Government College of Engineering, Karad

(An Autonomous Institute of Govt. of Maharashtra)

Department of Information Technology

SY BTech IT Curriculum Structure

Academic Year: 2020-21

Institute Vision
To emerge as a technical Institute of national repute driven by excellence in imparting value based education and innovation in research to face the Global needs of profession.
Institute Mission
To create professionally competent engineers driven with the sense of responsibility towards nature and society.
Department Vision
To provide value based high quality IT education by empowering every student to be innovative and employable IT professional.
Department Mission
To offer graduate program in Information Technology for making students excellent IT professionals and encouraging them for higher studies, research and social responsibility.

Programme Educational Objectives (PEO):

PEO1	To formulate, analyse and solve real life problems in software industry.
PEO2	To excel in professional career, higher education, research by acquiring knowledge in mathematics, computing and engineering principles.
PEO3	To exhibit ethical, social, communication skill, team work and adapt new tools and technology.

Programme Outcomes (PO):

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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

Program Specific Outcomes (PSO):

PSO1	Ability to understand, analyze and develop computer programs in the areas related to System Software, Database Systems, Networking, Web Designing.
PSO2	Ability to apply standard practices & strategies to solve IT Industry problems.

Government College of Engineering, Karad				
Second Year (Sem – III) B. Tech. Information Technology				
IT2301 : Values and Ethics				
Teaching Scheme			**Examination Scheme**	
Lectures	02 Hrs/week		CT – 1	15
Tutorials	-		CT – 2	15
Total Credits	02		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Students will be able to:

1.	Identify basic universal human values
2.	Exhibit correct moral ethical behavior.
3.	Outline various types of ethical conducts and Intellectual Property Rights.

	Course Contents	Hours
Unit 1	**Human Values:** Morals, Values, Ethics, Integrity, Work ethics, Service learning, Virtues, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Cooperation, Commitment, Empathy, Self-confidence, Challenges in the work place Spirituality.	**(03)**
Unit 2	**Engineering Ethics:** Overview, Senses of engineering ethics, Variety of moral issues, Types of inquiries, Moral dilemma, Moral autonomy, Moral development (theories), Consensus and controversy, Profession, Models of professional roles, Responsibility ,Theories about right action (Ethical theories),Self-control, Self-interest, Customs, Religion, Self-respect.	**(04)**
Unit 3	**Engineering as Social Experimentation:** Engineering as experimentation, Engineers as responsible experimenters, Codes of ethics, Industrial standards A balanced outlook on law. Safety, Responsibilities and Rights: Safety definition, Safety and risk, Risk analysis, Assessment of safety and risk, Safe exit, Risk-benefit analysis, Collegiality and loyalty, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Human rights, Employee rights, (**Self-study:** The challenger)	**(05)**
Unit 4	**Global Issues:** Globalization, Multinational corporations, Environmental ethics, Computer ethics, Weapons development, Engineers as managers, Consulting engineers, Engineer as expert witness, Engineers as advisors in planning and policy making, Moral leadership, Codes of ethics	**(04)**
Unit 5	**Intellectual Property Right**: Introduction and the need for intellectual property right (IPR), Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical indication.	**(04)**
Unit 6	**Patents**: Elements of patentability: Novelty , Non obviousness (Inventive Steps), Industrial application, Non patentable subject matter, Registration procedure, Rights and duties of patentee, Assignment and license , Restoration of lapsed patents, Surrender and revocation of patents, Infringement, Remedies and penalties, Patent office and appellate board	**(04)**

Text Books

1.	R.S Naagarazan, "Professional Ethics and Human Values", New Age International (P) Limited Publishers (Unit:1, 2, 3 and 4)
2.	Nithyananda, K V. "Intellectual Property Rights: Protection and Management", Cengage Learning India Private Limited, 2019 (Unit: 5and 6)

Reference Books

1.	A.N. Tripathy, " Human Values", New Age International Publishers,2003.
2.	M Govindrajan, S Natrajan and V. S Senthil kumar,"Engineering Ethics (including Humna Values)", Prentice Hall of India Ltd, Eastern Economy Edition.
3.	Neeraj P., and Khusdeep D, "Intellectual Property Rights", PHI learning Private Limited, 2014.

Useful Links

1.	https://nptel.ac.in/courses/109/104/109104068/ IIT Kanpur
2.	https://nptel.ac.in/courses/110105097/ IIT Kharagpur
3	Subramanian, N., & Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	-	-	-	-	-	-	-	3	-	-	-	2	-	2
CO 2	-	-	-	-	-	-	-	3	-	-	-	2	-	2
CO 3	-	-	-	-	-	-	-	3	-	-	-	2	-	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	3	20
Understand	10	5	3	20
Apply	-	5	4	20
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – III) B. Tech. Information Technology				
IT2302: Mathematics-III				
Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	01 Hrs/week		CT – 2	15
Total Credits	04		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Students will be able to:

1.	Solve field problems in engineering involving Ordinary differential equations using Laplace Transform.
2.	Evaluate Fourier transform and Z -transform techniques which would enable students to devise engineering solution for given situations.
3.	Understand concepts of basic probability and probability distributions.
4.	Analyse significance for large and small sample space.

	Course Contents	Hours
Unit 1	**Laplace Transform:** Properties of Laplace Transform, Laplace transform of standard functions. Initial value theorem, Final value theorem. Finding inverse, Laplace transform by different methods, Convolution theorem, Evaluation of integrals, Solving ordinary differential equations by Laplace transform.	**(10)**
Unit 2	**Fourier Transform:** Fourier Integral Theorem (statement only), Fourier Transform of a function, Fourier Sine and Cosine integral theorem (statement only), Fourier sine and cosine integrals, Fourier sine transform, Fourier cosine transform, Inverse fourier transform.	**(08)**
Unit 3	**Z – Transform:** Introduction, Definition, Region of convergence, Properties of Z-Transform, Inverse Z-Transform, Method of finding inverse Z-Transform, Difference equation using Z-Transform ,Application of Z-Transform to difference equation.	**(08)**
Unit 4	**Basic Probability:** Probability spaces, Conditional probability, Independence; Discrete random variables, Independent random variables ,Addition law of probability, Multiplication Law of probability, Expectation of discrete random variables, Correlation coefficient. Binomial, Poisson and Normal distributions.	**(08)**
Unit 5	**Test of Significance for Large Samples:** Testing of hypothesis, Null hypothesis and alternative hypothesis. Level of significance, Errors in sampling, Test of significance of large sample, Test of significance for difference of means of two large samples, Test of significance for the difference standard deviations.	**(04)**
Unit 6	**Test of Significance for Small Samples:** Test of significance for single proportion, Test of significance for single mean, Testing for difference between means of two samples, Student's t-distribution (t-test), Test-I: t-test of Significance for mean of a random sample, Test- II: test for difference of means of two small samples. (**Self-Study**: Chi-square Test, Chi-square test for goodness of fit, Z- Test and analysis of variance)	**(04)**

Tutorials

Total 8-10 number of tutorials should be conducted based on above syllabus.

Text Books

1.	N.P.Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2010,2016.(Unit: 1,3,4)
2.	H.K.Dass, "Advance Engineering Mathematics" , S. Chand publications. 15th revised edition 2006 (Unit: 2,5,6)

Reference Books

1.	S. C. Gupta, "Fundamentals of Statistics", Himalaya Publishing House, 6th revised edition, 2008.
2.	Debashis Datta, "Textbook of Engineering Mathematics'', New Age International Publication, 2nd Edition.
3.	G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry", Pearson publication, 9th Edition, 2002.
4	Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 9th Edition, 2006.
5	Veerarajan T., "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi, 2008.

Useful Links

1.	https://nptel.ac.in/courses/111106111/ Dr. Shrinivasa Rao Manam IIT Madras.
2.	https://nptel.ac.in/courses/108/104/108104100/ Prof. Aditya Jagannatham IIT Kanpur.
3.	https://www.youtube.com/watch?v=c9NibpoQjDk Prof. V. Balakrishnan IIT Madras.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	-	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	-	2	3	-	-	-	-	-	-	-	-	-	-	-
CO 3	1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	-	-	2	3	-	-	-	-	-	-	-	-	-	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	-	2	20
Understand	5	5	2	20
Apply	5	5	2	10
Analyse	-	5	2	-
Evaluate	-	-	2	10
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2303 : Digital Systems				
Teaching Scheme			**Examination Scheme**	
Lectures	04 Hrs/week		CT – 1	15
Tutorials	-		CT – 2	15
Total Credits	04		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Students will be able to:

1. Design and analyze combinational logic circuits.
2. Design and analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder.
3. Design and analyze synchronous sequential logic circuits.

	Course Contents	Hours
Unit 1	**Number Systems:** Binary numbers, Number-Base Conversion, Octal and Hexadecimal number system, Complements of numbers, Signed binary number system, BCD. Binary codes.	(07)
Unit 2	**Boolean Algebra:** Introduction, Digital logic gates, Axiomatic definition of boolean algebra, Basic theorems and Properties of boolean algebra, Boolean functions, Canonical and Standard forms, (**Self-Study:** Integrated Circuits),	(08)
Unit 3	**Logic Simplification Using K-MAP:** Introduction, The Map method, Four-Variable K-Map, Product of Sum simplification, Don't-Care conditions, NAND and NOR implementation.	(07)
Unit 4	**Combinational Logic:** Introduction, Combinational circuits, Binary adder and subtractor, Binary multiplier, Decoders, Encoders, Multiplexers, Demultiplexers. (**Self-Study**: HDL Models of Combinational Circuit)	(07)
Unit 5	**Sequential Logic:** Introduction, Sequential circuits, (**Self-study:** Difference between combinational circuits and sequential circuits), Memory element latch, Flip- flops: Design, Truth table, Excitation table of Master Slave SR, JK level triggered, D, T flip flops.	(08)
Unit 6	**Registers and Counters:** A) Registers: Buffer register, Shift register types - SISO, SIPO, PISO & PIPO, Applications of shift registers - Ring counter, Twisted ring counter. B) Counters: Asynchronous, Synchronous and modulo counters, Study of modulus n counter ICs- 7490, 74191 and their applications to implement mod counters.	(07)

Text Books

1. M Morris Mano, "Digital Design", Prentice Hall, 3rd Edition, 2001.(Unit: 1 to 6)
2. R.P. Jain, "Modern Digital Electronics", Tata McGraw-Hill, 3rd Edition , 2003.

Reference Books

1. Wakerly Pearon, "Digital Design: Principles and Practices", Pearson Education, 3rd edition, 2004.
2. Anand Kumar, "Fundamentals of digital circuits", PHI publication, 1st edition, 2001.

Useful Links

1. http://nptel.ac.in/courses/117105080/Prof. D. Roychoudhury IIT Kharagpur.
2. http://nptel.ac.in/courses/117106086/Prof. S. Srinivasan IIT Madras.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	-	3	3	-	-	-	-	-	-	-	-	1		1
CO 2	-	3	3	-	-	-	-	-	-	-	-	1		1
CO 3	-	3	3	-	-	-	-	-	-	-	-	1		1

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	3	20
Understand	-	5	3	20
Apply	5	5	3	10
Analyse	-	-	-	-
Evaluate	5	-	1	10
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – III) B. Tech. Information Technology				
IT2304: Computer Organization and Architecture				
Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	-		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO):

Students will be able to:

1.	Design system components of CPU Organization and fundamentals.
2.	Describe concepts of memory organization and Computer arithmetic.
3.	Analyze the structure of I/O modules and processor control units.
4.	Explain the parallel processing structures and pipelining.

	Course Contents	Hours
Unit 1	**Basic Structure of Computers:** Study of design and architecture of a small accumulator based CPU, A typical CPU with general register organization, Pipelining, Functional units, Floating-Point numbers, Addressing modes, Accessing I/O devices, Linker, Compiler, Debugger	**(06)**
Unit 2	**Memory System:** Connection of the memory to the processor, Internal organization of memory chip, Static memories, Dynamic RAMs, Read-Only Memories, Direct Memory Access, Memory hierarchy, Cache memories, Performance considerations, Virtual memory, Secondary storage.	**(07)**
Unit 3	**Computer Arithmetics:** Addition and subtraction, Multiplication of unsigned binary integers, Booth's algorithm for Two's complement multiplication, Unsigned binary division, IEEE Floating-Point representation, Floating-Point arithmetic.	**(07)**
Unit 4	**Input / Output:** Generic model of an I/O module, External devices, I/O modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O channels and processors. (**Self- Study:** External interface - Firewire and Infiniband, DMA controller)	**(06)**
Unit 5	**Control Unit:** Control Unit operation: Introduction, Micro-operations, Control of the Processor, Hardwired implementation, Micro programmed control: Microinstruction formats, Micro programmed control unit, Functioning of micro programmed control unit, Microinstruction sequencing techniques.	**(06)**
Unit 6	**Pipelining and Parallel Processing:** Pipelining: Introduction, Pipeline organization, Pipelining issues, Memory delays, Branch delays, Performance evaluation, The ARM processor Parallel processing: Types of parallel processor systems, Symmetric multiprocessors, Hardware multithreading, Vector (SIMD) processing, Graphics Processing Units (GPUs), Shared-memory multiprocessors, Cache coherence (**Self- Study:** GPU Nvdia Graphics)	**(08)**

Text Books

1.	Carl Hamacher, "Computer Organization and Embedded Systems", McGraw Hill Higher Education, 6th Edition, 2012.(Unit 1,2,6)
2.	William Stallings, "Computer Organization And Architecture", Pearson Education, 8th Edition, 2010. (Unit 3,4,5)

Reference Books

1.	J. P. Hayes, "Computer Architecture and Organization", McGraw-Hill Publication, 3rd Edition. ISBN: 978-1-25-902856-4.
2.	David A. Patterson and John L. Hennessy, "Computer Organization and Design", MK imprint of Elsevier publication, 5th Edition ISBN: 978-0-12-407726-3.
3.	A. Tanenbaum, "Structured Computer Organization", Prentice Hall of India, 4th Edition 1991. ISBN: 81 – 203 – 1553 – 7.

Useful Links

1.	http://nptel.ac.in/courses/106106134/ Prof. MadhuMatyam, IIT Madras.
2.	https://nptel.ac.in/courses/106/105/106105163/ Prof. Kamalika Datta NIT Meghalaya.
3.	https://nptel.ac.in/courses/106102163/ Prof. Yogesh Sabharwal IIT Delhi.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	-	3	-	2	-	-	-	-	-	-	-	-	2
CO 2	-	3	1	-	-	-	-	-	-	-	-	-	1	-
CO 3	-	-	3	-	-	-	-	-	-	-	-	-	2	-
CO 4	-	1	2	-	-	-	-	-	-	-	-	-	2	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	3	20
Understand	-	-	-	-
Apply	5	5	3	10
Analyse	-	5	3	20
Evaluate	5	-	1	10
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – III) B. Tech. Information Technology				
IT2305: Data Structure and Algorithms				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	-		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Students will be able to:

1.	Write algorithms, its Pseudo code representation and analysis.
2.	Implement linear and non-linear Data Structures.
3.	Perform various operations on Data Structures like searching, sorting and their complexities.
4.	Analyze problem techniques, select appropriate Data Structure and design the Algorithms for the problem.

	Course Contents	Hours
Unit 1	**Algorithm Basics and Recursion:** Algorithms, Pseudo code representation, Abstract data type, Data structures, Algorithm efficiency, Asymptotic notations, Recursion and designing recursive algorithms. (**Self-Study**: Recursive examples)	**(07)**
Unit 2	**Sequential Representation of Linear Data Structures:** Stack, Operations on stack, Applications of stack: Equation parsing, Postponement, Backtracking, Queue, Operations on queue, Priority queues, Circular queue.	**(06)**
Unit 3	**Linked Representation of Linear Data Structures:** Limitations of static memory allocation. Dynamic memory allocation, Singly, doubly and circular linked list, Stack using linked list, Queue using linked list, Operations like insertion, deletion, traversal.	**(07)**
Unit 4	**Nonlinear Data Structures (Trees):** Basic concept and terminology, Data structure for binary trees. Algorithms for tree traversals, Heaps, Binary search trees (BST), Algorithms on BST and applications, Threaded binary tree, AVL tree. B and B+ trees (Theoretical aspects only).	**(08)**
Unit 5	**Non Linear Data Structures (Graphs):** Concepts and terminology of graph, Representation of graph using adjacency matrix and adjacency list, Graph traversal techniques (Depth first and Breath first search), Applications of graphs as minimum spanning tree and shortest path algorithm.	**(08)**
Unit 6	**Searching and Sorting Techniques:** Need of sorting and searching, Sequential search, Binary search, Analysis of searching techniques (Best, Average and worst case), Hashing techniques, Types of hash functions, Collision resolution techniques, Open and closed hashing, Bubble sort, Insertion sort, Selection sort, Heap sort, Merge sort, Quick sort. (**Self-Study:** Analysis of sorting techniques using time and space complexity)	**(12)**

Text Books

1.	Richard Gilberg and Behrouz Forouzan, "Data structures A Pseudo code Approach with C", Cengage Learning, 2nd Edition, 2005(Unit:1,2,3,4,5)
2.	Semour Lipschutz, "Data structures with C", Schaum Series (TMH) ,1st Edition, 2017(Unit:6)

Reference Books

1.	E. Horowitz, S.Sahani, S. Anderson- Freed, "Fundamentals of Data Structures in C", SP publication, 2nd Edition.
2.	Yashwant Kanetkar, "Data Structures through C", BPB Publication
3.	Aaron Tenenbaum, Yedidyah Langsam, "Data structure using C", LPE, Pearson Education
4.	Mark Allen Weiss, "Data structure and algorithm analysis in C", Pearson Education, 2nd edition.

Useful Links

1.	http://nptel.ac.in/courses/106106130/, IIT Madras.
2.	http://nptel.ac.in/courses/106103069/, IIT Guwahati.
3.	http://nptel.ac.in/courses/106106127/, Prof. Shankar Balachandran, IIT Madras.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	1	-	-	-	-	-	-	-	-	-	1	1
CO 2	-	3	3	2	-	-	-	-	-	-	-	-	1	1
CO 3	-	3	2	2	-	-	-	-	-	-	-	-	1	1
CO 4	-	2	3	2	-	-	-	-	-	-	-	-	1	1

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	3	20
Understand	-	5	3	20
Apply	5	5	3	10
Analyse	-	-	-	-
Evaluate	5	-	1	10
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – III) B. Tech. Information Technology				
IT2306 : Digital Systems Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	02 Hrs/week		**CA**	50
Total Credits	01		**ESE**	50

Course Outcomes:	
Students will be able to:	
1	Implement basic gates & Boolean algebra.
2	Design combinational circuit.
3	Design sequential circuit.

Course Contents	
Experiment 1	Study and verify the truth table of basic logic gates and universal gates.
Experiment 2	Simplification and implementation of boolean function using logic gates in both sop and pos forms.
Experiment 3	Simplification and implementation of boolean function using K-MAP.
Experiment 4	Design of combinational circuit for BCD to decimal conversion to drive 7-segment display.
Experiment 5	Realize half/full adder and subtractor using basic and universal gates.
Experiment 6	Implementation and verification of Encoder/Decoder using logic gates.
Experiment 7	Implementation and verification of MUX/DeMUX using logic gates.
Experiment 8	Implementation and verification of Flip Flops.
Experiment 9	Implementation and verification of Master-Slave Flip Flops.
Experiment 10	Realization of Shift Registers.
Experiment 11	Realization of Universal Shift Register.
Experiment 12	Realization of Synchronous/ Asynchronous Up/Down counter.
List of Submission: **These are example problems and teachers should make new problem statements every year similar to this.**	
1.	Total number of Experiments : 10

Mapping of COs and POs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	-	2	3	-	-	-	-	-	1	-	-	-	2	0
CO2	-	2	3	-	-	-	-	-	1	-	-	-	2	0
CO3	-	2	3	-	-	-	-	-	1	-	-	-	2	0

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
CA											

Government College of Engineering, Karad			
Second Year (Sem – III) B. Tech. Information Technology			
IT2307 : Data Structure and Algorithms Lab			
Laboratory Scheme:		Examination Scheme:	
Practical	04 Hrs/week	**CA**	75
Total Credits	02	**ESE**	75

Course Outcomes:

Students will be able to:

1	Describe analysis and design notation of algorithm.
2	Implement sequential and linked representation of linear data structure.
3	Implement non-linear data structure like trees and graph.
4	Solve the searching and sorting techniques in systematic way.

Course Contents

Experiment 1	Implement stack and queue as an ADT using array.
Experiment 2	Implement circular queue as an ADT using array.
Experiment 3	Implement stack as an ADT to perform expression conversion and evaluation for infix to postfix.
Experiment 4	Implement stack as an ADT to perform expression conversion and evaluation for infix to prefix.
Experiment 5	Implement stack as an ADT to perform expression conversion and evaluation for prefix to infix.
Experiment 6	Implement stack as an ADT to perform expression conversion and evaluation for prefix to postfix.
Experiment 7	Implement stack as an ADT to perform expression conversion and evaluation for postfix to infix.
Experiment 8	Implement stack as an ADT to perform expression conversion and evaluation for postfix to prefix.
Experiment 9	Implement a program to perform following operations on singly linked list/ create, insert – start, end, In Between, search and delete, display etc.
Experiment 10	Implement a program to perform following operations on circular linked list: Create, Insert – start, end, In Between, search and delete, display etc.
Experiment 11	Implement a program to perform following operations on doubly linked list: Create, Insert – start, end, In Between, search and delete, display etc.
Experiment 12	Implement of binary search tree and perform recursive and non-recursive in order, pre-order and post order traversals.
Experiment 13	Implement a program to represent a given graph using adjacency list and perform DFS.
Experiment 14	Implement a program to represent a given graph using adjacency list and perform BFS.
Experiment 15	Implement a program for performing bubble sort using STL.
Experiment 16	Implement a program for performing selection sort using STL.
Experiment 17	Implement a program for performing insertion sort using STL
Experiment 18	Implement a program for quick sort using recursion and STL.
Experiment 19	Implement a program for merge sort using recursion.
Experiment 20	Implement a program for performing heap sort.

List of Submission: **These are example problems and teachers should make new problem statements every year similar to this.** Assignments to be submitted on github.com Platform to be used as Linux at least for 10 experiments.

1.	Total number of Experiments : 18

Mapping of COs and POs

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12
Task I	15	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05	05
CA	25	25	25	25	25	25	25	25	25	25	25	25

Skill Level (as per CAS Sheet)	Exp 13	Exp 14	Exp 15	Exp 16	Exp 17	Exp 18	Exp 19	Exp 20	Avg.
Task I	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05
CA	25	25	25	25	25	25	25	25	20

Government College of Engineering, Karad				
Second Year (Sem – III) B. Tech. Information Technology				
IT2308: Industrial Training				
Laboratory Scheme:			Examination Scheme:	
Practical	02 Hrs/week		**CA**	50
Total Credits	01			

Course Outcomes:	
Students will be able to:	
1	Create the ability to work in industry environment.
2	Develop the ability to work in team.
3	Develop the Skill to communicate effectively.
4	Write the project report and research paper.

Course Contents

PART I : Industrial Training / Internship

The students must undergo an industrial training of minimum two-three weeks in an industry preferably dealing with computer and IT industry. It is expected that students should complete work on assignment given by industry. The industrial training completed by the students during summer vacation after first year and needs to be assessed in the third semester of their second year.

Industrial Training/ Internship Report Format:

Maximum five students shall work under one faculty guide nominated by Head of Department. However, each student should have industrial training and its presentation. The report should be of 20 to 30 pages. For standardization of the report the following format should be strictly followed.

1. Page Size: Trimmed A4
2. Top Margin: 1.00 Inch
3. Bottom Margin: 1.32 Inches
4. Left Margin: 1.5 Inches
5. Right Margin: 1.0 Inch
6. Para Text: Times New Roman 12 Point. Font
7. Line Spacing: 1.5 Lines
8. Page Numbers: Right Aligned at Footer. Font 12 Point. Times New Roman
9. Headings: Times New Roman, 14 Point., Bold Face
10. All students should attach standard format of certificate as described by the department.
11. Certificate should have signatures of Guide, Head of Department and Principal/Director.

The entire report should be documented as "Name of Industry with address along with completed training certificate" and area in which Industrial training is completed. All Students must present their reports individually.

Internship Guidelines

Student internships for credit at GCE Karad are carefully monitored, work experiences in which students have intentional learning goals gained through experience in a professional workplace under the general supervision of an experienced professional. Best practices and tools used in industry has to be mentioned specifically in the report.

General Information

- It is the student's responsibility to seek the internship and successfully go through the hiring process of the company they choose.
- Internships may vary in duration but generally for 96 hours (minimum).
- Attendance sheets are required and it is the responsibility of the student to submit a time sheet after two weeks (signed by their supervisor) via paper copy to their department internship coordinator directly.
- Internship hours must be completed with one company for the duration of the semester. Transferring hours from one company to another for the same applied credit during the same semester will not be allowed.

Assessment Guideline:

- The students must submit a report of the training undergone and present the contents of the report before the evaluation committee constituted by the head of department.
- An internal evaluation will be conducted for examining the quality and authenticity of contents of the report and award the marks at the end of the semester.

Mapping of COs and POs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	-	1	1	-	3	-	-	2	1	1	-	2	2	1
CO2	-	1	1	-	3	-	-	2	3	1	-	2	2	1
CO3	-	1	1	-	3	-	-	-	2	1	-	2	2	1
C04	-	-	-	-	-	-	-	2	-	-	2	2	2	1

1: Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2401: Microprocessor and Microcontroller				
Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	-		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO):

Students will be able to :

1.	Explain concept of microprocessor and microcontroller.
2.	Analyze interfacing of microprocessor with peripheral devices along with instruction set and programming.
3.	Interpret interfacing and core expertise knowledge in microcontroller.
4.	Describe Embedded Systems and its application areas.

	Course Contents	Hours
Unit 1	**Fundamentals of Microprocessors:** Concept of microprocessor, micro controller and digital signal processor. Architecture and pin diagram of microprocessor 8085 and 8086. Definition of embedded system and its characteristics, Role of microcontrollers in embedded Systems.	(06)
Unit 2	**Assembly language programming and Interfacing:** Description of instructions set and addressing modes of 8086. Assembly directives and assembly software programs with algorithms. Interfacing with 8086, Interfacing with RAMs, ROMs along with the explanation of timing diagrams. Interfacing with peripheral ICs like 8255, 8254, 8279, 8259 etc. Interfacing with key boards, LEDs, LCDs, ADCs, and DACs etc.	(10)
Unit 3	**Coprocessor 8087:** Architecture of 8087, Interfacing with 8086. Data types, Instructions, Addressing modes and programming, Architecture of 80386.	(05)
Unit 4	**8051 Microcontroller:** Comparison between 8 bit, 16 bit and 32 bit microcontroller, Features, Architecture and pin configuration, Input/output ports, Memory organization, Counters and Timers, Interrupts, Serial data input and output.	(08)
Unit 5	**Programming and Interfacing:** 8051: Instruction set, Addressing mode, Assembler directives. Programming on arithmetic, logic, Delay, Input, Output, Timer, Counter, Serial communication. Interfacing of display: LED, LCD and seven Segment display, (**Self-Study:** 8096 microcontroller)	(06)
Unit 6	**Introduction to Embedded Systems:** Embedded system architecture, Application areas, Categories of embedded systems, Specialties of embedded systems. Brief introduction to embedded microcontroller cores CISC, RISC, ARM, DSP and SoC (**Self-Study**: ARM, DSP and SoC)	(06)

Text Books

1.	D. V. Hall, "Microprocessors & Interfacing", McGraw Hill Higher Education, 1991.(Unit 1,2,3)
2.	M.A.Mazidi, J.G.Mazidi and R.D.Mckinlay," The microcontroller & Embedded systems", Pearson Publication, 2nd Edition 2006. (Unit 4,5,6)

Reference Books

1.	R. Kamal, "Embedded System", McGraw Hill Education, 2009.
2.	R. S. Gaonkar, "Microprocessor Architecture: Programming and Applications with the 8085", Penram International Publishing, 1996.
3.	D. A. Patterson and J. H. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Morgan Kaufman Publishers, 2013.
4.	C.Kenneth J. Ayala and D.V. Gadre, "The 8051 Microcontroller and Embedded System using assembly & 'C',Cengage Learning, 2010.

Useful Links

1.	https://nptel.ac.in/courses/108/107/108107029/ Dr. Pramod Agarwal, IIT Roorkee.
2.	https://nptel.ac.in/courses/106/108/106108100/ Prof. Krishna Kumar, IISc Bangalore.
3.	https://nptel.ac.in/courses/117/104/117104072/ Dr. S.P. Das, IIT Kanpur.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	-	1	-	-	-	-	-	-	-	-	-	1	-
CO 2	-	-	3	2	-	1	-	-	-	-	1	-		1
CO 3	-	-	3	-	1	1	-	-	-	-	1	-	-	1
CO 4	3	-	2	-	-	-	-	-	-	-	2	-	-	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	5	10
Understand	-	5	-	-
Apply	5	-	5	35
Analyse	5	5	-	15
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2402: Discrete Mathematics				
Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	01 Hrs/week		CT – 2	15
Total Credits	04		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Students will be able to :

1.	Formulate given logic sentence in terms of predicates, quantifiers, and logical connectives.
2.	Describe concepts of set theory, relations and functions.
3.	Develop the given problem as graph networks and solve with techniques of graph theory.
4.	Classify algebraic structure for a given a mathematical problem.

	Course Contents	Hours
Unit 1	**Propositional Logic:** Syntax, Semantics, Validity and Satisfiability, Basic connectives and truth tables, Logical equivalence: The laws of logic, Logical implication, Rules of inference, The use of quantifiers. Proof techniques: Some terminology, Proof methods and strategies, Forward proof, Proof by contradiction, Proof by contraposition, Proof of necessity and sufficiency.	(06)
Unit 2	**Sets, Relation and Function:** Operations and laws of sets, Cartesian products, Binary relation, Partial ordering Relation, Equivalence relation, Image of a set, Sum and Product of functions, Bijective functions, Inverse and composite function, Size of a Set, Finite and infinite sets, Countable and uncountable sets, Cantor's diagonal argument and The power set theorem, Schroeder-Bernstein theorem.	(10)
Unit 3	**Basic counting techniques:** Inclusion and exclusion, Pigeon-hole principle, Permutation and combination, Discrete probability.	(05)
Unit 4	**Graphs and Trees:** Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian walks, Graph colouring, Colouring maps and Planar graphs, Colouring vertices, Colouring edges, List colouring, Perfect graph, Definition properties and example, Rooted trees, Trees and sorting, Weighted trees and prefix codes, Bi-connected component and articulation points, Shortest distances.	(08)
Unit 5	**Groups and Rings Algebraic Systems:** Semi groups, Groups, Monoid, Abelian groups, Subgroups, Isomorphism, Automorphisms and Homomorphism group, Rings, Integral domain and fields.	(06)
Unit 6	**Lattices and Algebraic Systems:** Lattices and algebraic systems, Principle of duality, Properties of algebraic system defined by lattices, Boolean lattices and boolean algebras, (**Self-Study:** Boolean functions and Boolean expressions, Normal forms).	(06)

Tutorials

Total 8-10 number of tutorials should be conducted based on above syllabus.

Text Books

1.	J.P. Tremblay and R. Manohar, "Discrete Mathematical Structure and It's Application to Computer Science", TataMcgraw-Hill (Unit:1 to 6)
2.	Norman L. Biggs, Seymour Lipschutz, Marc Lipson, "Discrete Mathematics", Oxford University Press, Schaum's Outlines Series, 2nd Edition (Unit:1 to 6)

Reference Books

1.	Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw – Hill.
2.	Susanna S. Epp, "Discrete Mathematics with Applications,4th edition", Wadsworth Publishing Co. Inc.
3.	C L Liu and D P Mohapatra, "Elements of Discrete Mathematics A Computer Oriented Approach", 3rd Edition, Tata McGraw – Hill.
4.	B. Kolman, R. Busby, S. Ross, "Discrete Mathematical Structures", Pearson Education, 4th Edition.
5.	Eric Gossett, "Discrete Mathematics with Proof", Wiley India Ltd., 2nd Edition.

Useful Links

1.	http://nptel.ac.in/courses/106106094/ Dr. Kamala Krithivasan, IIT Madras.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	-	3	1	1	-	1	-	-	-	1	-	2	2	2
CO 2	3	2	1	1	-	-	-	-	-	1	-	2	2	2
CO 3	3	3	2	-	-	-	-	-	-	-	-	2	3	2
CO 4	2	-	3	1	-	-	-	-	-	-	-	1	2	1

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	2	2	2	12
Understand	3	3	3	
Apply	5	5	2	24
Analyse	-	-	-	-
Evaluate	5	5	3	12
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2403 : System Software and Operating Systems				
Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	-		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

The students will be able to :

1.	Demonstrate the ability to analyze, design programs to demonstrate basic knowledge of systems software and operating systems.
2.	Identify different compiler phases.
3.	Analyze the requirements for process synchronization and coordination handled by operating system.
4.	Explain the process management policies and scheduling of processes by CPU.

	Course Contents	Hours
Unit 1	**Introduction and Overview of Language Processors:** System software, Goals, Language processors, Language processing activities, Fundamentals of language processing. Introduction to assemblers, Macro pre-processor, Linkers and Loaders	(06)
Unit 2	**Compiler – Lexical Analysis and Syntax Analysis:** The structure of a compiler, Lexical analysis: The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, Syntax analysis: Introduction, Context-free grammars, Writing a grammar, Top-down parsing. Compiler – Intermediate-Code generation and code generation: Variants of syntax tree, Three-address code, Code generation: Issues in the design of code generator.	(08)
Unit 3	**Introduction to Operating System:** Operating system (OS) definition, OS evolution, OS components and services. Process concept, Process scheduling, Operations on processes, Interprocess communication.	(06)
Unit 4	**Process Management**: CPU scheduling concepts, Scheduling criteria and algorithms. Process synchronization: The critical-section problem, Semaphores, Monitors. Deadlocks: Definition and characterization, Deadlocks prevention, Avoidance, Detection and recovery from deadlock.	(08)
Unit 5	**Memory Management:** Background, Swapping, Contiguous memory allocation schemes, Paging, Segmentation, Virtual memory management: Background, Demand paging scheme, Process creation, Page replacement policies, Allocation of frames, Thrashing, Introduction to file system interface.	(07)
Unit 6	**I/O Systems:** Overview, I/O hardware, Application I/O interface and kernel I/O subsystem. Transforming I/O to hardware Operations. Disk scheduling, Disk management, Swap-Space management, RAID structure.(**Self-study:** Linux)	(07)

Text Books

1.	D.M. Dhamdhere, "System Programming", McGraw Hill, 1st Edition .(Unit:1)
2.	Alfred V. Aho, "Compilers principles, techniques, & tools", Pearson Education., 2nd Edition.(Unit:2)
3	Silberschatz, P.B.Galvin, G. Gagne, "Operating System Concepts" John Wiley & Sons Publication, 6th Edition. (Unit:3,4,5)
4	D M Dhamdhere, "Operating Systems", Tata McGraw-Hill, 2nd Edition.(Unit:6)

Reference Books

1.	J. J. Donovan, "System Programming", Tata Mc-Graw Hill.
2.	Steven S. Muchnick, "Advanced Compiler Design Implementation", Morgan Kaufmann Publication.
3.	Dhamdhere, D.M., "Introduction to Systems Software", Tata Mc-Graw Hill 1996.
4.	Srimanta Pal, "System Programming", Oxford University Press.
5.	Doug Brown, John Levine, Tony Mason, "Lex & Yacc", O'Reilly Media, 2nd Edition.
6.	A.S Tanenbaum, "Modern Operating Systems", Pearson Education, 3rd Edition.
7.	William Stallings, "Operating Systems", Prentice-Hall, 7th Edition.

Useful Links

1.	www.gnu.org/s/gdb/
2.	https://nptel.ac.in/courses/106/105/106105214/IITKharagpur.
3.	https://nptel.ac.in/courses/106/106/106106144/IITMadras.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO 2	-	3	-	-	-	-	-	-	-	-	-	-	1	1
CO 3	-	-	3	-	2	-	-	-	-	-	-	-	1	1
CO 4	-	3	-	-	1	-	-	-	-	-	-	-	1	1

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	-	10
Understand	10	5	5	35
Apply	-	-	-	-
Analyse	-	5	5	15
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2404 : Database Management System				
Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	-		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

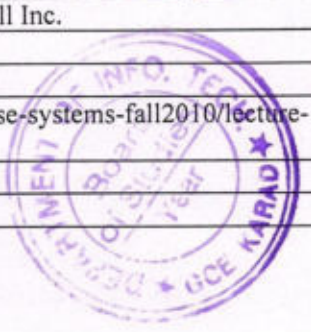
Course Outcomes (CO)	
Students will be able to :	
1.	Design the databases using E-R model and normalization for a given specification of the requirement.
2.	Formulate Regular expressions, SQL queries for a given specification.
3.	Determine the transaction atomicity, consistency, isolation and durability for a given transaction-processing system.
4.	Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

	Course Contents	Hours
Unit 1	**Introduction:** Early information systems: problems, Advantages of DBMS over file-processing systems, Organization of database, Components of database management systems, Data models - Entity-relationship model, Network model, Relational and object oriented data models, Integrity constraints, Data manipulation operations, Database architecture, Schema.	(05)
Unit 2	**Relational Model:** Entity Relation model, Structure of relational databases, The relational algebra, Tuple relational calculus, Structured Query Language (SQL), PL/SQL- Stored procedures, Functions, Trigger, and Cursor.	(08)
Unit 3	**Integrity Constraints and Design:** Domain constraints, Referential integrity, Functional dependencies, Closure of set of functional dependencies, Pitfalls in relational database design, Decomposition, Desirable properties of decomposition, Normalization using functional dependencies (1NF, 2NF, BCNF, 3NF).	(08)
Unit 4	**File and Index Structure:** Physical storage media, Storage access, File organization, Organization of records in files, Data dictionary storage, Indexing and hashing: Basic concepts, Ordered indices, B+ Tree index files, B-Tree index files, Static hashing, Dynamic hashing, Comparison of indexing and hashing.	(07)
Unit 5	**Concurrency Control and Crash Recovery:** Transaction concept, Transaction state, Concurrent executions, Serializability, Recoverability, testing for serializability, Lock-Based protocols, Graph based protocols, Time-Stamp based protocols, Validation based protocols. (**Self-Study:** Recovery and atomicity, Log based recovery).	(07)
Unit 6	**Database Security and Authorization:** Access control, Discretionary access control, Mandatory access control, Intrusion detection, SQL injection	(04)

Text Books	
1.	Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts",McGraw-Hill, 6th Edition.(Unit 1 to 6)
2.	Elmasri and Navathe,"Fundamentals of Database System", Addison Wesely Publication, 5th Edition, 2005. (Unit 1 to 6)

Reference Books	
1.	J. D. Ullman, "Principles of Database and Knowledge – Base Systems", Vol 1, Computer Science Press.
2.	Serge Abiteboul and Richard Hull, Victor Vianu, "Foundations of Databases", Reprint, Addison-Wesley.
3.	Ram Krishnan and Gehrke, "Database Management System", 3rd Edition, McGraw Hill Inc.

Useful Links	
1.	http://nptel.ac.in/courses/106106093/ Prof. D. Janakiram, IIT Madras.
2.	http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-830-database-systems-fall2010/lecture-notes.
3.	https://www.cse.iitb.ac.in/~sudarsha/db-book/slide-dir
4.	http://www.tutorialspoint.com/dbms



Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	-	3	2	-	-	-	-	-	-	2	2	3	3
CO 2	3	2	2	2	-	-	-	-	-	-	-	2	3	2
CO 3	2	-	2	3	2	-	-	-	-	-	-	2	3	2
CO 4	-	-	2	2	2	-	-	-	-	-	-	2	3	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	3	20
Understand	-	-	3	20
Apply	5	5	3	10
Analyse	-	-	-	-
Evaluate	-	-	1	10
Create	5	5	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2405: Object Oriented Programming				
Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	-		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Students will be able to :

1.	Describe basics of C++ and characteristics of Object oriented programming languages.
2.	Apply various concept of OOP like class, object, inheritance polymorphism, dynamic binding etc.
3.	Explain advance features of C++ Language.

	Course Contents	Hours
Unit 1	**Object Oriented Programming:** Object oriented programming paradigm, Concepts of object-oriented programming. Applications of OOP. Beginning with C++: simple program and its structure, Basic types, Variables, Constants, Storage class, Operators, Expression, Control statements, Loop statements, Functions, Inline function, Array, String, Pointers, Structure.	(07)
Unit 2	**Classes and Objects:** Defining class, Data members, Member functions, Access specifiers: public, private, protected, Constructor, Parameterized constructor, Destructor, Array of objects, Passing objects to functions, Returning object.	(05)
Unit 3	**Inheritance:** Need of inheritance, Concept, public, private, protected inheritance, Single inheritance, Multiple and multilevel inheritance, Abstract class, Hybrid inheritance, Virtual base class, Overriding of member functions, Static variable, Static function, Friend function, Friend class.	(06)
Unit 4	**Pointers and Polymorphism:** Pointers basics of memory management, New and delete operators, Pointer to object, Pointer to data members, this pointer, Need of polymorphism, Concept, Compile time polymorphism or early binding: Function over loading and operator overloading, Overloading: Unary, Binary, Arithmetic operators, Relational operators, Overloading new and delete operators, Insertion and extraction operators, Run time polymorphism or late binding using virtual function, Pure virtual function.	(08)
Unit 5	**Files and Streams:** Concept of streams, Concept of file, Opening and closing a file, Detecting end-of-file, File modes, File pointer, Reading and writing characters, Strings and objects to the file, Operations to move file pointers i.e seekg, seekp, tellg, tellp.	(05)
Unit 6	**Advanced C++ features:** Exception handling: Introduction, syntax for exception handling code: try-catch-throw, Multiple exceptions, Exceptions with arguments, (**Self-Study**: Templates: Function template and class template, Standard Template Library (STL), containers, iterators and algorithms)	(05)

Text Books

1.	R. Lafore, "Object Oriented Programming in C++", Galgotia Publications, 3rd Edition. (Unit:1-6)
2.	E. Balguruswamy, "Object Oriented Programming with C++",McGraw-Hill publication, 4th Edition. (Unit:1-6)

Reference Books

1.	Bjarne Stroustrup, "C++ Programming with language", AT & T
2.	Herbert Schildt, "C++: The Complete Reference", McGraw-Hill, 4th Edition.
3.	Cay Horstmann, Timothy Budd, "BIG C++", Wiley India.
4.	Yashvant Kanetkar, "Let us C++", BPB publication, 2nd Edition.
5.	K Venugopal, Raj Buyya, "Mastering C++", McGraw Hill Education, 2nd Edition.

Useful Links

1.	http://www.spoken-tutorial.org NMEICT Project of Govt. Of India.
2.	http://nptel.ac.in/courses/106106127/41 Prof. Shankar Balachandran, IITMadras

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	-	-	3	1	-	-	-	-	-	-	-	-	1	-
CO 2	-	-	3	2	-	-	-	-	-	-	-	-	3	-
CO 3	-	-	3	1	-	-	-	-	-	-	-	-	3	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	3	15
Understand	5	5	3	15
Apply	5	5	4	30
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2406 : Microprocessor and Microcontroller Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	02 Hrs/week		**CA**	25
Total Credits	01			

Course Outcomes:

Students will be able to :

1	Write assembly as well as c programs for microcontroller.
2	Implement delays using timers and waveform using DSO.
3	Implement interfacing of ADC, DAC, LCD, LED, Keyboard, Stepper motor, DC motor etc. with 8051.

Course Contents

Experiment 1	Write a program for addition and multiplication of two 8-bit numbers stored in registers or internal/external memory locations.
Experiment 2	Write a program to add and transfer block of data stored in internal/external memory locations.
Experiment 3	Write a program to sort block of data in ascending or descending order.
Experiment 4	Write a program to perform the following: 1. Keep monitoring P1.2 until it becomes high. 2. When P1.2 becomes high write value 45H on P0. 3. Sent a high to low pulse to P2.3
Experiment 5	Write a program to generate 5KHz pulse waveform of 50% duty cycle on pin 1.0 using timer 1 in mode 2.
Experiment 6	Write a program for the 8051 to transfer letter "A" and message "yes" serially, continuously.
Experiment 7	Implement interfacing of ADC and DAC.
Experiment 8	Implement an interfacing of matrix keyboard.
Experiment 9	Implement an interfacing of LED and LCD display.
Experiment 10	Implement an interfacing of stepper motor.
Experiment 11	Perform an experiment for controlling DC motor using PWM.

List of Submission: **These are example problems and teachers should make new problem statements every year similar to this.**

1.	Total number of Experiments : 10

Requirements:

1.	Keil Microvision IDE, Flash Magic 8051 DVK Microcontroller Kit, Stepper motor module, DC motor module, DSO, Multimeter.

Mapping of COs and POs

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	-	-	-	1	-	-	-	-	2	-	3	1
CO2	1	3	2	-	-	1	-	-	-	-	-	-	3	1
CO3	-	-	3	-	-	2	-	-	-	-	-	2	3	1

1: Slight (Low) 2: Moderate(Medium) 3:Substantial(High)

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05	05
CA	25	25	25	25	25	25	25	25	25	25	25	25

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2407 : System Software and Operating Systems Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	02 Hrs/week		**CA**	50
Total Credits	01			

Course Outcomes:	
Students will be able to :	
1	Understand and implement basic concepts of system software and operating systems.
2	Use modern operating system calls, synchronization libraries and system software in software/ hardware interfaces.
3	Implement memory management schemes and page replacement schemes.
4	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.

Course Contents	
Experiment 1	Symbol table generation for input *.c file
Experiment 2	Implement LEX program to count the number of vowels and consonants in given string.
Experiment 3	Implement LEX program to recognize a valid arithmetic expression and identify the identifiers and operators present. Print them separately.
Experiment 4	Use of LEX & YACC tools to design simple grammar to perform calculator operation.
Experiment 5	Program to create intermediate code generator for simple expression in 3AC format using LEX & YACC.
Experiment 6	Write a program to implement code generator from quadruples.
Experiment 7	Write a program to implement system calls (fork, vfork, wait, exit, signal kill).
Experiment 8	Write a program to implement file permissions and operations (stat, fstat, lock, flock).
Experiment 9	Write a program to implement dining philosophers problem and producer – Consumer problem.
Experiment 10	Write a program to simulate bankers algorithm for the purpose of deadlock avoidance.
Experiment 11	Write a program to simulate page replacement algorithms.
Experiment 12	Write a program to simulate disk scheduling algorithms.
Experiment 13	Study of Linux operating systems.

List of Submission: **These are example problems and teachers should make new problem statements every year similar to this.**	
1.	Total number of Experiments : 10

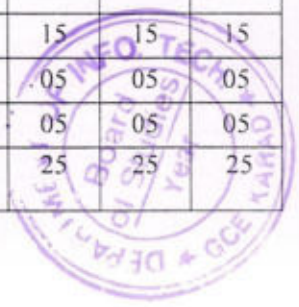
Mapping of COs and POs

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	2	3	-	-	-	-	-	-	-	1	1
CO2	-	2	-	1	2	-	-	-	-	-	-	-	1	1
CO3	-	1	-	-	2	-	-	-	-	-	-	-	1	1
CO4	-	1	-	-	2	-	-	-	-	-	-	-	1	1

1: Slight(Low) 2:Moderate(Medium) 3:Substantial(High)

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05	05	05
CA	25	25	25	25	25	25	25	25	25	25	25	25	25



Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2408: Database Management System Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	02 Hrs/week		**CA**	25
Total Credits	01		**ESE**	25

Course Outcome(CO)	
Students will be able to :	
1	Design ER diagrams for the case studies.
2	Implement DDL,DML and DCL queries.
3	Design Database and normalize data.

Course Contents	
Experiment 1	Study and design of ER diagram for given case study.
Experiment 2	Implementation of DDL for given case study. (Create table with all constraints, Alter table, Drop table).
Experiment 3	Implementation of DML for given case study. (Basic SQL structure-select, from, where clause. Other DML clauses like insert, update, delete, in, between, etc.)
Experiment 4	Implementation of joins for given case study- (Natural Join, outer joins)
Experiment 5	Study and implementation of views.
Experiment 6	Study and use of string, set operations, order by clause. Queries based on above commands. Aggregate functions, Group by, Having clauses for given case study.
Experiment 7	Study and implementation of normalization and normal forms for given case study.
Experiment 8	Study and implementation of PL/SQL- stored procedures, functions for given case study.
Experiment 9	Study and implementation of trigger and cursor.
Experiment 10	Study of DCL queries (Grant, Revoke) for given case study.
Experiment 11	Study and implementation of B+ index file (creation, traversal, deletion operations).
Experiment 12	Study and implementation of static index structure.
Experiment 13	Simulation of immediate log based recovery scheme.
Experiment 14	Simulation of deferred log based recovery scheme.
Experiment 15	Study and implementation of database connectivity using JDBC-ODBC for given case study.
Experiment 16	Implement a mini project based on given case study.
List of Submission: **These are example problems and teachers should make new problem statements every year similar to this.**	
1.	Total number of Experiments : 10

Mapping of CO and PO

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	2	2	-	-	-	1	-	-	-	3	2
CO2	-	-	3	2	2	-	-	-	1	-	-	-	3	2
CO3	-	-	3	2	1	-	-	-	1	-	-	-	3	2

1: Slight(Low) 2:Moderate(Medium) 3:Substantial(High)

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
CA	25	25	25	25	25	25	25	25	25	25	25

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2409: Object Oriented Programming Lab				
Laboratory Scheme:			Examination Scheme	
Practical	02 Hrs/week		**CA**	50
Total Credits	01		**ESE**	25

Course Outcome(CO)	
Students will be able to :	
1	Implement basic C++ programming concepts like inheritance, polymorphism, encapsulation etc.
2	Develop and execute program by using multiple concepts.
3	Analyze errors and program behavior for different set of inputs.

Course Contents	
Experiment 1	Implementation of array, string and structure.
Experiment 2	Implementation of class objects, constructor, destructor, constructor overloading.
Experiment 3	Implementation of multiple and multilevel inheritance with function overriding.
Experiment 4	Implementation of virtual base class and virtual function.
Experiment 5	Implementation of static variable and static function.
Experiment 6	Implementation of friend function and friend class.
Experiment 7	Implementation of function over loading and operator overloading.
Experiment 8	Implementation of dynamic memory allocation using new and delete operators.
Experiment 9	Implementation of virtual function and pure virtual function.
Experiment 10	Implementation of random access file.
Experiment 11	Implementation of exception handling.
Experiment 12	Implement a mini project based on above experiments.

List of Submission: **These are example problems and teachers should make new problem statements every year similar to this.**	
1.	Total number of Experiments : 10

Mapping of CO and PO

PO/ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	2	-	-	-	-	-	-	-	-	3	1
CO2	-	-	3	2	-	-	-	-	-	-	-	-	3	1
CO3	-	-	3	1	-	-	-	-	-	-	-	1	3	1

1: Slight (Low) 2: Moderate (Medium) 3:Substantial(High)

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
CA	25	25	25	25	25	25	25	25	25	25	25

Government College of Engineering, Karad				
Second Year (Sem – IV) B. Tech. Information Technology				
IT2410: Environmental Studies				
Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		**CT – 1**	15
Tutorials	-		**CT – 2**	15
Total Credits	AUDIT		**TA**	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO):

Students will be able to :

1.	Analyze economic and social concepts to evaluate environmental policies and institutions.
2.	Apply methos of ecological and physical sciences in environmental problem solving.
3.	Analyze ethical and historical context of environmental issues and the links between human and natural systems.
4.	Identify the roles and identities of environmental actors in a complex and interconnected world.

	Course Contents	Hours
Unit 1	**Natural Resources and Associated Problems:** Nature of environmental studies: Definition, scope and importance, Multidisciplinary nature of environmental studies, Need for public awareness: Environment resources, Water resources, Mineral resources, Food resources, Energy, Solar energy, Biomass energy, Nuclear energy, Land resources: Land as a resource, Land degradation, Man induced landslides, Soil erosion and desertification.	**(08)**
Unit 2	**Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, Consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, Food webs and ecological pyramids, Characteristics features, Structure and function of the ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).	**(06)**
Unit 3	**Biodiversity and its conservation:** Introduction, Definition, Ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: consumptive use, productive use, Social, Ethical, Aesthetic and option values, Threats to biodiversity habitat loss, Poaching of wildlife, Man- wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity.	**(06)**
Unit 4	**Environmental Pollution:** Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste management: Causes, Effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution.	**(06)**
Unit 5	**Social Issue and Environment:** Disaster management: floods, earthquake, cyclone, tsunami and landslides, Urban problems related to energy water conservation, Rain water harvesting, Watershed management resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions, Global warming, Acid rain, Ozone layer depletion, Social Environment, Sustainability nuclear accidents and holocaust, Wasteland exclamation, Consumerism and waste products.	**(07)**
Unit 6	**Environmental Protection:** Environmental protection act. Air (Prevention and Control of Pollution) act, Water (Prevention and control of Pollution) act, Wildlife protection act, Forest conservation act. Population growth and human health, Human rights, Environment impact assessment, Green tribunals.	**(06)**

Text Books

1.	Dr. P.D. Raut, "Text Book of Environmental Studies", Shivaji University, 2013.
2.	Dr. Madhukar Bachulkar, B.V. Kulkarni and Sharvil A. Shah, "Concise Environmental Studies", R.K. Publications, 2014.

Reference Books

1.	Miller T.G. Jr., "Environmental Science", Wadsworth Publications Co., 2007.
2.	Townsend C., Harper, J. and Michael Begon, "Essentials of Ecology", Blackwell Science, 2012.
3.	Trivedi R.K. and P.K. Goel, "Introduction to air pollution", Techno- Science Publications, 2010.

Useful Links

1.	http://nptel.ac.in/courses/106106134/ Prof. MadhuMatyam, IIT Madras.
2.	https://nptel.ac.in/courses/106/105/106105163/ Prof. Kamalika Datta NIT Meghalaya.
3.	https://nptel.ac.in/courses/106102163/ Prof. Yogesh Sabharwal IIT Delhi.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	-	3	-	-	-	-	3	-	-	-	-	2	-	-
CO 2	3	-	-	-	-	2	-	-	-	-	-	3	-	-
CO 3	-	2	-	-	-	-	-	-	-	-	-	3	-	-
CO 4	2	-	-	-	-	-	-	-	-	-	-	3	-	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	3	20
Understand	-	5	3	-
Apply	-	-	3	10
Analyse	5	5	-	20
Evaluate	5	-	1	10
Create	-	-	-	-
TOTAL	15	15	10	60