja	Oxford University Press	2nd	2014

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0ECSPCC204 Digital Electronics

Course Code	0ECSPCC204			
Course Title	**Digital Electronics**			
Semester	III			
Prerequisites	Basic Electronics and Electrical Engineering			
Teaching Scheme	**Lecture**	**Tutorial**		**Practical**
	03	--		--
Credits	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10	20	10	60

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Apply** various Boolean expression reduction techniques to minimize the digital hardware.	3
CO2	**Differentiate** between various IC logic families and state their use in digital system design.	2
CO3	**Design** combinational, sequential logic circuits for various digital applications	3
CO4	**Classify** various semiconductor memories used in digital electronics applications.	3

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Number System and Logic Gates** **Number Systems:** decimal, binary, octal, hexadecimal, conversion, binary arithmetic, one's and two's complements arithmetic, codes, **Logic Gates:** AND, OR, NOT, NAND, NOR, XOR, XNOR, Universal gates. Boolean algebra, examples of IC gates.	**06**
2.	**Logic Families** Digital IC specification terminology: TTL sub families, ECL subfamilies, MOS Logic, CMOS family, TTL – CMOS Interfacing.	**06**
3.	**Combinational Digital Logic** Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, Don't care conditions, Adders, Subtractor, BCD adder, serial adder, Comparator, Multiplexer, De-Multiplexer, parity checker / generator, Encoder, Priority Encoder, Decoder.	**08**
4.	**Sequential Digital Logic:** Flip Flop (D, T, JK and RS), Latch, Flip Flop conversion, Shift registers, applications of shift registers, Counters: ripple (Asynchronous) counters, synchronous counters, ring counter, sequence generator, special counter IC's.	**08**
5.	**Finite State Machines** State diagram, Types of FSM, Designing of synchronous counters, sequence detectors	**06**

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6.	**Memory Devices** Classification of memory devices, Volatile and Non-volatile Memory, Random Access Memory (RAM), RAM ICs, Read Only Memory (ROM), ROM ICs, Programmable Read Only Memory (PROM), Erasable Programmable Read Only Memory (EPROM), Electrically Erasable Programmable Read Only Memory (EEPROM), Flash Memory, Charge Coupled Device (CCD) Memory.	**05**
	Total Hours	**39**

Text Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	A Textbook of Digital Electronics	Dr. R. S. Sedha	S. Chand and Company Ltd.	Revised Enlarged Edition	2010
2.	Modern Digital Electronics	R. P. Jain	*McGraw Hill Education*	3rd	2009
3.	Digital Electronics, Principles Devices and Applications	Anil K. Maini	Willey Publication	1st	2007

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Digital logic and Computer design	M. M. Mano	*Prentice Hall*	2nd	1995
2.	Fundamentals of Digital Circuits	Anand Kumar	*Prentice Hall India*	2nd	2016
3.	Digital Design, Principles and practices	John F. Wakerly	*Prentice Hall India*	3rd	1999
4.	Digital principles and application	Donald P Leach, Albert Paul Malvino, Goutam Saha	Tata McGraw Hill Education Private limited	7th	2011

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0ECSVEC206 Environmental Studies

Course Code	0ECSVEC206			
Course Title	Environmental studies			
Semester	III			
Prerequisites	--			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	2	--	--	
Credit	**02**			
Evaluation Scheme	**ISE**	**MSE**	**ISE**	**ESE**
	--	--	50	--

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Explain** the components and importance of Environment, ecosystems and Bio-diversity	2
CO2	**Discuss** the various natural resources and strategies for their management	3
CO3	**Explain** the sources of pollution, effects and control measures	2
CO4	**Apply** the knowledge of EIA, EMS and Audits for the preparation of reports.	3

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Introduction to Environmental Studies:** Definition, scope and importance, Components of environment, Multidisciplinary nature of environmental studies. Ecosystems- Types, Structure and function, energy flow, food chains and food webs. Biodiversity- Types, Importance and conservation	6
2.	**Natural resources and Management:** Natural resources- Forest, Water, Mineral food, Energy and Land. Energy resources- Renewable-Wind, Hydropower, Tidal, Ocean thermal, Solar, Biomass, Biogas, Geothermal and Hydrogen. Non-renewable- Coal Petroleum, Natural gas, Nuclear energy, Sustainable management of resources	6
3.	**Environmental pollution and climate change:** Types of pollution- Water, Air, Solid waste, Soil and Noise, Sources, effects and control measures, Global effects of pollution	6
4.	**EIA, EMS, Social issues and legislation:** Environmental Impact Assessment (EIA)- Purpose and process. Engineering Management Systems(EMS)-Principles and steps, Introduction to Environmental Audit and Green audit	6
	Total Hours	**24**

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Text Books					
Sr. No.	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1.	Ecological and Environmental studies	S. K. Garg	Khanna publishers	1st	2006
2.	Essentials of Environmental studies	Kurian Joseph and R. Nagendran	Pearson Education, Singapore	2nd	2004
3.	Environmental studies	Dr. Suresh K. Dhameja	Katson books	4th	2012
4.	Environmental studies	Dr. P. D. Raut	Shivaji University, Kolhapur	4th	2012

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0ECSHSSM207 Principles of Management

Course Code	0ECSHSSM207		
Course Title	Principles of Management		
Semester	III		
Prerequisites	--		
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**
	2	--	--
Credit	**02**		
Evaluation Scheme	**ISE**	**MSE**	**ESE**
	50	-	-

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Develop** analytical and managerial abilities for solving organizational and workplace problems using management concepts and theories.	3
CO2	**Identify** and classify different types of plans such as policies, procedures, rules, programs, budgets, and strategies used in organizations..	3
CO3	**Describe** different types of organizational structures and evaluate their suitability in various business environments.	3
CO4	**Identify** and compare different leadership styles and major leadership theories used in management practices.	3

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Introduction to Management:** Definition, nature, scope, and importance of management, Functions of management, Levels of management, Managerial roles and skills, Evolution of management thought ,Scientific Management – F.W. Taylor, Administrative Theory – Henri Fayol, Bureaucratic Theory – Max Weber, Human Relations Approach – Elton Mayo ,Management as science, art, and profession.	7
2.	**Planning and Decision Making:** Nature and importance of planning. Types of plans, Planning process, Strategic planning, Forecasting techniques, Decision-making process, Types of decisions, Decision-making models, Problem-solving techniques, Management by Objectives (MBO).	5
3.	**Organizing and Staffing:** Principles of organization, Organizational structure, Departmentation, Delegation and decentralization, Authority and responsibility, Span of control, Line and staff organization, Staffing process, Recruitment and selection, Training and development, Performance appraisal.	5

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4	**Leadership, Motivation, and Communication:** Nature and importance of leadership, Leadership styles and theories, Motivation concepts, Maslow's Need Hierarchy Theory, Herzberg's Two-Factor Theory, McGregor's Theory X and Theory Y, Communication process, Types and barriers of communication, Team dynamics and conflict management, Emotional intelligence.	7
	Total Hours	**24**

Text Books					
Sr. No.	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1.	Essentials of Management	Koontz, H. and Weihrich, H	McGraw Hill	12th Edition	2023
2.	Management	Robbins, S.P. and Coulter, M.	Pearson	16th Global Edition	2024
3.	Principles of Management	Gupta, C.B.	Sultan Chand & Sons	18th Revised Edition	2023
4.	Principles and Practice of Management	Prasad, L.M.	Sultan Chand & Sons	10th Edition	2020
5.	Principles of Management	Tripathi, P.C. and Reddy, P.N.	McGraw Hill	6th Edition	2017

Reference Books					
Sr. No.	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1.	The Practice of Management	Peter Drucker	Harper Business	Classic/Reissue	2006
2.	Organizational Behaviour	Fred Luthans	McGraw Hill	14th Edition	2021
3.	Management	Stoner, Freeman & Gilbert	Pearson / Prentice Hall	6th Edition	2018
4.	Organizational Behaviour	Stephen Robbins	Pearson	19th Global Edition	2023

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0ECSPCC208 Analog and Digital Electronics Lab

Preamble:

The Analog Electronics Laboratory course is designed to provide students with practical exposure to the fundamental principles and applications of analog electronic circuits. This laboratory complements theoretical concepts by enabling students to design, analyze, and test various analog components and systems using standard laboratory equipment and simulation tools. The course focuses on key topics such as Field Effect Transistors (FETs), Operational Amplifiers (Op-Amps), oscillators, and voltage regulators.

The Digital Electronics laboratory course is designed to provide students with practical exposure to the fundamental concepts of digital systems design. This laboratory complements theoretical knowledge by enabling students to implement, analyze, and troubleshoot digital circuits using hardware platforms. In this course, students explore the behavior of logic gates, combinational and sequential circuits, flip-flops, counters, and registers, forming the backbone of digital system design.

By the end of the course, students will have a strong foundation in analog electronics and digital electronics, enabling them to design and analyze real-world electronic circuits and preparing them for advanced studies in electronics, communication, and embedded systems.

Course Code	0ECSPCC208		
Course Title	**Analog Electronics and Digital Electronics Lab**		
Semester	III		
Prerequisites	Basic Electronics and Electrical Engineering		
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**
	--	--	02
Credit	**01**		
Evaluation Scheme	**ISE**	**MSE**	**ESE**
	50	--	50

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Perform** simulation and analysis of JFET/MOSFET circuits using software tools.	3
CO2	**Design**, **simulate**, and **implement** Op-Amp based circuits for various applications through simulation and hardware verification	3
CO3	**Design** and **implement** combinational circuits (adders, Subtractor, comparator, multiplexers, encoder decoders) as well as sequential circuits (flip flops Shift Registers and counters)	3
CO4	**Prepare** the effective laboratory report and maintain the documentation record based on the experimental analysis and observations.	4

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Lab Experiments: Analog Electronics

Unit No.	List
1.	Study of JFET characteristics (Drain & Transfer) .
2.	MOSFET output characteristics (E-MOSFET)
3.	Design and simulate Common Source amplifier
4.	MOSFET as switch (LED ON/OFF control)
5.	MOSFET as resistor/diode behaviour study
6.	Inverting & Non-inverting amplifier design and verification
7.	Voltage follower (buffer)
8.	Summing & Averaging amplifier
9.	Integrator and Differentiator circuits (waveform analysis)
10.	Comparator and Schmitt Trigger
11.	RC Phase Shift Oscillator (simulation)
12.	Wien Bridge Oscillator (frequency verification)
13.	Study of feedback effect on gain & bandwidth
14.	Design of IC voltage regulator (78xx / LM317)
15.	Zener diode voltage regulator
16.	Design, simulate, and analyze timer and waveform circuits using the IC 555 Timer.

Any SIX experiment from above list.
Software Tools to be used: Multisim / LTspice /MATLAB

Lab Experiments: Digital Electronics

Expt. No.	List of Experiment
1.	Verify the truth table of all logic gates
2.	Verify the universal gates (NAND and NOR)
3.	Design and implement BCD to GRAY and BCD to XS-3 code converters
4.	Design and implement the half and full adder
5.	Design and implement the half and full Subtractor
6.	Design and implement 1 bit magnitude comparator
7.	Verify the functionality of multiplexer and demultiplexers
8.	Verify the functionality of encoder and decoders
9.	Verify the truth tables of flip flops
10.	Design and implement the 4-bit shift register
11.	Design and implement *mod-N* synchronous counter

Any SIX experiment from above list.

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0ECSPCC209 Data Structure and Algorithms Lab

Preamble:

The course Data Structure and Algorithms Lab builds a strong practical foundation in implementing core data structures and algorithms using the C programming language. It enables students to understand the behaviour, efficiency, and real-world applicability of linear and non-linear data structures through hands-on experimentation.

The lab emphasizes problem-solving, algorithm analysis, and the development of optimized solutions for computational problems, thereby preparing students for advanced computing concepts and industry-oriented programming practices.

Course Code	0ECSPCC209			
Course Title	**Data Structure and Algorithms Lab**			
Semester	III			
Prerequisites	Programming for Problem Solving in C			
Teaching Scheme	**Lecture**	**Tutorial**		**Practical**
	--	--		02
Credit	**01**			
Evaluation Scheme	**ISE1**	**MSE**	**ISE2**	**ESE**
	--	--	50	50

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Implement** linear data structures and their operations for practical problem solving.	3
CO2	**Construct** non-linear data structures and perform traversal techniques for given practical applications.	3
CO3	**Analyze** the efficiency of searching and sorting algorithms for computational problems.	4
CO4	**Develop** dynamic and competitive programming solutions through individual and team-based implementation with effective technical communication.	4

Course Contents (Topics Covered)

Expt. No.	List of Experiments
1.	Implement traversal, insertion, deletion, and searching operations on arrays.
2.	Create a singly linked list and perform insertion, deletion, traversal, and searching.
3.	Implement stack using array with operations: Push, Pop, Peek, Overflow, Underflow.
4.	Implement linear queue and circular queue using arrays with enqueue and dequeue operations.
5.	Create a binary tree and perform inorder, preorder, and postorder traversals.

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6.	Implement graph using adjacency matrix and perform BFS and DFS traversal.
7.	Write code and understand the concept Search Algorithms (Any two)
8.	Write code and understand the concept Sorting Algorithms (Any two)
9.	Create a C program using a circular linked list to implement a simple music playlist. Each song should have a title and duration. The program should support adding a song, deleting a song, moving to the next song, and displaying the current playlist in a loop.
10.	Develop a ticket booking system where customers arrive at a counter and wait in a queue. The program should allow customers to join the queue (enqueue), process a customer when they buy a ticket (dequeue), and display the current queue status using C language.

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0ECSCEP210 Community Engagement Project

Preamble:

The Community Engagement Project is designed to foster social responsibility, civic awareness, and experiential learning among students by actively involving them in real-world community development activities. This course aims to bridge the gap between academic knowledge and societal needs by encouraging students to apply their skills and values for the betterment of the community. Through this project, students engage with local communities to identify key social, environmental, educational, or health-related challenges. They work collaboratively with community members, organizations, and stakeholders to design and implement sustainable solutions. Activities may include awareness campaigns, educational initiatives, environmental conservation efforts, digital literacy programs, and support for underprivileged groups.

The course emphasizes teamwork, leadership, communication, and ethical responsibility. Students gain hands-on experience in problem identification, project planning, resource management, and impact assessment. It also nurtures empathy, cultural sensitivity, and a deeper understanding of societal issues. Overall, the Community Engagement Project aims to create socially conscious individuals who are equipped to address real-world challenges and contribute meaningfully to sustainable community development.

Course Code	0ECSCEP210			
Course Title	**Community Engagement Project**			
Semester	III			
Prerequisites	--			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	--	--	2	
Credit	**01**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	--	--	50	--

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Identify** and **Classify** the problems and challenges present in the community and society	2
CO2	**Conduct** surveys, collect relevant data, and interpret the results to understand community needs and issues.	3
CO3	**Apply** appropriate technical and engineering knowledge to design and propose feasible solutions for social problems.	3
CO4	**Communicate** with stakeholders by demonstrating teamwork and interpersonal skills.	3

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Course Contents (Topics Covered)

Course Instructions

In order to solve real-life issues and advance sustainable development, a community engagement initiative aims to establish social responsibility and link students with nearby communities. By sharing their learning results and offering solutions to social and community issues, students are expected to give back to the community. "Campus to Community" is the community engagement project's motto. Under the teacher's guidance, students are encouraged to find socially significant projects or problems and either solve them or suggest answers. These initiatives promote social responsibility, empathy, and teamwork.

Projects may cover a wide range of topics, including health, where students can plan free check-up camps or mental health awareness campaigns; livelihood, through skill-sharing or support for micro entrepreneurship; and education, through workshops on digital literacy, mobile libraries, or career counseling camps. Projects that have an influence on the environment include solar lights in villages and raising awareness of rainwater collecting. Additionally, initiatives like recording local history or planning cultural exchanges support the celebration and preservation of communal identity. In addition to helping society, these programs give participants real-world experience, leadership training, and a better grasp of their civic responsibilities. Through these interactions, communities take an active role in development, resulting in a society that is more resilient and inclusive.

A. Project Scope:

The CEP should focus on addressing a specific community or societal issue. Projects may fall under the following themes:

1. Education and Awareness: Conduct workshops or awareness drives on topics like digital literacy, environmental sustainability, mental health, or career planning for local stakeholders.
2. Technology for Social Good: Develop a simple prototype or solution that addresses a real world problem (e.g., a water saving device, simple mobile apps, or tools for community use).
3. Environmental Sustainability: Organize clean-up drives, tree plantations, recycling campaigns, or energy conservation initiatives.
4. Health and Wellness: Promote health through awareness programs on hygiene, nutrition, and exercise.
5. Skill Development: Teach basic computer or technical skills to students, staff, or the community.

B. Step-by-Step Execution Plan:

1. Planning Phase:

a) Team Formation: Form a team of 3-4 students with a balance of skills and interests.

The group should be cohesive, sharing and caring, contribute to the task assigned.

b) Project Selection: Choose a project theme and define a clear objective that aligns

with community needs.

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c) Proposal Submission: Submit a one-page project proposal outlining:

- Title of the project.
- Objective and expected outcome.
- Plan of execution (timeline and activities).
- Required resources (if any).
- Get approval from the designated faculty mentor.

2. Execution Phase:

a. Phase 1 Activities

- Conduct initial outreach and engage with the community or target participants.
- Implement planned activities with close teamwork and documentation.

b. Phase 2 Activities

- Continue engagement and collect feedback from the participants.
- Begin summarizing the outcomes of the project.

3. Reporting Phase:

a. Documentation: Create a detailed report containing:

- Title, objective, and scope of the project.
- Activities conducted and timeline.
- Outcomes and community feedback.
- Photos/videos of the activities (if permitted).
- Challenges faced and how they were addressed.

b. Presentation:

- Each team will present their project to a panel of faculty members or peers, showcasing their efforts and outcomes.
- Duration of presentation: 5-7 minutes per team.

C. Evaluation Criteria:

Projects will be evaluated based on:

1. Relevance: How well the project aligns with community needs.

2. Impact: The tangible and intangible benefits delivered to the community.

3. Innovation: Creativity in the approach or solution provided.

4. Teamwork: Collaboration and effective delegation within the group.

5. Documentation & Presentation: Clarity, depth, and overall delivery of the report and presentation.

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D. Guidelines for Conduct:

1. Behavior: Students should display professionalism, punctuality, and respect.

2. Safety: Follow all safety protocols during on-campus or fieldwork activities.

3. Feedback: Collect feedback from participants to measure the success and identify areas for improvement.

E. Best Practices:

1. Maintain a positive attitude and open communication with the community.

2. Respect cultural norms and values of the participants.

3. Adapt your plan based on real-time needs or challenges.

4. Faculty mentors has to be assigned to each group to guide them throughout the project.

5. The task carried out need to be maintained in field work diary by each group.

Text Books					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Sustainable Development	R.B.Patil	Rawat Publications	4th	2014
2.	Communicating in Business	Karen Williams,joyce logan &patricia marrier	Cengage learning	8th	2011

Reference Books					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
5.	Basic environmental technology	Jerry A. Nathanson	PHI Learning Private Limited	5th	2008
6.	Business and managerial communication	Sailesh Sengupta	PHI Learning Private Limited	7th	2011
7.	Comprehensive environmental studies	K.G.Bhattacharya, Arunima Sarma	Narosa bublishing house	5th	2015
8.	Industrial engineering and management	Arun V.Viswanath, Anoop S.Nair S.L.Sabu	Scitech Publications (India) Pvt.Ltd.	2nd	2014

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0ECSPCC251 Signals and Systems

Course Code	0ECSPCC251			
Course Title	**Signals and Systems**			
Semester	IV			
Prerequisites	Probability Theory and Transforms			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	03	01	-	
Credit	**04**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10	20	10	60

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		Blooms Level
CO1	Represent CT and DT signals and **Solve** the numerical on operations on signals.	3
CO2	**Analyze** the systems and find out response of system for given input by using analytical and graphical method.	4
CO3	**Analyze** signals and systems using Fourier and Z Transform	4
CO4	**Illustrate** the DT systems using given form of structures	3

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Signals Representation and Analysis** Overview of signals , Orthogonality, Types of signals: continuous-time (CT) & discrete-time (DT) , Elementary signals: unit step, impulse, ramp, exponential, sinusoidal, Signal operations: Delay,Advance,scaling, shifting, folding, Classification: Periodic/aperiodic, Energy & power signals ,Deterministic and Non deterministic, Bounded and Unbounded signals, Even and Odd Signals.	07
2.	**Time Domain analysis of Systems** Definition of systems, Types of Systems: Continuous-time and discrete-time , ,Static and Dynamic ,Causal and Noncausal, Stable and Unstable, Linear and Nonlinear, Time Varying and Time Invariant, Impulse and Step Response, Linear Time Invariant (LTI) systems, Properties of LTI systems, Convolution Integral and Convolution Sum	08
3.	**Frequency Domain Analysis of Continuous Time Signals and systems** Review of Fourier series for periodic signals, Fourier Transform for aperiodic Signals ,Continuous Time Fourier Transform (CTFT), Properties of the CTFT, Analysis of CT LTI systems	06
4.	**Frequency Domain Analysis of Discrete Time Signals** Brief Review of Discrete time Fourier series (DTFS), Fourier Transform of sequences(DTFT),Inverse DTFT,Properties of DTFT, Solutions of Difference equations	06

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5.	**Frequency Domain Analysis of DT signals using Z Transform** Definition of Z Transform, Region of Convergence (ROC), transfer function, Stability and System Analysis , Properties of Z transform , Inverse Z Transform: Long Division Method, PFE method, Residue method	**06**
6.	**Realization of DT systems** Discrete time IIR and FIR systems, Direct form I and Direct form II Realization, Cascade and Parallel form structures	**06**
	Total Hours	**39**

Text Books					
Sr. No.	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1.	Signals and Systems	Allen. V. Oppenheim, A.S.Wilsky	Prentice Hall publication	2nd	2006
2.	Signals and Systems	Nagoor Kani	McGraw Hill Education Pvt. Ltd.	Reprint	2014
3.	Signals and Systems	P.Ramesh Babu, R.Ananda Natranjan	Scitech Publication Pvt. Ltd.	3rd	2008

Reference Books					
Sr. No.	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1.	Fundamentals of Signals and Systems	Edward W. Kamen, Bonnie S. Heck	Pearson Publication	3rd	2014
2.	Signals and Systems	V.Krishnaveni, A. Rajeswari	wiley India publication	Reprint	2013
3.	Signals and Systems	A.Anand Kumar	PHI Publication	3rd	2014
4.	Signals and Systems	Simon Haykins, Barry Van Veen	John wiley & Sons	2nd	2004
5.	Signals and Systems (With MATLAB Programs)	Dr Sanjay Sharma	S. K. Kataria and Sons Publications	7th edition Reprint	2014

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0ECSPCC252 Microcontrollers and Applications

Course Code	0ECSPCC252			
Course Title	Microcontrollers and Applications.			
Semester	IV			
Prerequisites	Digital Electronics, Basic C Programming.			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	3	--	--	
Credit	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10	20	10	60

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Differentiate** the basic architecture of Microprocessor and Microcontroller.	1
CO2	**Explain** the memory organization and interface the memory with microcontroller 8051.	2
CO3	**Develop** embedded systems using assembly and C language for interfacing of On-Chip Peripherals of microcontroller.	3
CO4	**Apply** skills to interface various I/O devices using microcontroller 8051 and arduino UNO for given applications.	3

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Introduction to Microcontroller:** Compare microprocessor and microcontroller, features and requirements, Pin configuration, block diagram, structure I/O ports, Power Saving modes, , power reset and clocking circuits, Address and Data Buses, Families of 8051(8052,8031 and 8751).	7
2.	**Memory Interfacing of 8051:**-Introduction to Memory Organization, Registers of 8051, stack operation, PC,DPTR, RAM ,SFRs, ROM on-chip and external program code memory, address decoding, (absolute and Linear decoding), Interfacing of program memory, interfacing of Data memory, Interfacing of external program and Data memory.	6
3.	**Instruction sets and Addressing modes:**-assembly language: Data transfer, Arithmetic, logical, Boolean, branching operation, Addressing modes: Immediate, register, direct ,Indirect, indexed, GPIO Programming using embedded C.	6
4.	**Timer/Counter, Serial Port and Interrupts of 8051** :- Basics of Timers & Counters, Timer Types and Modes of Operation, Interrupt vs. Polling, Types of interrupts, Register used for interrupts initialization, External interrupts, Timer interrupts. Introduction to serial communication, RS232 standard, RS485 Standard, protocols: I2C, SPI, Max 232/233 Driver, and Serial Communication Interrupts.	7

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5.	**I/O devices Interfacing of 8051**:- Interfacing of LED and switch using 8051, Seven segment display, LCD 16x2, Relay with 8051, stepper motor, DC motor control, Interfacing of DAC and ADC, Interfacing temperature controller using LM35 sensor.	7
6.	**Introduction to Arduino UNO:** - Architecture & Features of Arduino UNO, ATmega328p arduino overview, pin diagram, arduino IDE and program structure, analog input and PWM operations, digital I/O interfacing, Applications of Arduino UNO in embedded systems.	6
	Total Hours	39

Text Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	The 8051 Microcontroller and Embedded Systems Using Assembly and C.	M. A. Mazidi, J. C. Mazidi, Rolin D. McKinlay,	Pearson Education	2nd edition	2005
2.	The 8051 Microcontroller	Kenneth J. Ayala	Cengage Learning India Pvt. Ltd,	3rdedition	2005
3.	Programming and customizing the 8051 microcontroller	Myke predko	Tata McGraw-Hill Publications	1st edition	1999
4.	Programming Arduino, getting started with sketches.	Simon Monk	McGraw Hill Education	2nd edition	2016
5.	8051 microcontroller Fundamentals and Programming.	Dr. Umesh Dutta ,Dr. Kamal Jha,vikas Sharma and Shivam Gupta.	Clever fox	1st edition	2022

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	The 8051 Microcontroller Based Embedded Systems	Manish K Patel	McGraw Hill	1st edition	2014
2.	Microcontroller Theory and Applications	Ajay V Deshmukh	Tata McGraw-Hill	2nd edition	2005
3.	8051 microcontroller Internal, Instruction, programming and interfacing by	Subrata Ghoshal,	pearson publication.	2nd edition	2002
4.	Introduction to microcontroller and their application	T.R. Padmanabhan	Tata McGraw-Hill	1st edition	2006
5.	Getting Started with Arduino	Massimo Banzi	O'reily media	1st edition	2008

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Course Code	0ECSPCC253			
Course Title	**Database Management**			
Semester	IV			
Prerequisites	Programming in C, Data Structure.			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	03	--	--	
Credit	**03**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10	20	10	60

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Explain** the fundamental concepts, architecture, and data models of DBMS for efficient database design	2
CO2	**Apply** different queries to perform database operations for effective data handling	3
CO3	**Apply** normalization techniques and keys to efficient relational database design	3
CO4	**Explain** transaction processing and concurrency control mechanisms to ensure data consistency, reliability and recovery in database systems.	2
CO5	**Demonstrate** CRUD operations using MongoDB and procedural database operations using PL/SQL	3

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Introduction to Database Management System** Introduction: purpose and benefits of database system, characteristics of DBMS, advantages of DBMS over traditional file systems, DBMS architecture, data abstraction AND independence, Data Models: relational, hierarchical, network, E-R, schemas and instances E-R model:- entities, relationship, attributes, E-R diagram	7
2.	**Structured query language** SQL Basics, data definition language (DDL): create, alter, drop, Data Manipulation language: select, insert, update, delete, SQL Clauses: where, group by, having, order By, LIMIT, Join operation: inner, LEFT, RIGHT, FULL, Self, SET Operations: UNION, INTERSECT, Functions	6
3.	**Database design and Normalization** **Types of keys**: - primary key, foreign key, candidate key, super key, integrity constraints, functional dependency, **Normalization:** motivation for normalization forms, Anomalies, 1NF, 2NF, 3NF, BCNF, Decomposition, Dependency preservation	7

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4.	**Transaction Processing and Concurrency control** **Transaction:** definition and properties (ACID), schedules, need for recovery, types of Failures, Recovery Techniques: log based, check point, shadow paging **Concurrency Control:** Concurrency problem, Schedules: conflict and view serializability Concurrency Control Techniques: Lock –Based protocols (Shared/ Exclusive) ,Time stamp Based protocols	7
5.	**PL/SQL – Procedural SQL (Extended from SQL Concepts)** Basics of PL/SQL and Program Structure, Variables, Constants, and Data Types, Control Structures: IF, LOOP, WHILE, FOR, Cursors: Implicit and Explicit, Triggers	6
6.	**NOSQL(Non Query Language)** Need of NOSQL database, Difference between RDBMS and NOSQL Database, Types of NOSQL databases, , CAP Theorem Introduction to Document oriented database with MongoDB, MongoDB installation, Basic CRUD operation with MongoDB, **Query Operators (comparison/logical)** ,Applications of MongoDB	6
	Total Hours	**39**

Text Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Fundamentals of Database Systems	Ramez Elmasri & Shamkant Navathe	Pearson Education.	7	2016
2.	Database System Concepts	Abraham Silberschatz,Henry Korth, S. Sudarshan	McGraw-Hill.	7	2019
3.	Database System Concepts	Raghu Ramkrishnan, Johannes Gehrke	McGraw-Hill.	3	2016
4.	Database Systems-Design Implementation , Management,	Rob Coronel	Thomson Course Technology	4	2018

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	An Introduction to Database systems, ,	C.J. Date, A.Kannan, S.Swami Nadhan	Pearson	7	2002
2.	Querying MySQL	Adam Aspin	BPB Publications	1	2022
3.	Principles of Database Systems	J.D. Ullman	Galgotia Publications	2	1992
4.	SQL and NoSQL Interview Questions	Vishwanathan Narayanan	BPB Publications	1	2023

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Course Code	0ECSPCC254			
Course Title	**Java Programming**			
Semester	IV			
Prerequisites	C Programing			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	3	--	--	
Credit	3			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	10	20	10	60

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Apply** Java data types, operators, control statements, and arrays to construct syntactically correct Java programs.	3
CO2	**Utilize** methods, classes, strings, wrapper classes, and object to develop well-structured Java programs.	3
CO3	**Apply** OOP principles encapsulation, abstraction, inheritance, and polymorphism to design modular and reusable Java applications.	3
CO4	**Integrate** Java programs by integrating interfaces, abstract methods, functional interfaces, and packages to achieve modularity.	4
CO5	**Apply** exception handling mechanisms and multithreading concepts to construct robust and concurrent Java programs.	3
CO6	**Develop** real-world Java applications by employing the Collection Framework List, Set, and Map to manage and process data efficiently.	3

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Introduction to JAVA Programming** Comparison of C++ and Java, Fundamentals of JAVA: - Java features, JDK, JRE, and JVM, overview of Java language, simple Java program, and Java program structure. Java tokens, Java statements, constants, concepts of variables, data types, and operators. Arrays and its types, Access modifiers, class, object and functions, constructor and their types, **keywords**: final, static, this and super, garbage collection, and finalize method.	7
2.	**Method, Classes and String** **Method and Classes**:-Classes and Objects, Static concept: - variables and methods, reference variables and methods. Object class as super class, Object class methods, importance and implementation of toString() , equals(), hashCode() methods, Math class and Arrays class , Wrapper classes: - Byte, Double, Float, Integer, Long, Short, Auto boxing and unboxing. **String**: - String Builder and String Buffer, String Constant Pool, Immutability of objects.	7

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3.	**OOPs Concepts.** OOP principles, Encapsulation, Abstraction, Inheritance and Polymorphism, Polymorphism: Introduction, types, function and constructor overloading Inheritance: Types of inheritance, method overloading and overriding, Dynamic method dispatch.	6
4.	**Interface and Packages** **Interface**: - Multiple Inheritance in java and Interface, implementation of abstract methods, default and static method in interface, functional interface. Common interfaces: Comparable, Comparator, Iterable, Iterator, Runnable. **Packages**: - Definition, types of packages, creation of package, accessing of package element.	6
5.	**Exception and Thread** **Exception Handling**: - Exception hierarchy, Errors, Checked and unchecked exceptions. Exception propagation, try-catch-finally block, throws clause and throw keyword, multiple catch statements. Creating user defined exceptions. **Thread**: - creation of thread by Thread class and Runnable interface, life cycle of Thread.	7
6.	**Collection Framework** Introduction to Java Collection Framework and its use. Commonly used collections and implementations of List (ArrayList, LinkedList), Set (HashSet, Linked HashSet, TreeSet), Map (HashMap, Linked HashMap, Tree Map), Concept of hashing.	6
	Total Hours	39

Text Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Core Java: An Integrated Approach	R. Nageswara Rao	Dream Tech Press.	New (includes Java 8)	2016
2.	Programming with JAVA	E. Balagurusamy	Tata McGraw Hill	6th Edition.	2019
3.	Java: The complete reference	Herbert Schildt	Tata McGraw-Hill	7th Edition.	2006

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Understanding OOP with Java,	T. Budd	Pearson Education, India	2nd Edition.	2001
2.	Introduction to Java programming	Y. Daniel Liang	Pearson Education, India	7th Edition.	2010

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0ECSOE256 Intellectual Property Rights

Course Code	0ECSOE256			
Course Title	**Intellectual Property Rights**			
Semester	IV			
Prerequisites	-			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	02	0	0	
Credit	**02**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	--	-	50	-

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Grasp** the significance and need of IPR as well as its historical context.	2
CO2	**Demonstrate** proficiency in IPR categorization and procedures to file various IPRs in India.	2
CO3	**Utilize** patent databases effectively	3
CO4	**Stay updated** on the latest IPR developments	4

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Introduction to Intellectual Property** Introduction to IPR, Need of IPR, Role of IP in the Economics, IP as a Global Indicator of Innovation, Origin of IP, **History of IP in India:** Patents, Copyrights, Trademarks, Geographical Indications, Trade Secrets, Semiconductor Integrated Circuits and Layout, Designs, Plant Varieties, Traditional Knowledge, Industrial Designs.	06
2.	**Patents and Copyrights** **Patents:** Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention, Rights Associated with Patents, Classification of patents in India, Special Patents, Patent document, granting of patent, Patent Searching, Patent Drafting, filing of a patent, Utility models, Rights Associated with Patents, Utility models, Licensing and transfer of technology. **Copyrights** Classes of Copyrights, Criteria for Copyright, Copyrights and Internet, Non-Copyright Work, Copyright Registration, Transfer of Copyrights to a Publisher, Joint Authorship, International Copyright agreements, Conventions and Treaties.	07

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3.	**Trademarks, Industrial Designs & GIs** **Trademarks:** Intro to Trademark, Eligibility Criteria, Classification of Trademarks, Validity of Trademark, Types of Trademark Registered in India, Process for Trademarks Registration. **Industrial Designs:** Eligibility Criteria, Acts and Laws, Design Rights, Non-Protectable Industrial Designs India, Importance of Design Registration, Classification of Industrial Designs, Procedure for Registration of Industrial Designs: *Prior Art Search, Application for Registration* **Geographical Indications:** Introduction to GI, Rights Granted, Registered GI in India, Identification of Registered GI, Classes of GI, Protection of GI, Procedure for GI Registration, GI Ecosystem in India.	**08**
4.	**International Patents Systems** Patent databases, Introduction to WIPO, Activities of WIPO, Paris Convention, Patent Cooperation Treaty (PCT), Budapest Treaty, Trademark Law Treaty, Case studies	**05**
	Total Hours	**26**

Text Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Intellectual Property A Primer for Academia	Rupinder Tewari and Mamta Bhardwaj	Publication Bureau, Panjab University	--	--

Reference Books

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	The Law of Patents	Feroz Ali	LexisNexis	-	-
2.	Indian Patent Law and Practice	K.C. Kankanala, A.K. Narasani, and V. Radhakrishnan	Oxford India	-	2012
3.	Invention Analysis and Claiming – A Patent Lawyer's Guide	Ronald D. Slusky	American Bar Association	2nd	2012

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0ECSAEC257 Soft Skills

Course Code	0ECSAEC257			
Course Title	**Soft Skills**			
Semester	IV			
Prerequisites	--			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	--	--	02	
Credit	**01**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	--	--	25	--

Course Outcomes (CO) Upon successful completion of this course, the students will be able to:		**BL**
CO1	**Develop** professional self-presentation and non-verbal communication skills.	3
CO2	**Demonstrate** effective collaborative problem-solving and leadership in team settings.	3
CO3	**Construct** professional documents including resumes and formal emails.	3
CO4	Critically **evaluate** personal career goals and execute mock professional interactions.	4

Unit No.	Contents
Unit 1	**Communication Skills & Confidence Building:** • Verbal communication (clarity, tone, articulation) • Non-verbal communication (body language, gestures, eye contact) • Active listening • Overcoming stage fear • Basic presentation skills **Practical / Group Activities:** • Self-Introduction Round (Recorded) • Pair Activity: Active Listening Drill • Role Play: Good vs Poor Communication • 1-Minute Video Speaking Task • Impromptu Speaking (Extempore) • Mirror Practice (confidence building)
Unit 2	**Teamwork, Leadership & Interpersonal Skills:** • Team dynamics • Conflict resolution • Leadership styles • Emotional intelligence (EI basics) • Collaboration & trust building **Practical / Group Activities:** • Marshmallow Tower Challenge (Team Building) • Blindfold Navigation Activity (Trust exercise) • Group Puzzle Solving Task • Conflict Role Play (Student vs Team disagreement) • Rotate Leader Activity (each student leads once) • Group Discussion (GD) Sessions

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Unit 3	**Critical Thinking & Problem Solving:** • Logical reasoning • Decision-making frameworks • Creative thinking • Problem-solving techniques • Case study analysis **Practical / Group Activities:** • Case Study Discussion (Real-world engineering problem) • Mystery Problem Challenge (group deduction task) • Brainstorming Sessions (idea generation) • Lateral Thinking Puzzles Competition • Decision-Making Simulation (choose best solution scenario) • Mini Innovation Task (build simple solution prototype)
Unit 4	**Employability Skills & Professional Development:** • Resume writing • Interview skills • Group discussion techniques • Workplace etiquette • Time management • Goal setting **Practical / Group Activities:** • Resume Building Workshop • Mock Interviews (Panel + Recording) • Group Discussion (HR-style topics) • Time Management Game (task prioritization) • Goal Setting Exercise (SMART goals) • Professional Etiquette Role Play

Activities Planned

Activities should be conducted from the following areas.

1. SWOT Analysis
2. Self-Development Plans
3. Demonstration of reading skills
4. Role playing
5. Group activity on poster/model presentation
6. Group Discussion/ Debate on Current issues
7. Identifying Role Models / motivational posters/audio/video
8. Writing of reports / resume or a mini presentation.
9. Visit to library to explore technical resources /mini projects.
10. Invited expert lectures by a doctor/industrialist/ professional counselors.
11. Stress management activities/ visit to Gymnasium.
12. Mock Interview

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Text Books					
Sr. No.	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1.	Soft Skills: Enhancing Employability	M. S. Rao	I. K. International Publishing house	1st	2010
2.	Personality Development and Soft Skills	Barun K. Mitra	Oxford University Press	3rd	2024
3.	*Soft Skills for Managers*	Dr. Kalyana Chakravarthi and Dr. Latha Chakravarthi	Bizantra Publications	1st	2015

Reference Books					
Sr. No.	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
1.	The 7 Habits of Highly Effective People	Stephen Covey	Simon & Schuster	13th	2019
2.	How to Win Friends and Influence People	Dale Carnegie	Simon & Schuster	--	2009
3.	Emotional Intelligence: Why It Can Matter More Than IQ	Daniel Goleman	Bantam Books.	--	2005
4.	*Adam's Time Management*	Marshall Cook	Viva Books	1st	2001
5.	*Presentation Skills*	Michael Hutton	ISTE Publications	1st	2004

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0ECSVEC258 Universal Human Values (UHV)

Course Code	0ECSVEC258			
Course Title	Universal Human Values (UHV)			
Semester	III			
Prerequisites	Student Induction Program (SIP)			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	2	--	--	
Credit	**02**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	--	--	50	--

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Develop** the ability to self-explore and verify value-based living through natural acceptance having right understanding and harmonious relationships as foundational to resolving personal, familial, and societal problems sustainably.	2
CO2	**Apply** the understanding of respect as right evaluation to address societal conflicts and contribute to value-based education.	3
CO3	**Recognize** the interconnectedness of natural orders and propose responsible human participation to ensure mutual fulfilment in existence.	3
CO4	**Apply** value-based understanding to their domain expertise to propose sustainable solutions for societal and ecological mutual fulfilment.	3

Course Contents (Topics Covered)

Unit No.	Contents	HRS
1.	**Introduction to Value Education:** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations,	6
2.	**Understanding 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 Lecture, Understanding Harmony in the Self, Harmony of the Self with the Body Lecture, Programme to ensure self-regulation and Health	6
3.	**Harmony in the Family – the Basic Unit of Human Interaction** 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in Society, Vision for the Universal Human Order	6
4.	**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.	6
	Total Hours	24

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Text Books					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books	2nd	2019
2.	Teachers" Manual for A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books	2nd	2019
3.	Human Values	A.N. Tripathi	New Age Intl. Publishers	--	2004

Reference Books					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Jeevan Vidya: Ek Parichaya	A Nagaraj	JeevanVidyaPrakashan, Amarkantak	--	1999
2.	The Story of Stuff (Book)	Annie Leonard	Free Press Publishers	--	2010
3.	The Story of My Experiments with Truth	Mohandas Karamchand Gandhi	Navjivan Publishing House Publishers	--	1948
4.	Small is Beautiful	E. F Schumacher	Harper Collins/Penguin Publishers	--	1993
5.	Slow is Beautiful	Cecile Andrews	Penguin Random House Publishers	--	2023

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ECSVSEC259 Computational Programming Lab

Preamble:

The Computational Programming Laboratory course is designed to provide students with hands-on experience in object-oriented programming using Java. This laboratory bridges the gap between theoretical knowledge and practical application by enabling students to write, compile, execute, and debug Java programs in a structured environment.

In this course, students progressively explore the core principles of Java — from basic input/output operations and control flow structures to advanced concepts such as object-oriented design using classes, objects, inheritance, polymorphism, interfaces, and multiple inheritance. The course further strengthens understanding of exception handling, multithreading, array and string manipulation, and the Java Collections Framework. Students gain proficiency in writing clean, modular, and reusable code while adhering to sound programming practices. Safe and efficient use of the Java Development Kit (JDK) environment, IDE tools, and proper documentation of experimental programs are integral components of the learning process.

Course Code	ECSVSEC259			
Course Title	**Computational Programming Lab**			
Semester	First			
Prerequisites	--			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	--	--	2	
Credit	**01**			
Evaluation Scheme	**ISE**	**MSE**	**ISE 2**	**ESE**
	--	--	25	--

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Write** and execute fundamental Java programs involving data types, operators, control structures (loops, conditionals), and basic input/output operations to solve computational problems.	3
CO2	**Design** and **implement** object-oriented Java programs demonstrating classes, objects, constructors, inheritance, polymorphism, interfaces, and exception handling to build modular and reusable software solutions.	4
CO3	**Apply** advanced Java features including multithreading, the Collections Framework (ArrayList, HashSet, sorting with Comparator and Comparable), and string manipulation to develop efficient and concurrent programs.	4
CO4	**Prepare** effective laboratory records and demonstrate the ability to work individually or as a team to analyse program outputs, debug code, and document experimental findings following professional standards.	5

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Course Contents (Topics Covered)

Expt. No.	List of Experiment
1.	Write a Java program to read two integers from the user, compute their sum, difference, product, and quotient, then display the results.
2.	Develop a program to check if a number is prime using loops and display prime numbers between 1 and 100.
3.	Create a 'Student' class with name, rollNo, and percentage; include constructors and a method to display grade.
4.	Write a program to demonstrate single inheritance, method overriding, and the "super" keyword.
5.	Implement method overloading for addition in a 'Calculator' class handling int, double, and String concatenation.
6.	Write a program to handle multiple exceptions with try-catch-finally and custom exceptions.
7.	Create two threads: one prints even numbers, another prints odd numbers up to 20. Implement using Thread class and Runnable interface.
8.	Sort an array of strings alphabetically and find the longest string.
9.	Define an interface 'Drawable' with draw(); implement it in 'Rectangle' and 'Triangle' classes.
10.	Write a program to implement multiple inheritance using interfaces in Java.
11.	Write a Java program to use ArrayList, HashSet, and sorting with Comparator and Comparable.

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0ECSPCC260 Microcontrollers and Applications Lab

Preamble:

The Microcontrollers Laboratory course is designed to provide students with hands-on experience in the design, programming, and application of microcontroller-based systems. This laboratory complements theoretical concepts by enabling students to understand how embedded systems function in real-world applications.

The course introduces students to the microcontroller architecture, instruction sets, and interfacing capabilities. Through practical experiments, students learn to write and execute programs using assembly language and/or embedded C, gaining insight into low-level hardware control and efficient resource utilization. Emphasis is placed on understanding input/output operations, timers, interrupts, and serial communication.

Students also explore interfacing techniques with peripheral devices such as LEDs, switches, sensors, displays, and motors. These experiments help in understanding how microcontrollers interact with external hardware to perform specific tasks in embedded systems. The laboratory focuses on developing problem-solving skills, logical thinking, and debugging techniques. Students learn to design, implement, and test microcontroller-based applications while following proper laboratory practices, safety guidelines, and documentation standards.

By the end of the course, students will have a strong foundation in microcontroller programming and interfacing, preparing them for advanced studies and careers in embedded systems, automation, robotics, and IoT-based applications.

Course Code	0ECSPCC260			
Course Title	**Microcontrollers and Applications Lab**			
Semester	IV			
Prerequisites	--			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	0	0	2	
Credit	**01**			
Evaluation Scheme	**ISE**	**MSE**	**ISE 2**	**ESE**
	--	--	50	50

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Learn** and use software tools like Keil, Proteus, and IDE for programming microcontrollers.	2
CO2	**Conduct** experiments on microcontroller using timers, counters, interrupts, and serial communication.	3
CO3	**Build** up skills related to self-learning and teamwork by analyzing and demonstrating interfacing applications.	4
CO4	**Prepare** effective laboratory reports and documentation based on practical implementation of experiments.	4

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Course Contents (Topics Covered)

Expt. No.	List of Experiment
1.	Develop an Assembly language program to perform arithmetic operations: addition, subtraction, multiplication and division on 8-bit data.
2.	Develop an Assembly language program to perform arithmetic operations: addition, subtraction on 16-bit data.
3.	Write an Assembly language program to generate delay using timer register.
4.	Develop an Assembly language program to transfer 8 bit data serially on serial port.
5.	Interface the LED and switch with 8051 and Use conditional statements using embedded C.
6.	Interface 7-segment display with 8051 and display 0-9 using embedded C,
7.	Interface 16x2 LCD with 8051 and display your name on LCD using embedded C.
8.	Interface the Relay with 8051 microcontroller.
9.	Interface stepper motor to microcontroller & rotate in clockwise direction at the given angles.
10.	Interface ADC with 8051 microcontroller.
11.	Interfacing of DAC 0808 and generation of various waveforms.
12.	Interface DC motor to microcontroller 8051 and control its speed.
13.	Interface temperature sensor LM35 to 8051 to read temperature, convert it to decimal and send the value to Port 0 with some delay.
14.	Interface the LED and switch with arduino UNO.
15.	Interface 7-segment display with arduino UNO and display 0-9 digits.

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Preamble:

This course is important for students as data forms the core of every business system, making database management a key skill. The Database Management Systems Laboratory course provides practical exposure to database concepts and their applications using SQL and modern database tools. It enables students to perform operations using DDL, DML, and TCL commands, along with gaining hands-on experience in various SQL clauses, joins, and functions for efficient data handling Students analyse the importance of keys and constraints to maintain data integrity and consistency. The course also introduces PL/SQL concepts such as procedures and triggers for implementing database logic. The course also introduces MongoDB for performing CRUD operations in NoSQL environments. It enhances logical thinking, problem-solving ability, and systematic query formulation while ensuring proper documentation and validation of database results.

Course Code	0ECSPCC261			
Course Title	**Database Management Lab**			
Semester	II			
Prerequisites	0BSES115			
Teaching Scheme	**Lecture**	**Tutorial**	**Practical**	
	--	--	2	
Credit	**01**			
Evaluation Scheme	**ISE 1**	**MSE**	**ISE 2**	**ESE**
	--	--	50	50

Course Outcomes (COs): Upon successful completion of this course, Student will be able to:		**Blooms Level**
CO1	**Apply** SQL commands (DDL, DML, TCL) and queries using clauses, joins, subqueries, and aggregation for data retrieval.	3
CO2	**Design** relational database schemas using keys, constraints, and normalization to ensure data integrity.	3
CO3	**Develop** database applications using PL/SQL procedures, triggers and MongoDB CRUD operations.	3
CO4	**Prepare** the effective laboratory report and maintain the documentation record based on the experimental analysis and observations	4
CO5	**Develop** self or team learning skills to demonstrate the experimental findings	3

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Course Contents (Topics Covered)

Expt. No.	List of Experiment
1.	Study of DDL commands
2.	Study of DML commands
3.	Study of TCL commands
4.	Study of 'where', 'order by' and 'limit' clause in SQL.
5.	Study of Aggregated functions in SQL.
6.	Study of 'Group by' and 'Having clause' in SQL
7.	Study of Keys in SQL
8.	Study of Data Constraints in SQL
9.	Study of different Joins in SQL.
10.	Study of Sub-queries and Set operations in SQL.
11.	Study of different Functions in SQL.
12.	Study of Procedure and Triggers in PL/SQL
13.	Study of CURD operations in MongoDB

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