Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information	
Programme	B.Tech. (Computer Science and Engineering)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7CS201
Course Name	Computer Organization and Architecture
Desired Requisites:	Basic Electronics Engineering

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-	**Credits: 3**			

Course Objectives	
1	To introduce the organization and architecture of computers.
2	To familiarize the memory organization architecture.
3	To present the basic concepts of execution speedup by pipelining.
4	To enable use of organization concepts for 8085 microprocessor.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	discuss classic computer architectures, microprogrammed control, memory organization, I/O and pipelining	II	Understanding
CO2	examine organization concepts such as control and arithmetic design, memory hierarchy, I/O and pipelining	III	Applying
CO3	use organization concepts for 8085 microprocessor	III	Applying
CO4	compare classic architectures, memory addressing modes, types of I/O interfaces and pipelining concepts	IV	Analysing

Module	**Module Contents**	**Hours**
I	**Introduction to computer organization and architectures** Introduction, Von Neumann Architecture, Harvard architecture, Memory locations & addresses, memory operations, addressing modes, encoding of machine instructions. **Arithmetic design** Design of signed multiplication, Booth's algorithm, bit-pair recording, division, floating point numbers and operations, guard bits and rounding.	8
II	**Control design** Execution of a complete instruction, sequencing of control signals, micro programmed control, microinstruction format, microinstruction sequencing, and bit slice concept.	7
III	**Memory hierarchy** Computer memory organization, RAM/main/primary memories, Read Only memories, cache memories, mapping functions, replacement algorithms,	7

	performance consideration: Multimodal memories & interleaving, hit rate & miss penalty, multilevel cache organization, virtual memories, address translation, memory management requirement.	
IV	**I/O interface** Input-output organization, I/O mapped I/O and memory mapped I/O, Direct Memory Access (DMA), interrupts and interrupts handling mechanisms, device identification, vectored interrupts, interrupt nesting, I/O interfaces, synchronous vs. asynchronous data transfer, I/O channels	7
V	**Pipelining** Basic concepts in pipelining, data hazards, instruction hazards, influence of pipelining on instruction set, data-path & control considerations, performance considerations, and Fyn's classification of computer architectures.	5
VI	**8085 Microprocessor** CPU organization, Microprocessors, Machine language, Assembly Language, Computer classification, Microprocessor Architecture, microcomputer systems; Single chip microcomputer: Microcontrollers, The 8085 microprocessor, machine cycles, 8085 Programming model, Instruction classification, Instruction Data format and storage, 8085 Instructions: Data transfer operations, Arithmetic operations, Logic operations, Branch operations.	6

Textbooks	
1	William Stallings. "Computer Organization and Architecture: Designing for Performance". Pearson Education, 8th Edition/10th Edition, 2010/2016
2	J. Hayes , "Computer Architecture and Organization", McGraw Hill, 3rd edition, 2017
3	Ramesh S. Gaonkar. "Microprocessor architecture, programming & applications", Penram International publications (India) Pvt. Ltd. 6th edition, 2013
References	
1	David A. Patterson and John L. Hennessy "Computer Organization and Design: The Hardware/Software Interface", Elsevier, 5th Edition, 2013
2	N. Senthil Kumar, M. Saravanan, S. Jeevanathan, S. K. Shah. "Microprocessors and Interfacing", Oxford Higher Education, 1st Edition, 2012
Useful Links	
1	https://www.udemy.com/course/computer-organization-and-architecture-j/?couponCode=LEADERSALE24B
2	https://nptel.ac.in/courses/106106166

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2									1			2	
CO2	3	1							2	1			2	
CO3	3	1							2	1			1	
CO4	2	2							1				1	

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2024-25

Course Information

Programme	B.Tech. (Computer Science and Engineering)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7IK201
Course Name	Introduction to Ancient Indian Technology
Desired Requisites:	General curiosity, maturity expected from adult student.

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-	**Credits: 2**			

Course Objectives

1	The course is designed for undergraduate students, interested in learning about the ancient Indian technology which is the hallmark of glorious Indian civilization.
2	The objective is to emphasize on nature centric aspects of ancient Indian technologies that can be adopted in modern time.
3	The course is to expose the students to ancient science and technologies which can be adopted for modern technological development.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	name the ancient Indian technological achievements	II	Understanding
CO2	comprehend the concept of Indian traditional knowledge and its relevance	III	Applying
CO3	explain the Indian contribution to the world at large	III	Applying
CO4	judge the ancient Indian technology.	IV	Analysing

Module	**Module Contents**	**Hours**
I	Introduction: Why are ancient Indian science and technology relevant today? What is science? How is it different from technology? .	4
II	Philosophy of ancient Indian technology, how is different from modern technology? Ancient Indian Scientific methods. Glimpses of ancient Indian science and technology?.	4
III	Material technology in ancient India : Mining, Metals and Metallurgy, Iron Making and craftsmanship, Wootz Steel Technology	5
IV	Extraction of Zinc in ancient India, Glass making, Bead making Techniques, Ceramic Technology.	4

V	Water Harvesting Technology, Irrigation Systems. Town planning, Building construction, Sanitation from ancient India period.	5
VI	Agriculture and Textile Technology in context of ancient India i.e. Bharat.	4

Textbooks	
1	Transcript of the NPTEL course available at https://archive.nptel.ac.in/courses/101/104/101104065/. Title of the course “Introduction to Ancient Indian Technology” by Prof. D.P. Mishra Department of Aerospace Engineering, IIT Kanpur
References	
1	The NPTEL course available at https://archive.nptel.ac.in/courses/101/104/101104065/. Title of the course “Introduction To Ancient Indian Technology” by Prof. D.P. Mishra Department of Aerospace Engineering, IIT Kanpur
Useful Links	
1	https://archive.nptel.ac.in/courses/101/104/101104065/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2					1								
CO2	1					2						1		
CO3	1					2			1					

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher’s assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2024-25

Course Information

Programme	B.Tech. (Computer Science and Engineering)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7EE201
Course Name	Understanding Incubation and Entrepreneurship
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	03Hrs/week	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100

Credits: 3

Course Objectives

1	To familiarize the entrepreneurial framework and the start-up projects which help students to navigate through their own entrepreneurial journey.
2	To develop an entrepreneurial mind-set thereby encouraging the journey of transformation to convert an idea or a solution into a business

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Descriptor**
CO1	Translate creative ideas into a sustainable business opportunity	II	Understanding
CO2	Apply principles and practice of new entrepreneurial venture planning to assess a business idea	III	Applying
CO3	Differentiate among types of Business Models	IV	Analysing
CO4	Evaluate decision making towards establishing enterprises in real life situations	V	Evaluating

Module	**Module Contents**	**Hours**
I	**Introduction to Entrepreneurship**	7

	Hand holding for Entrepreneurship GDC start-up stories, The Entrepreneurial Mind-Set , Corporate Entrepreneurship , Generating and Exploiting New Entries	
II	**Innovation and Entrepreneurship Types** Methodology for Innovation, Team Building, Problem Statement Presentation	6
III	**The Innovation Process** Innovation and Entrepreneurship, Solar Oven case-study Paradigm shift from Design to Entrepreneurship, Bio- Med Innovation and Entrepreneurship, Healthcare and Innovation, Human Centered Innovation, Success Stories	7
IV	**Introduction to Incubators** Business Model Canvas, Technology led Entrepreneurship, Introduction to SINE Incubator, Lean Model Canvas SINE, Start-up Stories:	7
V	**From Corporate to Entrepreneurship** Creativity and Generating Product Ideas, From Idea to Proof of Concept, Network Entrepreneurship	7
VI	**Case Study** Learning from examples Start-up PITCHES - Using Lean Canvas Model	6
Textbooks		
1	Disciplined Entrepreneurship: 24 Steps to a Successful Startup by Bill Aulet	
2	The Essence of Medical Device Innovation by B Ravi	
3	THE FORTUNE AT BOTTOM OF PYRAMID: Eradicating Poverty Through Profits by C.K.Prahalad Stay Hungry	
References		
1	Stay Foolish by Rashmi Bansal	
2	The Entrepreneurial Connection: East Meets West in the Silicon Valley by Gurmeet Naroola	
3	Innovation By Design: Lessons from Post Box Design & Development by B. K. Chakravarthy , Janaki Krishnamoorthi	
Useful Links		

1	

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		3												
CO2			3											
CO3			3											
CO4								3	3	3	3			

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

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Course Information

Programme	B.Tech. (Computer Science and Engineering)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7CS202
Course Name	Discrete Mathematics
Desired Requisites:	Mathematics-(Boolean operations, logical operations)

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-	**Credits: 3**			

Course Objectives

1	Deliver basic concepts of Logic theory to solve real life problems.
2	Introduce graphs, trees and algebraic structure and develop an attitude to solve problems based on these topics.
3	To give deep insight into discrete probability and combinatory.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	explain logical notation to define and reason about fundamental mathematical concepts of logic theory, set theory, relations, probability, counting techniques.	II	Understanding
CO2	solve problems of POSET, Hasse diagram, groups, semigroup and monoid	III	Applying
CO3	analyze various relations and its types, functions and different algebraic structures.	IV	Analyzing
CO4	analyze concepts and algorithms of graph theory and elementary combinatorial processes such as permutations and combinations.	IV	Analyzing

Module	**Module Contents**	**Hours**
I	**Mathematical Logic & Set Theory** Introduction, Statement and Notation, Connectives, statements formulas and truth tables, Tautologies Equivalence of formulas, other connectives, Basic concepts of set theory, Venn Diagram, set operation, algebra of sets.	8
II	**Relations and Functions** Relations, Pictorial representation of Relations, Properties of binary relation, Equivalence Relations, partition and covering of set, POSET and Hasse Diagram, Lattice. Functions: Definition, Domain, Range, Image, etc. Types of functions: Surjection, Injection, Bijection, Inverse	8

III	**Algebraic structures** Basics of Modulo Arithmetic, Introduction, Operations, semigroups, Groups, subgroups, Rings, monoid, Codes and Group codes	5
IV	**Graph theory and its applications** Basic terminology, multigraphs and weighted graphs, Paths and Shortest path in weighted graphs, Hamiltonian and Eulerian Paths and Circuits, Factor of a graph, planar graph , independent sets, coloring	7
V	**Directed graphs** Trees, Rooted Trees, Path lengths in rooted trees, Prefix codes, Binary search trees, Spanning trees and cut sets, Minimal spanning trees, Kruskal's algorithm and Prim's algorithms, Warshall's algorithm for transitive closure of graph	5
VI	**Counting** Basic counting techniques – inclusion and exclusion, Rules of sum and product, permutations, combinations, Basic Counting Techniques (sum, product, subtraction, division, exponent), Pigeonhole and Generalized Pigeonhole Principle with many examples	6

Textbooks	
1	J.P. Tremblay &R. Manohar , "Discrete Mathematical structure with applications to computer", McGraw Hill,1st Edition, 2001
2	Liu, "Elements of Discrete Mathematics", Tata McGraw Hill,3rd edition 2008
3	Kenneth Rosen, "Discrete Mathematics & its application" McGraw Hill, 7th edition 2012.
References	
1	Seymour Lipschutz,Mar Lipson "Discrete Mathematics:Schaum's Outlines Series",Schaum's outline series.,3rd edition, 2009
2	K.D. Joshi, "Foundation of Discrete Mathematics ", New Age International Ltd., 1 st edition,2014
Useful Links	
1	NPTEL: https://youtu.be/Lj9Awpd5ltc
2	NPTEL: https://youtu.be/BYD9yLHQdBs

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	-	-	-	-	-	-	-		-	-	2	-
CO2	3	2	-	-	-	-	-	-	2		-	-	2	-
CO3		3	-		-	-	-	-	2	-	-	-	2	-
CO4		3		-	-	-	-	-	2	-	-	-	2	-
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.														

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2024-25

Course Information	
Programme	B.Tech. (Computer Science Engineering)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7CS203
Course Name	Data Structure
Desired Requisites:	Programming in C including structures, pointers and File Handling

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/Week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	**Credits: 3**			

Course Objectives

1	To make the students understand elementary linear and non-linear data structures and concepts of ADTs.
2	To develop and improve logical thinking and to make the students capable of applying appropriate data structure for solving a given problem.
3	To provide a foundation to analyse and compare various searching and sorting techniques and to select optimal techniques to solve the problem.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	describe the fundamental concepts of linear and non-linear data structures with ADTs, searching ,sorting and hashing techniques.	II	Understanding
CO2	demonstrate use of data structures and apply it to solve the problems.	III	Applying
CO3	compare and analyse data structure algorithms, searching and sorting methods in terms of asymptotic notation.	IV	Analyzing
CO4	select appropriate data structure, searching, sorting method, algorithm for any practical problem.	V	Evaluating

Module Contents

I	**Basic Concepts** Algorithm, Pseudocode, ADT, Data Structure, Algorithmic Efficiency, Asymptotic Notations, Recursion: Direct and Indirect recursion, analysis of recursive functions e.g. Towers of Hanoi, Ackerman's function, etc	6
II	**Linked Lists** Concept of linked organization, Singly linked list, doubly linked list and dynamic storage management, circular linked list, Operations such as insertion, deletion, inversion, concatenation, computation of length, traversal on linked list, Representation and manipulations of polynomials using linked lists.	6

III	**Stacks and Queues** Fundamentals stack and queue as ADT, Representation and Implementation of stack and queue using sequential and linked organization, Circular queue: representation and implementation, Application of stack for expression evaluation and for expression conversion, Backtracking, Stacks and Recursion, Priority queue Doubly Ended Queue.	6
IV	**Trees** Basic terminology, binary trees and its representation, binary tree traversals (recursive and non-recursive), operations such as copy, equal on binary tree, expression trees, AVL Tree, Binary Search Trees, Heaps and its operations, Introduction to Multiway Trees.	7
V	**Graphs** Terminology and Representation of graphs using adjacency matrix, adjacency list and adjacency Multilist, Traversals Depth First and Breadth First, Minimum Spanning Tree, Shortest Path Algorithm.	5
VI	**Searching & Sorting Technique** Searching: Importance of searching, Sequential, Binary, Fibonacci search algorithms Sorting: Internal and External Sorts, Insertion, Heap, Quick sort, Merge sort, Radix sort Hashing: Hashing functions, overflow handling with and without chaining,open addressing: linear, quadratic, rehashing	9

Textbooks	
1	Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures, A Pseudocode Approach With C”,Cengage Learning, Second Edition, 2014
2	S. Lipschutz, “Data Structures,Schaum's” Outlines Series, Tata McGraw-Hill, 2013
3	Ellis Horowitz, S. Sahni, D. Mehta, “Fundamentals of Data Structures in C++”, Galgotia Book Source, New Delhi, 2008
References	
1	Yashavant Kanetkar, “Understanding pointers in C”, BPB Publication, 4th Edition, 2009
2	N. B. Venkateshwarlu, E. V. Prasad, “C and Data Structures”, S. Chand and Company, 2010
3	Jean-Paul Tremblay, Paul. G. Soresan, “An introduction to data structures with Applications”, Tata Mc-Graw Hill International Editions, 2nd edition, 1984
4	Thomas H. Cormen Charles E. Leiserson Ronald L. Rivest Clifford Stein “Introduction to Algorithms” Third Edition, 2009,The MITPress Cambridge.

Useful Links	
1	http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html
2	https://www.coursera.org/learn/data-structures
3	http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/dslab/index.php
4	https://nptel.ac.in/courses/106/106/106106130/

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	1
CO2	2	3	2	-	-	-	-	-	1	1	-	-	3	1
CO3	2	3	2	-	-	-	-	-	1	1	-	-	3	1
CO4	2	2	2	2	-	-	-	-	-	-	-	-	3	1
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2024-25

Course Information	
Programme	B.Tech. (Computer Science and Engineering)
Class, Semester	Second Year B. Tech, SEM III
Course Code	7CS204
Course Name	Computer Network
Desired Requisites:	Hardware and networking essentials

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/Week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-	**Credits: 3**			

Course Objectives

1	To elaborate various features and operations of networking.
2	To inculcate protocol functions and issues related to each layer of the network model.
3	To introduce the design and configuration of various networking techniques.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	articulate and elaborate networking basics and different layers in networking models	II	Understanding
CO2	examine and illustrate the features and operations of protocols of data Link Layer, Network layer, transport layer and Application Layer.	III	Applying
CO3	categorize and compare networking functionalities of protocols under a given scenario.	IV	Analyzing
CO4	analyse and interpret different fields of the packets/frames of protocols and conclude their implication	IV	Analyzing

Module	**Module Contents**	**Hours**
I	**Networking Basics** A Communications Model, Data Communications, Networks, The Internet- An Example, Data communication Concepts and Terminology: Analog and Digital Data Transmission, Transmission Impairments, types of media, Store-and-forward and circuit switching, layered network architecture, the OSI network model,TCP-IP Protocol suite introduction	5

II	**Encoding techniques** Digital Data- Digital Signals, Digital Data- Analog Signals, Analog Data- Digital Signals, Analog Data- Analog Signals. Digital data communication techniques,Numerical problems, Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing	7
III	**Data Link Layer** Data Link Layer and Logical Link Control (LLC) sub-layer: Framing; Error control including Bit- parity, CRC, Stop-and-Wait, Go-back-N, Selective Repeat. Multiple Access Protocols- ALOHA, CSMA/CD Ethernet frame structure Wireless LANs, CSMA/CA, numerical problems	7
IV	**The Network Layer** Logical Addressing: IPv4 addresses, IPv6 addresses, internetworking, NATtransition from IPv4 to IPv6, Address Mapping, ICMP, IGMP, Unicast and Multicast Routing, Numerical problem on logical addressing	7
V	**Transport Layer Protocol** Importance of the transport layer; end-to-end principle,TCP and UDP, process-to process delivery, multiplexing, port numbers, header structure, sequence numbers, ACKs, timeout, TCP connection setup and teardown, Flow control and congestion control at the transport layer	7
VI	**Application Layer** Domain Name Space (DNS),TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP	6
Textbooks		
1	Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 4th/5th Edition, 2017.	
2	William Stallings, “Data and Computer Communications”, Prentice Hall(PHI) , 8th /9th Edition, 2010/2011.	
3	A S Tanenbaum, “Computer Networks”, Pearson Education, ISBN 9788177581652	
References		
1	James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education,5th /7th edition, 2012/2016	
2	Behrouz A. Forouzan, Firouz Mosharraf, Computer Networks: A Top-Down Approach, Tata McGraw-Hill Education Pvt. Ltd, ISBN 10: 1259001563 / ISBN 13: 9781259001567	
Useful Links		
1	https://nptel.ac.in/courses/106/105/106105082/	
2	https://archive.nptel.ac.in/courses/106/105/106105081/	

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	-	-	-	-	-	-	1	2	-	-	1	-
CO2	3	2	-	-	-	-	-	-	1	1	-	-	1	-
CO3	2	3	-	-	-	-	-	-	1	1	-	-	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	1	1
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.														

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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Course Information

Programme	B.Tech. (Computer Science and Engineering)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7CS205
Course Name	Software Engineering
Desired Requisites:	Nil

Teaching Scheme		**Examination Scheme (Marks)**			
		MSE	**ISE**	**ESE**	**Total**
Lecture	3 Hrs/week	30	20	50	100
Tutorial	-				
Practical	-	**Credits: 3**			

Course Objectives

1	To unleash the orientation & importance of engineering approach to software development.
2	To infuse the knowledge of software processes & models practiced at IT industries
3	To acquaint students with the SDLC phases in detail.
4	To emphasize on the Design aspect with UML technology.
5	To inculcate the importance of software quality by virtue of software testing methods.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Grasp industry processes on software development to become IT industry-savvy.	II	Understanding
CO2	practice with the spirit of team-working and importance of using artifacts at SDLC phases.	III	Applying
CO3	Distinguish and evaluate procedural & OO based development practices.	IV	Analysing
CO4	Integrate SDLC phases especially for design and testing of software to undertake industrial strength software projects.	IV	Analysing

Module	**Module Contents**	**Hours**
I	**Software Processes** Need of software engineering approach, ETVX model, project management process, software development process & models, configuration management process, process management process	6
II	**Software Quality & Project Planning** Quality objectives, software quality factors, PAF Model, quality standards, project management plan, cost estimation, project scheduling, personnel planning with WBS, risk management.	6

III	**Software Requirement Analysis & Function Oriented Design** Software requirement process, need and characteristics of SRS artifact, design principles, module level concepts, design notation and specifications, structured design methodology.	7
IV	**Object Oriented Design with UML & Continual Integration** UML model, UML diagrams: Use-case, Class, Activity, State-chart, Interaction, Sequence, Collaboration, Component, Deployment. Continual integration with Agile model process frameworks.	8
V	**User Interface Design & Coding** UI rules, UI analysis and steps in UI design, best programming practices such as TDD & pair programming, verification	4
VI	**Software Testing** Testing purpose and concepts, test process, levels of testing, regression testing, test case design for functional testing & structural testing. Study of Open-source Tools.	8

Textbooks	
1	Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Publishers, 3rd Edition, 2005.
2	Ian Sommerville, "Software Engineering", Addison-Wesley, 7th Edition, 2004.
3	James Rumbaugh, "Object Oriented Modeling and Design with UML", Pearson, 2nd Edition, 2004.
4	Jawadekar W.S., "Software Engineering: principles and practices", Tata McGraw Hills, 1st Edition.

References	
1	Roger S. Pressman, "Software Engineering: Practitioner's Approach", McGraw Hill, 7th Edition, 2010.
2	Gillies A.C. and Smith p., "Managing Software Engineering: CASE studies and solutions", Chapman and Hall, London.

Useful Links	
1	https://nptel.ac.in/courses/106/105/106105182/
2	https://www.javatpoint.com/software-engineering-tutorial

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2		3										3	
CO2			1					2	2	2	2			
CO3														
CO4			2									2		3

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information	
Programme	B.Tech. (Computer Science Engineering)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7CS251
Course Name	Data Structures Lab
Desired Requisites:	Programming in C including pointers and File Handling

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Lecture	-	30	30	40	100
		Credits: 1			

Course Objectives	
1	To develop and improve skills in programming in a systematic way and preparing the students for advanced computer science courses.
2	To make the students understand the concept of ADT, recursion, various searching and sorting algorithms along with their performance comparisons and to use appropriate data structure for modelling given problem.
3	To inculcate theoretical and practical knowledge of various linear and nonlinear data structures to solve real world problems.
4	

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	demonstrate the concept of recursion, abstract properties of various linear and nonlinear data structures, searching and sorting methods through implementation.	III	Applying
CO2	identify suitable data structures to be used to solve the various problems.	IV	Analyzing
CO3	select appropriate searching, sorting method on the basis of its performance while developing application.	V	Evaluating
CO4	create applications for real-time problems using Data Structures.	VI	Creating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Program based on structures and pointers in C.
2. Program based on arrays and pointers in C.
3. File handling and command line arguments.
4. Implementation of recursion.
5. Developing ADT for singly linked list and its applications.
6. Developing ADT for Doubly linked list and its applications.
7. Developing ADT for circular linked list and its applications.
8. Developing ADT for stack and queue and their applications.
9. Implementation of double ended queue.
10. Implementation of recursive and non-recursive tree traversals.
11. Binary search tree and application.
12. Implementation of graph, DFS, BFS.
13. Implementation of searching: linear search, binary search, Fibonacci search.
14. Sorting Methods: Insertion sort, shell sort, heap sort, quick sort, merge sort, radix sort etc.
15. Implementation of hashing

Textbooks	
1	Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures, A Pseudocode Approach With C",Cengage Learning, Second Edition, 2014
2	S. Lipschutz, "Data Structures,Schaum's" Outlines Series, Tata McGraw-Hill, 2013
3	Ellis Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 2008

References	
1	Yashavant Kanetkar, "Understanding pointers in C", BPB Publication, 4th Edition, 2009
2	N. B. Venkateshwarlu, E. V. Prasad, "C and Data Structures", S. Chand and Company, 2010
3	

Useful Links	
1	http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html
2	https://www.coursera.org/learn/data-structures
3	http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/dslab/index.php
4	https://nptel.ac.in/courses/106/106/106106130/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1				3	3				1	1			2	1
CO2			2	2	2								2	1
CO3			2	2	2								2	1
CO4			2	2	2				1	1			2	1

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing (min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

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Course Information	
Programme	B.Tech. (Computer Science and Engineering)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7CECS251
Course Name	Community Field Project
Desired Requisites:	Willing to help with gratitude to the community, being patriotic in national development.

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction		30	30	40	100
		Credits: 01			

Course Objectives

1	To realize the dearth of community engagement to engineering aspirants
2	To acquaint with scope, culture and current practices
3	To connect with especially with rural society, administration and NGO for community development
4	To imbibe with programmes of community engagements whole heartedly

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	identify concepts related to community engagement	I	Remembering
CO2	follow practices of community engagement	II	Understanding
CO3	appraise community development principles, connections, schemes in local reach	IV	Analysing
CO4	create a helpful mind-set to help the unprivileged community futuristically	VI	Creating

List of Experiments / Lab Activities/Topic

List of Activities:

- Need of Community connection: Concepts, Moral responsibility, Ethics and Scope of Community engagement
- Community Culture and Practices: Local societal communities, Rural reach-culture, Practice of community engagement
- Community upliftment: Components, Stages, Primitive Principles for development, Utilities and public resources.
- Support Systems: Local Administration, NGO and Community Involvement
- Socialization: Social contribution of community networking, Various government schemes.
- Programs and Government/industrial initiatives of community engagement and their evaluation.

Textbooks	
1	Principles of Community Engagement, 2nd Edition, NIH Publication No. 11-7782, Printed June 2011.
2	Modern-Day Strategies for Community Engagement (Link: - https://amzn.to/3XadlXO)
3	Introduction to Community Development, Theory, Practice, and Service-Learning, Gary Paul Green, Jerry W. Robinson, Jr, 2011
References	
1	https://www.uvm.edu/sites/default/files/community_engagement_handout.pdf (Community Engagement)
2	https://www.atsdr.cdc.gov/communityengagement/pce_concepts.html (Perspectives of Community)
3	https://egyankosh.ac.in/bitstream/123456789/59002/1/Unit1.pdf (community concepts)
4	Israel BA, Coombe CM, Cheezum RR, Schulz AJ, McGranaghan RJ, Lichtenstein R, Reyes AG, Clement J, Burris A. Community-based participatory research: a capacity-building approach for policy advocacy aimed at eliminating health disparities. Am J Public Health. 2010 Nov;100(11):2094-102. doi: 10.2105/AJPH.2009.170506. Epub 2010 Sep 23. PMID: 20864728; PMCID: PMC2951933.
Useful Links	
1	https://youtu.be/bcFe0cj8kUw
2	https://youtu.be/LhaQUb0hX1g
3	https://images.app.goo.gl/VaMNNMEs77XyPMrP7
4	https://www.sewa.org

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1												1	
CO2	1	1				1							1	
CO3	1	1				2							1	
CO4						1			1	1			1	

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

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AY 2024-25

Course Information

Programme	B.Tech. (Computer Science Engineering)
Class, Semester	Second Year B. Tech., Sem III
Course Code	7VSCS251
Course Name	Object Oriented Programming
Desired Requisites:	Basic knowledge of programming

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Lecture	1 Hrs/Week	30	30	40	100
		Credits: 2			

Course Objectives

1	To provide in-depth coverage of object-oriented programming principles and techniques using C++ and Java.
2	To inculcate the advanced programming concepts in C++ and Java.
3	To use appropriate concepts of java programming such as collection, interface, exception handling, multi-threading, packages etc.
4	To infuse skills of integrating all components to build small java application for real world problem.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Summarize the concepts and usage principles of OOP.	II	Understanding
CO2	Develop the skills to apply concepts of OOP to solve simple problems.	III	Applying
CO3	Investigate and evaluate different OOP concepts to determine their suitability for specific software development projects.	IV	Analyzing
CO4	Design and create solution for real-life applications using OOP concepts.	VI	Creating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Program based on creating Class and Object.
2. Program based on constructor and destructor.
3. Implementation of Inheritance and polymorphism.
4. Programs based on use of template, generic template and function.
5. Programs based on namespaces.
6. Installation of jdk package, understand the difference between jdk and jre folder, set environment variable PATH/CLASSPATH.
7. Implementation of Interface and Package.
8. Implementation of Exception Handling.
9. Implement collection utility classes – list, set, map with their specific methods available in interface or implemented class.
10. Implementation of Multithreading.
11. Implementation of database connectivity using JDBC.
12. GUI design and Event handling using Swing.

Textbooks	
1	Herbert Schildt, "The Complete Reference: C++" Tata McGraw-Hill, 4th Edition, 2010.
2	E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill, 4th Edition, 2008.
3	Cay S. Horstmann, Gary Cornell "Core Java Fundamentals Volume –I" (The Sun Microsystems Press Java Series), 10th Edition, March 2016.
4	Cay S. Horstmann, Gary Cornell, "Core Java Volume – II" (The Sun Microsystems Press Java Series), 10th Edition, April 2017

References	
1	Herbert Schildt, "Java Complete Reference", McGraw Hill Education, 10th Edition, November 2017
2	Kathy Sierra and Bert Bates, "Oracle Certified Associates JAVA Standard Edition 8 Programmer I Exam Guide", McGraw Hill Education (Oracle Press), May 2017
3	Kathy Sierra and Bert Bates, "Oracle Certified Associates JAVA Standard Edition 8 Programmer II Exam Guide", McGraw Hill Education (Oracle Press), July 2018
4	Stanley B. Lippman , "C++ Primer" Pearson , 4th Edition, Jan 2010.

Useful Links	
1	https://onlinecourses.nptel.ac.in/noc21_cs32/announcements?force=true

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1				2						1			2	
CO2				2	2								2	
CO3					3								2	
CO4			3		2			2	3	2			2	
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