

D. Y. Patil College of Engineering and Technology

**Kasaba Bawada, Kolhapur
(An Autonomous Institute)**

NBA Accredited

Accredited by NAAC with 'A' Grade



D Y PATIL
COLLEGE *of*
ENGINEERING & TECHNOLOGY
(AN AUTONOMOUS INSTITUTE)
KASABA BAWADA, KOLHAPUR

Structure and Syllabus

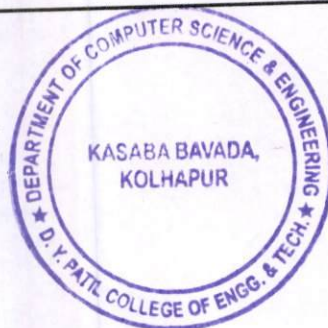
(As per NEP 2020)

for

Second Year B. Tech in Computer Science and Engineering

Department of Computer Science and Engineering

W. e. f. 2024-25



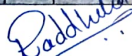
Raddheka

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Computer Science & Engineering
D. Y. Patil College of Engg. & Tech.
Kasaba Bawada, Kolhapur 416 006

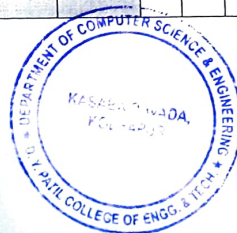
D. Y. Patil College of Engineering and Technology, Kolhapur
Department of Computer Science and Engineering


SEMESTER-III													
Course Code	Course Category	Course Type	Course Name	Teaching Scheme				Theory			Practical		Total Marks
				Credits	L	P	T	ISE	MSE	ESE	INT	OE/ PoE	
231CSEPCCL201	Program Core Courses	PCC	Discrete Mathematical Structures	3	3	-	-	20	30	50	-	-	100
231CSEPCCL202			Computer Networks	3	3		-	20	30	50	-	-	100
231CSEPCCP203			Computer Networks Laboratory	1	-	2	-	-	-	-	25	25	50
231CSEPCCP204			Object Oriented Concepts	3	2	2	-	-	-	-	50	50	100
231CSECEPP201	Comm. Eng. Project (CEP)	CEP	Community Engagement Project	2	-	4	-	-	-	-	50	-	50
231CSEMDML201	Multidisciplinary Minor	MDM-1	Fundamentals of Software Testing	2	2	-	-	20	-	30	-	-	50
231CSEVECP201	Value Education Course	VEC	Responsible use of Technology in Animation	2	1	2	-	-	-	-	50	-	50
231CSEOECL201	Open Elective Course	OEC-1 (ODL Only*)	Computer Networks and Internet Protocol	4	2	-	-	20	30	50	25	-	125
231CSEOECL202			Software Project Management										
231CSEOECL203			Cloud Computing										
231CSEHSSML201	Humanities Social Science and Management	Entrepreneurship / Economics/ Management course	Intellectual Property Rights	2	2	-	-	-	-	50	-	-	50
231CSEMCL201	Mandatory Course	MC	Finishing School Training III	Audit	3*	-	-	50	-	-	-	-	Grade
231CSECCAP201	Co-Curricular Activities	CCA	Liberal Learning	Audit	2	-	-	-	-	-	50	-	Grade
Total				22	10			80	90	230	200	75	675




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SEMESTER- IV													
Course Code	Course Category	Course Type	Course Name	Teaching Scheme				Theory			Practical		Total Marks
				Credits	L	P	T	ISE	MSE	ESE	INT	OE/ PoE	
231CSEPCL205	Program Core Courses	PCC	Automata Theory	3	3	-	-	20	30	50	-	-	100
231CSEPCL206			Data Structures	3	3	-	-	20	30	50	-	-	100
231CSEPCCP207			Data Structures Laboratory	1	-	2	-	-	-	-	25	25	50
231CSEPCCP208			Advanced Object-Oriented Concepts	3	2	2	-	-	-	-	50	50	100
231CSEMDML202	Multidisciplinary Minor	MDM-2	Automation and Manual Testing	2	2	-	-	20	-	30	-	-	50
231CSEVECL202	Value Education Course	VEC	Environment Study	2	2	-	-	-	-	50	-	-	50
231CSEHSSMP202	Humanities Social Science and Management	Entrepreneurship/Economics/Management course	Technologies used for Project management and Start-ups	2	1	2	-	-	-	-	50	-	50
231CSEAECP201	Ability Enhancement course	AEC	Trending Techno Laboratory	2	-	4	-	-	-	-	50	-	50
231CSEOECL204	Open Elective Course	OEC-II	E-Commerce and Digital Marketing	2	2	-	-	-	-	50	-	-	50
231CSEOECL205			Front End Development										
231CSEOECL206			Basics of Data Structures										
231CSEVSECP201	Vocational Skills Enhancement Course	VSEC	Web development	2	1	2	-	-	-	-	50	-	50
231CSEMCL202	Mandatory Course	MC	Finishing School Training IV	Audit	3*	-	-	50	-	-	-	-	Grade
231CSECCAP202	Co-Curricular Activities	CCA	Liberal Learning	Audit	2	-	-	-	-	-	50	-	Grade
			Total	22	16	12	-	60	60	230	225	75	650
231CSEHCL201A/201B/201C	Honors Courses/Double (Minor)	HC (Optional)	Honors Paper- I	04	3	1	-	20	30	50	-	25	125

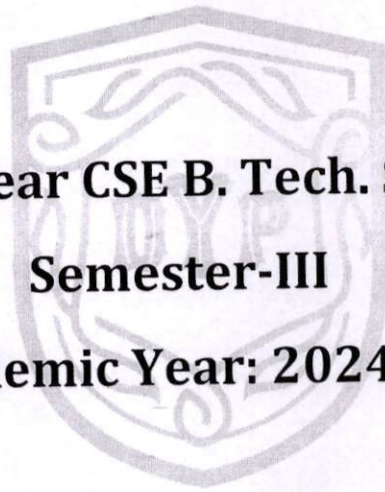



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Second Year CSE B. Tech. Syllabus

Semester-III

Academic Year: 2024-25





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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Discrete Mathematical Structures										
Course Code:231CSEPCCL201				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
3	3	-	-	20	30	50	-	-	-	100

Note: L – Lecture, T – Tutorial, P – Practical, ISE – In Semester Evaluation, MSE – Mid Semester Evaluation, ESE – End Semester Evaluation, INT – Internal marks for practical, OE – Oral Examination, POE – Practical Oral Examination

Prerequisite: Mathematics -Probability Theory, Set Theory.

Course Description:

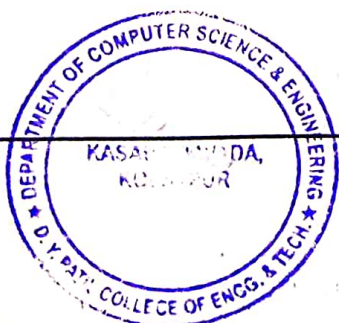
This course is designed to develop logical and mathematical thinking, focusing on mathematical reasoning and problem-solving methods. It covers discrete mathematical structures such as Set Theory, Algebraic Systems, Lattices, Graphs, and Probability. These topics support advanced computer science courses in Automata, Computability, AI, and Information Retrieval.

Course Objectives:

1. To develop logical thinking and its application to computer science.
2. To understand operations on sets, relations, and functions.
3. To explore concepts of algebraic structures and lattices.
4. To introduce basic concepts of graphs, trees, and their applications.
5. To understand permutations, combinations, and probability theory for solving problems.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
PCC201.1	Write arguments using logical notation and determine their validity.	III
PCC201.2	Apply set operations, use Venn diagrams, and identify different types of binary relations based on their properties.	III
PCC201.3	Identify appropriate algebraic structures and lattices.	IV
PCC201.4	Understand graph theory and apply it to computer science applications.	III
PCC201.5	Solve problems using combinations and permutations.	III



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Second Year B. Tech. Curriculum

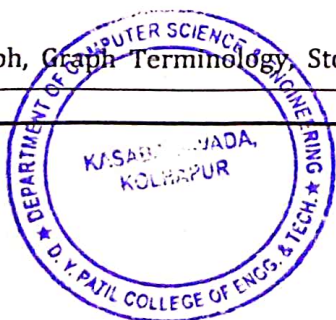
Semester-III & IV (Academic Year: 2024-25)

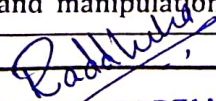
Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
PCC201.1	2	-	1	-	-	-	-	-	-	-	-	1	-	-	III
PCC201.2	2	-	-	-	-	-	-	-	-	-	-	1	1	-	III
PCC201.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	IV
PCC201.4	2	-	-	-	1	-	-	-	-	-	-	-	2	-	III
PCC201.5	2	-	-	-	-	-	-	-	-	-	-	1	-	-	III

Content	Hours
Unit 1: Mathematical Logic Statements and Notations, Connectives – negation, Conjunction, disjunction, conditional, bi-conditional, Statement formulas and truth tables, well-formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connective, Normal and principal normal forms, Theory of Inference for statement calculus – validity using truth table, rules of inference only Rule P & T, Practice Problems.	9
Unit 2: Set Theory Basic concepts of set theory, Operations on sets, ordered pairs, Cartesian Products, Relation and ordering - properties of binary relations in a set, Relation matrix and the graph of a relation, Partition and Covering of set, Equivalence relations, Composition of Binary relations, Functions – types, composition of functions, Inverse functions. Practice Problems.	9
Unit 3: Algebraic Systems Algebraic systems, properties and examples, Semigroups and Monoids, properties and examples, Homomorphism of Semigroups and Monoids, Groups: Definition and examples, Subgroups and homomorphism, Practice Problems.	6
Unit 4: Lattices and Boolean Algebra Partial ordering, POSET and Hasse diagram, Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems, Special lattices. Boolean algebra definition and examples, Boolean functions, representation and minimization of Boolean functions, Practice Problems.	7
Unit 5: Graphs Introduction to graph, Graph Terminology, Storage representation and manipulation of Graphs,	6




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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

PERT and related techniques, Euler and Hamilton Paths, Planar Graphs, Practice Problems.	
Unit 6: Permutations, Combinations and Probability theory Random Experiments, Sample space & Events, Pigeon hole principle, Permutations and Combinations, Concept of Probability Discrete Probability, Conditional Probability.	6

Text Books:

1. J. P. Tremblay & R. Manohar, "Discrete Mathematical Structures with Application to Computer Science" MGH International (Unit 1 to 5).
2. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", SiE Edition, Tata McGraw-Hill, 2008, ISBN 10:0-07-066913-9. (Unit 6).

Reference Books:

1. Seymour Lipschutz, Marc Lipson, "Discrete Mathematics", MGH Schaum's outlines.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications" AT&T Bell Labs (mhhe.com/rosen).
3. John Schiller, Murray R. Spiegel, "Probability and Statistics" MGH, Schaum's outlines.
4. Michael Baron, "Probability and Statistics for Computer Scientists", Second Edition, CRC Press publication.

Online Resources:

1. <https://nptel.ac.in/courses/111/107/111107058/>
2. <https://nptel.ac.in/courses/106/106/106106094/>
3. <https://nptel.ac.in/courses/106/106/106106183/>



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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Computer Networks										
Course Code:231CSEPCCL202				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
3	3	-	-	20	30	50	-	-	-	100

Prerequisite: Basic knowledge of computers.

Course Description:

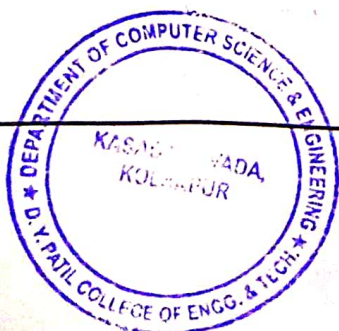
This course provides a comprehensive understanding of the fundamental concepts of computer networks. It covers the essential components and functionalities of data communication, network topologies, protocols, and various networking models. The course delves into the data link layer, addressing schemes, IP datagrams, routing techniques, transport layer services, and application layer protocols, offering a holistic view of computer networking.

Course Objectives:

1. To perceive fundamental concepts of Computer Networks.
2. To understand layered architecture and basic networking protocols.
3. To demonstrate IP addressing schemes as well as subnetting and supernetting techniques.
4. To understand the services and functionalities of the transport and application layers in modern computer networks.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
PCC202.1	Describe the concepts of Computer Networks and Network layered architecture.	II
PCC202.2	Explain the design issues and mechanisms of the data link layer, including error detection and correction, and flow control.	II
PCC202.3	Apply IP addressing schemes and routing techniques.	III
PCC202.4	Understand the services and functionalities of the transport layer and application layer protocols	II



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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Table with 16 columns: COs, POs (1-12), PSOs (1-2), BTL. Rows include PCC202.1 through PCC202.4.

Table with 2 columns: Content, Hours. Rows include Unit 1 (Introduction to Computer Network), Unit 2 (Data Link Layer), Unit 3 (IPv4 Addressing), Unit 4 (IPv4 Datagram and routing techniques), Unit 5 (Transport Layer), and Unit 6 (Application Layer).



Handwritten signature of the Head of Department.

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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Text Books:

1. Behrouz A. Forouzen, TCP/IP protocol Suit, Tata Mag. Hill, 4thEd.

Reference Books:

1. Andrew S. Tanenbaum (PHI), Computer Networks
2. W. Richard Stevens (PHI), Unix Network Programming
3. Richard Stevens, G. Gabrani (Pearson Education.), TCP/IP Illustrated, the Protocols, Vol.I – W.
4. Computer Networking: A Top-down approach, James F. Kurose, Keith W. Ross, Pearson
5. D. E. Comer (Pearson Ed.), Internetworking with TCP/IP, Vol. I Principles, Protocols, and Architectures.
6. D. E. Comer, David L. Stevens (Pearson Ed.), Internetworking with TCP/IP, Vol. III, Client- Server Programming and Application (2ndEd.)

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs18/preview
2. <https://www.udemy.com/topic/computer-network/>
3. <https://www.netacad.com>



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Computer Networks Laboratory										
Course Code:231CSEPCCP203				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
1	-	-	2	-	-	-	25	-	25	50

Prerequisite: Basic knowledge of computers, C / C++ Programming Language, Linux, and Windows OS.

Course Description:

This lab course is designed to provide hands-on experience with the fundamental concepts of computer networks. The course covers key topics such as network topologies, IP addressing, subnetting, routing, and the configuration of network services. Through a series of structured experiments, students will learn to use Cisco Packet Tracer for network simulation, configure DHCP and ARP, implement framing methods, error detection and correction codes, and develops client-server socket programs.

Course Objectives:

1. To provide hands-on experience in designing and configuring network topologies using Cisco Packet Tracer.
2. To develop practical skills in implementing and troubleshooting network protocols and services, including DHCP, ARP, FTP, and email servers.
3. To enhance understanding of network cabling, error detection and correction methods, and IP addressing.
4. To enable analysis and capture of network traffic using Wireshark, and implement client-server socket programming for TCP and UDP protocols.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
PCC203.1	Design and configure basic network topologies using Cisco Packet Tracer.	III
PCC203.2	Configure protocols such as DHCP, ARP, FTP, email servers, etc. using Cisco Packet Tracer	III
PCC203.3	Implement error detection and correction methods	III
PCC203.4	Make use of socket programming and analyze the network traffic using Wireshark	III



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

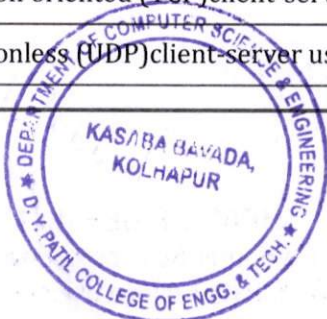
Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
PCC203.1	3	2	-	-	2	-	-	-	-	-	-	-	-	-	III
PCC203.2	2	1	2	-	2	-	-	-	-	-	-	-	-	-	III
PCC203.3	3	2	-	2	-	-	-	-	-	-	-	-	2	-	III
PCC203.4	3	1	-	-	2	-	-	-	-	-	-	-	1	-	III

List of Experiments

No.	Name of Experiment	S/O	Hours
1	Design simple network (Peer to Peer LAN) using Cisco Packet Tracer	0	2
2	Configure a Network topology using Cisco Packet Tracer.	0	2
3	Learn cross-wired cable and straight through cable using crimping tool	S	2
4	Configure DHCP server using CISCO packet tracer.	0	2
5	Address Resolution Protocol (ARP) configuration using Cisco Packet Tracer.	0	2
6	Simulate working of FTP using Cisco Packet Tracer	0	2
7	Simulate working of Email Server using Cisco Packet Tracer	0	2
8	Implementing Framing method: Bit Stuffing	0	2
9	Implementing Elementary data link protocol (Stop & Wait protocol)	0	2
10	Implementation of Error correction code (Hamming Distance)	0	2
11	Implementation of Error detection (CRC)code	0	2
12	Implement C program to find Network ID, Host ID and the network Class of a given input IPv4 Address.	0	2
13	Implementation of Shortest Path algorithm.	0	2
14	Implement connection oriented (TCP)client-server using socket programming	0	2
15	Implement connectionless (UDP)client-server using socket programming	0	2



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Semester-III & IV (Academic Year: 2024-25)

16	Use Wireshark packet sniffer software and capture TCP, UDP, IP, ARP, ICMP, Telnet, FTP packets.	0	2
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S-STUDY, O-OPERATIONAL

Note: The instructor should take at least 10 to 12 experiments from the list.

STUDENTS ACTIVITIES THAT CAN BE CONDUCTED:

1. Group-play activities for demonstration of data-link layer protocols.
2. Group/Individual Presentation activity after a visit to a networking-based industry or laboratory.
3. Implementation and Configuration of the FTP Client-Server model, in a group (2-5 students per group).
4. Seminar / Webinar / Workshop for students by an Industrial expert.
5. Industrial visit to a networking-based industry.

Text Books:

1. Behrouz A. Forouzen, TCP/IP protocol Suit, Tata Mag. Hill, 4thEd.
2. W. Richard Stevens (PHI), Unix Network Programming
3. Kurose James F., Ross Keith W., Computer Networking: A Top-Down Approach, Sixth Edition, By Pearson.

Reference Books:

1. Andrew S. Tanenbaum (PHI), Computer Networks
2. D. E. Comer, David L. Stevens (Pearson Ed.), Internetworking with TCP/IP, Vol. III, Client- Server Programming and Application (2ndEd.)

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs18/preview
2. <https://www.netacad.com>.



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Object Oriented Concepts										
Course Code:231CSEPCCP204				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
3	2	-	2	-	-	-	50	-	50	100

Prerequisite: Basic knowledge of Computers & C Programming.

Course Description:

Object-Oriented Programming (OOP) is a programming paradigm that uses "objects" to design applications and computer programs. This course will cover the fundamentals of OOP, including concepts such as classes, objects, inheritance, polymorphism, encapsulation, and abstraction.

Course Objectives:

1. To understand the principles of object-oriented programming.
2. To learn how to design and implement software using OOP concepts.
3. To develop problem-solving skills using OOP methodologies.
4. To gain proficiency in a specific OOP language.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
PCC204.1	To gain proficiency in Object Oriented Programming Concepts	II
PCC204.2	To demonstrate a thorough understanding of core OOP concepts such as classes, objects, inheritance, polymorphism, encapsulation, and abstraction	III
PCC204.3	To develop strong problem-solving skills by designing and implementing solutions to complex problems	III
PCC204.4	To apply OOP principles effectively in real-world software development scenarios	III



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Table with 16 columns: COs, POs (1-12), PSOs (1-2), and BTL. Rows include PCC204.1 through PCC204.4.

Table with 2 columns: Content and Hours. Rows include Unit 1. Basics of C++ Programming (7 hours), Unit 2. Classes & objects (5 hours), Unit 3. Inheritance (4 hours), Unit 4. Virtual Function and Polymorphism (5 hours), and Unit 5. File handling (4 hours).



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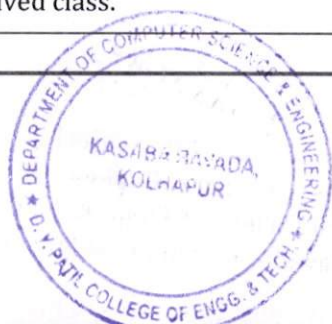
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Semester-III & IV (Academic Year: 2024-25)

Unit 6. Templates and Exception Handling Function Template, Class Template, Generic Classes, Generic. Functions, Standard Template Library (STL): STL Container, STL Algorithm, STL iterator. Exception handling: Exception handling fundamentals, Catching, Throwing, & Handling Exception, Exception handling options	5
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---

List of Experiments			
No.	Name of Experiment	S/O	Hours
1	Implement a program to define a Student class with attributes like name, roll number, and marks. Implement member functions to input and display student details.	0	2
2	Implement a program to create a Complex class to represent complex numbers. Implement member functions for addition, subtraction, and display of complex numbers.	0	2
3	Develop a simple banking system with classes for Account, SavingsAccount, and CheckingAccount. Implement features such as deposit, withdrawal, and account statement.	0	2
4	Implement a Rectangle class with attributes for length and width. Include constructors, a destructor, and member functions to calculate the area and perimeter.	0	2
5	Implement a Program to find out area of different shapes using function overloading.	0	2
6	Implement a program to create student class from which derive test class and from test class derive the result class.	0	2
7	Implement a class hierarchy for a simple library system with a base class LibraryItem and derived classes Book and Magazine.	0	2
8	Implement a program to perform multiple inheritance for Educational Institute database.	0	2
9	Implement a program to perform Hybrid Inheritance	0	2
10	Implement a program to overload all unary and binary operators	0	2
11	Implement a program to overload relational operators	0	2
12	Program to overload insertion and extraction operators	0	2
13	Implement a program to create a base class Shape with a virtual function area(). Derive two classes Circle and Rectangle from Shape and implement the area() function in each derived class.	0	2



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14	Implement a program to create a base class Employee with a virtual function calculateSalary(). Derive two classes FullTimeEmployee and PartTimeEmployee and implement the calculateSalary() function in each derived class.	0	2
15	Implement a program to write user input data to a file and then read it back from the file.	0	2
16	Implement a program that uses try, catch, and throw to handle division by zero exceptions. Create a custom exception class InvalidAgeException and use it to validate the age input for a Person class.	0	2
17	Implement program using template function to find the maximum of two numbers. Create a program that demonstrates the use of STL containers (vector, list, map) for basic operations.	0	2

S-STUDY, O-OPERATIONAL

Note: The instructor may choose minimum twelve experiments from list.

Text Books:

1. The Complete Reference C++ by Herbert Schild (Tata McGraw Hill) 4th Edition and onwards.
2. "The C++ Programming Language" by Bjarne Stroustrup (Pearson Education).

Reference Books:

1. Object-Oriented Programming with C++ by E. Balaguruswamy. (Tata McGraw-Hill) 6th Edition.
2. C++ Programming - An Object-Oriented Approach by Behrouz A. Forouzan and Richard F. Gilberg (Tata McGraw-Hill).

Online Resources:

1. Virtual Lab - <http://cse02-iiith.vlabs.ac.in/>
2. NPTEL - https://onlinecourses.nptel.ac.in/noc21_cs02/preview
3. NPTEL - https://onlinecourses.nptel.ac.in/noc24_cs44/preview



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Community Engagement Project										
Course Code:231CSECEPP201				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	-	-	4	-	-	-	50	-	-	50

Prerequisite: Students should be able to write and integrate source code in various languages.

Course Description:

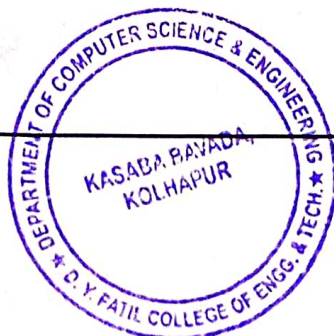
This course aims to engage students in understanding the issues faced by rural areas in India and equipping them with the knowledge of computer science and e-services provided by the Government of India to address these issues. Through group projects, presentations, and practical demonstrations, students will develop a deeper understanding of community service and the use of technology in addressing societal challenges.

Course Objectives:

1. To promote awareness and utilization of government e-services among nearby communities.
2. To familiarize students to use computer science knowledge to solve real world problems of society.
3. To develop teamwork, communication, and presentation skills through group projects.
4. To encourage students to apply theoretical knowledge to real-life scenarios for the benefit of the society.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
CEP201.1	Demonstrate knowledge of various e-services provided by the Government of India to address common people issues.	I
CEP201.2	Work effectively in groups while collecting data, preparing presentations and videos on the identified problem.	II
CEP201.3	Apply classroom knowledge to identify and solve the problems of people in nearby community.	III
CEP201.4	Advocate for the adoption of government e-services and provide solution to the real-world problem of the nearby people.	III



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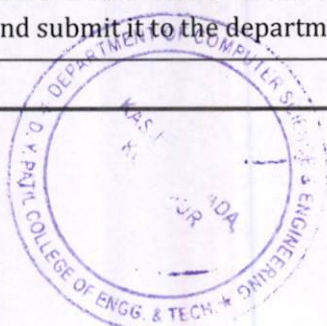
Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Table with 16 columns: COs, POs (1-12), PSOs (1-2), and BTL. Rows include CEP201.1 through CEP201.4.

Table with 2 columns: Content and Hours. Rows describe project phases: Week 1-2, Week 3-4, Week 5-8, Week 9-10, and Week 11-12.



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Semester-III & IV (Academic Year: 2024-25)

- | | |
|---------------------------------------------------------------------------------------------------------------------|--|
| <ul style="list-style-type: none">Peer evaluation and feedback session by beneficiaries and teachers. | |
|---------------------------------------------------------------------------------------------------------------------|--|

Assessment:

- Participation in group activities: 20%
- Group project development and presentations: 40%
- Project demonstration: 10%
- Final reflection of the work: 30%

Note: Two practical sessions of 2 hours per week will be dedicated to project development, research, and hands-on training.

Reference and Online Resources:

- <https://csc.gov.in/digitalIndia>
- <https://www.studyiq.com/articles/digital-india-mission/>



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Fundamentals of Software Testing (MDM-I)										
Course Code: 231CSEMDML201				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	2	-	-	20	-	30	-	-	-	50

Prerequisite: Working knowledge of C programming language.

Course Description:

This course contains an introduction to software testing and discussion of it's main types. Students will learn about the levels of testing at different phases of software development and testing standards.

Course Objectives:

1. To expose the students to basic concepts and principles of software testing.
2. To make the students aware of the importance of testing strategies.
3. To expose the students to Software test plans and level.

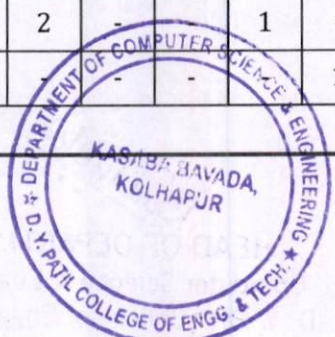
Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
MDM201.1	Understand systematic software testing importance.	II
MDM201.2	Understand the software testing life cycle.	II
MDM201.3	Describe the process of testing.	II
MDM201.4	Understand the testing standards.	II

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
MDM201.1	1	2	-	-	-	-	-	-	-	-	1	1	-	-	II
MDM201.2	2	2	-	-	-	-	-	-	1	-	-	-	1	-	II
MDM201.3	2	2	-	-	1	-	-	-	-	-	-	-	-	-	II
MDM201.4	1	-	-	-	-	1	1	2	-	1	-	1	-	1	II



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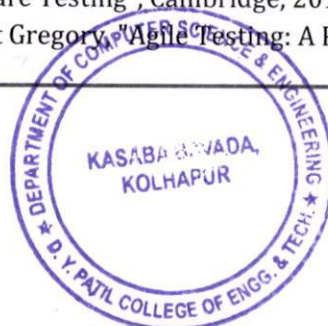
Content	Hours
Unit 1. Introduction to Software Engineering Software Engineering and its importance, Software Process and Project, Component Software Processes, SDLC, Software Development Process Modules (Waterfall, Prototype, Spiral, V-model, RAD, Iterative), Project Management Process. Agile Development- XP, other Agile Process Models.	7
Unit 2. Introduction to Software Testing Testing Process, Selection of Good Test Cases, Measurement of Testing. Incremental Testing Approach, Basic Terminology Related to Software Testing, Testing Life Cycle (STLC), Principles of Testing, Limitations of Testing.	6
Unit 3. Software Verification and Validation Differences between Verification and Validation, Differences between QA And QC, V&V Limitations, Categorizing V&V Techniques, Role of V&V in SDLC—Tabular Form (IEEE std. 1012), Software V&V Planning (SVVP), Software Technical Reviews (STRs).	5
Unit 4. Types of Testings and Levels of Testing Functional and Non-Functional Testing. Introduction, Unit, Integration, System, and Acceptance Testing Relationship, Integration Testing, Classification of Integration Testing, Decomposition-Based Integration, Call Graph-Based Integration, Path-Based Integration with its Pros and Cons.	7
Unit 5. Specialized Testing Types Regression Testing, Smoke Testing, Sanity Testing, Exploratory Testing and Ad-hoc Testing in Agile Development, Introduction to Agile Development and Agile Testing Quadrants.	3
Unit 6. Software Testing Standards Introduction to Software Testing Standards, Key Software Testing Standards, Industry-Specific Testing Standards.	2

Text Books:

1. Panjkaj Jalote, "Software Engineering - A precise approach", Wiley India, 2010 (Unit 1,3,4)
2. Rajiv Chopra, "Software Testing - A Self Teaching Introduction", Mercury Learning and Information, 2018 (Unit 2,3,4,5)
3. Rohit Khurana, "Software Engineering Principles and Practices", Vikas Publication. 2010 (Unit 5)
4. Kshirasagar Naik, Priyadarshi Tripathi, "Software Testing and Quality Assurance - Theory and Practices", Wiley, 2008 (Unit 6)

Reference Books:

1. Hansvan Vliet, "Software Engineering Principles and Practice", Willey-India Edition. 2006
2. P Fleeger, "Software Engineering", Pearson Education, India.2009
3. Yogesh Singh, "Software Testing", Cambridge, 2012
4. Lisa Crispin and Janet Gregory, "Agile Testing: A Practical Guide for Testers and Agile Teams".



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Online Resources:

1. <https://www.geeksforgeeks.org/software-testing-basics/>
2. <https://www.geeksforgeeks.org/software-testing-tutorial/>
3. <https://www.coursera.org/learn/foundations-of-software-testing-and-validation>

ISE 2:

Each student should submit the report on any four Software Testing topics from the list below

- Unit Testing
- Integration Testing
- System Testing
- Performance Testing
- Usability Testing
- Compatibility testing.
- Agile and DevOps Testing Types
- Regression Testing
- Smoke Testing
- Sanity Testing
- Exploratory Testing



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Responsible Use of Technology in Animation										
Course Code:231CSEVECP201				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	1	-	2	-	-	-	50	-	-	50

Prerequisite: Basic knowledge of drawing and design principles or no prerequisites.

Course Description:

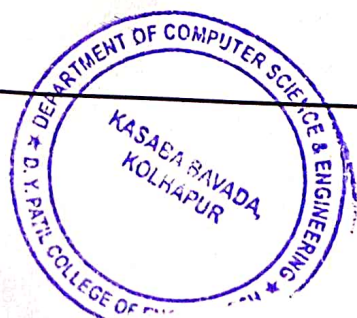
This course covers the basics of animation, including principles, techniques, and history. Students will learn about different animation styles and tools while creating their own animations. The course also highlights ethical practices and social responsibility in animation. Students will understand the impact of their work on society and learn to create responsible content.

Course Objectives:

1. To understand and apply the fundamental principles and techniques of animation.
2. To gain proficiency in various animation styles, tools, and software through hands-on projects.
3. To analyze and discuss the ethical considerations and responsibilities in animation production.
4. To develop the skills to create animations that are ethically sound and socially responsible.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
VEC201.1	Describe the fundamental principles of animation and the technologies used to create believable movement and storytelling.	II
VEC201.2	Describe the ethical considerations in animation production and social responsibility.	II
VEC201.3	Apply 3D modeling techniques to develop character designs, storyboards, and different 3D models for short animations.	III
VEC201.4	Create content that is responsible, respectful, accurate, transparent, culturally sensitive, and inclusive.	IV



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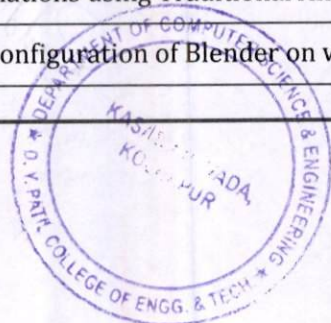
Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
VEC201.1	2	-	-	-	-	-	-	-	-	-	-	-	3	-	II
VEC201.2	2	-	-	-	2	1	-	-	-	-	-	-	3	-	II
VEC201.3	3	3	3	-	3	1	-	-	-	-	-	-	-	3	III
VEC201.4	2	-	-	-	-	-	-	-	-	-	-	-	3	-	IV

Content	Hours
Unit 1. Introduction to Animation Basics of Animation, Principles of Animation, Types of Animations.	2
Unit 2. Technologies used in Animations Traditional Animation Techniques, Digital Animation Software: Blender Introduction, key features, how to Animate in Blender.	4
Unit 3. Character Design and Story Boarding Basics of character design (proportions, shapes, expressions), Importance of storyboarding, elements of a good storyboard (Design, Colour, Light and Shadow, Perspective, Staging, Composition Rules).	3
Unit 4. Introduction to Ethics in Animation Introduction to ethical principles and theories, Definition of ethics in the context of animation, Exploration of the ethical responsibilities of animators, Animation for Education and Social Change, Human Rights and Social Justice in Animation.	3
Unit 5. Responsible Content Creation Legal and Copyright Issues, Copyright law and fair use in animation, Intellectual property rights, Ethical considerations in licensing and distribution.	3

List of Experiments			
No.	Name of Experiment	S/O	Hours
1	Create short animations using Traditional Animation Techniques	0	2
2	Installation and configuration of Blender on windows platform.	0	2



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3	Create and manipulate basic shapes (cube, sphere, cylinder) using blender.	0	2
4	Create simple 3D objects (e.g., a chair or table) using extrude, loop cut, and other mesh tools.	0	2
5	Model a more complex object (e.g., a human face or a creature) in blender.	0	2
6	Apply basic materials to models in blender.	0	2
7	Set up different types of lights (e.g., point, spot, area lights) in blender.	0	2
8	Animate simple transformations (e.g., moving, rotating, scaling an object) in blender.	0	2
9	Create a basic bouncing ball animation in Blender.	0	2
10	Create and apply an armature to a simple character	0	2
11	Animate a simple walk cycle in blender.	0	2
12	Add sound effects and background music to animations	0	2

S-STUDY, O-OPERATIONAL

Note:

1. Blender is used as a case study, and the instructor can use other animation tools as well.
2. The instructor should conduct at least 10 to 12 experiments from the list.
1. The content and experiments are suggestive. The instructor can use the latest versions of the tools as applicable.

Text Books:

1. The complete animation course by Chris Patmore Pub.-Baron’s Educational Series. (New York)

Reference Books:

1. Frank Thomas and Odie Johnson, The Illusion of Life: Disney Animation, Disney Editions.
2. Don Bluth, “Art of Animation Drawing”, First Edition, DH Press,2014.
3. The Encyclopedia of Animation Techniques, Richard Taylor, 1996 (India).

Online Resources:

1. <https://www.blender.org/>
2. <https://studio.blender.org/welcome/>
3. <https://www.youtube.com/watch?v=B0J27sf9N1Y>
4. <https://pixune.com/blog/types-of-animation/>
5. <https://lesley.edu/article/tools-and-technology-that-animators-game-designers-visual-effects-vfx-artists-use>
6. <https://www.geeksforgeeks.org/basics-of-animation/>
7. https://www.splunk.com/en_us/blog/learn/ar-vr.html



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Computer Network & Internet protocol (ODL) (OEC-I)										
Course Code: 231CSEOECL201				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
4	2\$	-	-	20	30	50	25	-	-	125

Prerequisite: Basic knowledge of computers.

Course Description:

The domain of Internet has grown in a rapid pace from traditional circuit switched and packet switched small-scale networks to modern high-speed mobile and wireless Internet. A large number of methods, architectures, and designs came up at every protocol level to cop up with the demands for developing a secure and highly dependable information technology infrastructure. In this course, we will broadly cover the basic TCP/IP protocol stack and touch on the next generation computer networks. We will take a top-down approach to cover different protocols at the TCP/IP protocol stack.

Course Objectives:

1. To perceive fundamental concepts of Computer Networks
2. To understand layered the architecture and principles of computer networks,
3. To understand protocols and their functionalities
4. To understand the requirements for the future Internet and its impact on the computer network architecture.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
OEC201.1	Describe the concepts of Computer Networks and Network layered architecture.	II
OEC201.2	Understand the protocols, algorithms and the addressing model used in networking.	II
OEC201.3	Learn and understand various networking protocols and communication problems	II
OEC201.4	Learn and implement communication using various transport and application protocols	III



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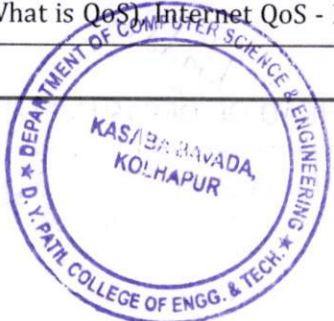
Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
OEC201.1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	II
OEC201.2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	II
OEC201.3	2	3	2	-	-	-	-	-	-	-	-	-	1	-	II
OEC201.4	2	2	-	-	-	-	-	-	-	-	-	-	2	-	III

Content	Hours
Week 1: Introduction to Computer Networks Introduction to Computer Networks - A brief history, Data Networks - from Circuit Switching Network to Packet Switching Network, Network Protocol Stack, Services at the Different Layers of the Protocol Stack, Application Layer I - Different Protocols at the Application Layer	2
Week 2: TCP/IP Protocol Stack – Basic Overview Application Layer II - Domain Name Systems, Application Layer III - The Web, Application Layer III - Hypertext Transfer Protocol, Application Layer III - Internet Mail Transfer, Application Layer IV - File Transfer (FTP)	3
Week 3: Application Layer Services (HTTP, FTP, Email, DNS) Transport Layer I – Services, Transport Layer II – Connection. Transport Layer IV – Reliability, Transport Layer V - Sliding Window Protocols.	2
Week 4: Transport Layer Primitives – Connection Establishment and Closure Transport Layer Performance, Buffer Management and Congestion Control, Transport Layer Primitives, Transmission Control Protocol I – Basics, Transmission Control Protocol II - Connections	3
Week 5: Flow Control and Congestion Control at the Transport Layer Transmission Control Protocol III - Flow Control, Transmission Control Protocol IV - Congestion Control, User Datagram Protocol, Socket Programming – I, Socket Programming – II	3
Week 6: Transmission Control Protocol – Basic Features, TCP Congestion Control Network Layer I – Introduction, IP Addressing (IPv4) I - Classful addressing, IP Addressing (IPv4) II – CIDR, IP Addressing (IPv4) III - Network Address Translation (NAT), IPv6 Addressing	3
Week 7: Network Layer Primitives – IP Addressing Internet QoS - I (What is QoS), Internet QoS - II (Basic QoS Architecture), Internet QoS - III (Traffic	3



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Policing and Traffic Shaping), Internet QoS - IV (Traffic Scheduling), Internet QoS - V (Integrated and Differentiated Service Architecture)	
Week 8: IP Routing – Intra Domain Routing Protocols, Inter Domain Routing Protocols (BGP) IP Routing Table, Routing in the Internet I - Intra-domain routing, Routing in the Internet II - Routing protocols, Routing in the Internet III - Inter-domain Routing, Routing in the Internet IV - Border Gateway Protocol	2
Week 9: IP Services – SNMP, ARP IP Routers, IP Routers Demo, Software Defined Networking - I (Basics), Software Defined Networking - II (Open Flow), Software Defined Networking - III (Demo)	2
Week 10: Data Link Layer Service Primitives – Forwarding, Flow Control, Error Control Data Link Layer - Overview Data Link Layer - Basic Concepts, Data Link Layer – Ethernet, Data Link Layer - Flow and Error-Control	2
Week 11: Media Access Control - Channel Access Protocols, Framing ARP-RAPP-BOOTP-DHCP, Wireless LANs	3
Week 12: End to End Principles of Computer Networks Layer 1: Physical Layer, Layer 1: Physical Layer-II, Layer 1: Physical Layer-III, Network Security-Overview, Network Security-II, Network Security-III (TCP-IP Security)	2

Text Books:

1. Behrouz A. Forouzen, TCP/IP protocol Suit, Tata Mag. Hill, 4thEd.

Reference Books:

1. Andrew S. Tanenbaum (PHI), Computer Networks
2. W. Richard Stevens (PHI), Unix Network Programming
3. Richard Stevens, G. Gabriani (Pearson Education), TCP/IP Illustrated, the Protocols, Vol. I – W.
4. Computer Networking: A Top-down approach, James F. Kurose, Keith W. Ross, Pearson
5. D. E. Comer (Pearson Ed.), Internetworking with TCP/IP, Vol. I Principles, Protocols, and
6. Architectures.
7. D. E. Comer, David L. Stevens (Pearson Ed.), Internetworking with TCP/IP, Vol. III, Client-
8. Server Programming and Application (2ndEd.)

Online Resources:

1. NPTEL Course - <https://nptel.ac.in/courses/106105183>



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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Software Project Management (ODL) (OEC-I)										
Course Code: 231CSELOEC202				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
4	2\$	-	-	20	30	50	25	-	-	125

Prerequisite: Knowledge of Software Engineering

Course Description:

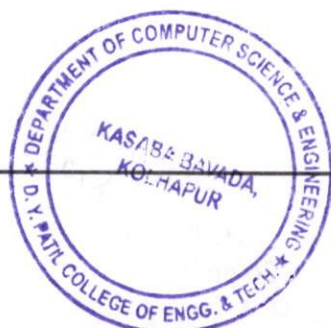
This course will enable the students to have an understanding on the need for Software Project Management. It highlights different techniques for software cost estimation and activity planning. Software Project Management provides the platform for students to gain knowledge on procedures, skills, tools and techniques for applying in real world scenarios. The monitoring and control activities encompass keeping track of the progress and removing bottlenecks using techniques such as PERT, GANTT, and also effective risk management, team building, etc.

Course Objectives:

1. To provide basic understanding of project management principles and practices.
2. To learn the basics of Project Planning and Scheduling.
3. To understand the importance of Time, Cost and Quality attributes in project management.
4. To learn the agile development practices and an agile approach to software development.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
OEC202.1	Identify project characteristics and various stages of a project management.	II
OEC202.2	Apply the concept of project planning and scheduling to meet the goals of project management.	III
OEC202.3	Understand the importance of scope, time and cost attributes in project management.	II
OEC202.4	Use and apply the fundamental concepts of agile methodology and agile development practices in project management.	III



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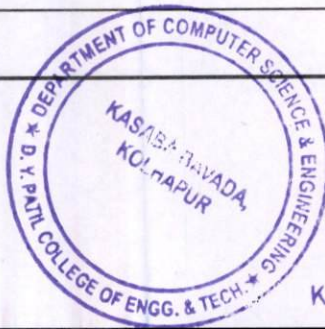
Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
OEC202.1	2	-	-	-	-	-	-	1	-	-	2	-	-	-	II
OEC202.2	2	1	-	-	-	-	-	-	-	-	1	-	1	-	III
OEC202.3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	II
OEC202.4	2	1	1	-	-	-	-	1	-	-	1	-	1	-	III

Content	Hours
Week 1: Introduction to Software Project Management Introduction-I (Introduction about Software Project Management, Jobs, Projects, Exploration), Introduction-II (Introduction of Software projects, Types of Software Project, Project Management Activities), Introduction-III (Introduction of Software products & services, Project Management Activities), Project Management Standards, Life Cycle Models - I (Waterfall Model, V Model, Evolutionary Model, Prototyping Model).	3
Week 2: Selection of a Project Approach Life Cycle Models- II (Waterfall Model, V Model, Evolutionary Model, Prototyping Model), Life Cycle Models - III (Reflection on Waterfall based Model, Incremental, RAD, Evolutionary), Life Cycle Models - IV (Evolutionary Model, Agile Model), Life Cycle Models - V (Agile Model), Life Cycle Models - VI (Sprint, Scrum framework).	3
Week 3& 4: Project Estimation Techniques Project Evaluation and Programme Management (Business case for Project, Project Portfolio Management, Project Management), Project Estimation Techniques (Introduction, Project planning, Basics of Project Estimation)	4
Week 5& 6: Project Planning and Project Scheduling Project Estimation Techniques (Parametric Model, COCOMO 81, COCOMO II), Project Scheduling, Project Scheduling Using PERT/CPM, Computation of Project Characteristics Using PERT/CPM, Computation of Project Characteristics Using PERT/CPM: Illustration	5
Week 7: Project Organization and Team Structures PERT, Project Crashing, Team Management, Organization and Team Structure, Risk Management, Introduction to Software Quality	3



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Week 8 & 9: Risk Management Risk Management, Resource Allocation, Project Monitoring and Control	5
Week 10: Project Monitoring and Control, Software Configuration Management Project Monitoring and Control, Contract Management, Project Close Out	2
Week 11: Software Quality Management Software Quality Management (Evolution of Quality Systems), ISO 9000 (Structure & Certification), ISO 9001(Requirements), SEI CMM	2
Week 12: Managing Contracts and Project closeout Personal Software Process (PSP), Software Reliability - I (Software Reliability Measurement, Reliability Growth Model, Statistical Testing), Software Reliability - II (Hardware Failure Curve, Software Failure Curve, Measuring Reliability Curves), Software Reliability - III (Software Reliability Estimation, Reliability Growth Model, Statistical Model), Software Testing	3

Text Books:

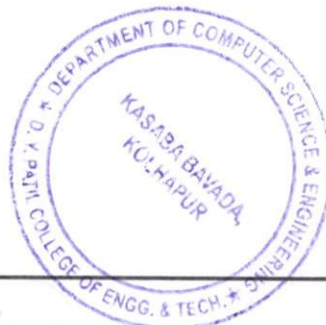
1. Project Management Core Text Book by Samuel Mantel Jr., Jack Meredith, Sutton, M. R.
2. Gopalan, Scott Shafer, Wiley India, First Indian Edition. (Unit 1 to 4)
3. Agile & Iterative Development-A managers Guide by Craig Larman Pearson Education. (Unit 5 and 6).

Reference Books:

1. Information Technology Project Management, Kathy Schwalbe, Cengage Learning
2. Software Project Management, Bob Huges, Mike Cotterell, Rajib Mall, McGraw Hill Education.

Online Resources:

1. NPTEL Course - <https://nptel.ac.in/courses/106105218>
2. ASANA -Manage your team's work, projects, & tasks online
3. Slack - <https://slack.com>
4. JIRA- Jira suite of products | How teams do great work - together (atlassian.com)



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Cloud Computing (ODL) (OEC-I)										
Course Code:231CSEOECL203				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
4	2\$	-	-	20	30	50	25	-	-	125

Prerequisite: Operating Systems, Fundamentals of Computer Networks.

Course Description:

Cloud computing is a scalable services consumption and delivery platform that provides on-demand computing service for shared pool of resources, namely servers, storage, networking, software, database, applications etc., over the Internet. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources, which can be rapidly provisioned and released with minimal management effort. This course will introduce various aspects of cloud computing, including fundamentals, management issues, security challenges and future research trends.

Course Objectives:

1. To explain the main concepts, key technologies and the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
2. To identify problems, and explain, analyze, and evaluate various cloud computing solutions.
3. To research collaboratively on the state of the art (and open problems) in cloud computing.
4. To choose the appropriate technologies, algorithms, and approaches for the related issues and display new ideas and innovations in cloud computing.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
OEC203.1	Summarize the evolution of cloud and its basic concepts	II
OEC203.2	Summarize virtualization techniques, migration and provisioning of VM's in cloud environment.	II
OEC203.3	Understand the importance of scope, time and cost attributes in project management.	II
OEC203.4	Compare different architectures and platforms of cloud computing	IV



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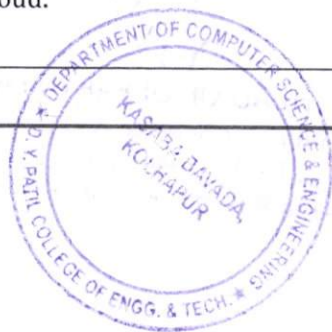
Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
OEC203.1	2	-	-	-	-	-	-	1	-	-	2	-	-	-	II
OEC203.2	2	1	-	-	-	-	-	-	-	-	1	-	1	-	II
OEC203.3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	II
OEC203.4	2	1	1	-	-	-	-	1	-	-	1	-	1	-	IV

Content	Hours
Week 1: Introduction to Cloud Computing Cloud Computing: Overview, Introduction, Architecture.	2
Week 2: Cloud Computing Architecture Cloud Computing Architecture-Deployment Models, Virtualization, XML Basics, Web Services, Services Oriented Architecture.	3
Week 3: Service Management in Cloud Computing Service Level Agreement, Cloud Economics, Managing Data, Introduction to Map Reduce, Open Stack.	2
Week 4: Data Management in Cloud Computing Cloud Computing: Open-Source Cloud-Open Stack Demo, Case Study with Commercial Cloud Microsoft Azure, Demo-Microsoft Azure, Case Study-Google Cloud Platform (GCP), Demo - Google Cloud Platform (GCP).	3
Week 5: Resource Management in Cloud SLA-Tutorial, Cloud Computing Economics-Tutorial, Map Reduce-Tutorial, Resource Management-I, Resource Management-II.	2
Week 6: Cloud Security Cloud Computing Security-I, Security-II, Security-III, Cloud Computing Security Issues in Collaborative SaaS Cloud, Cloud Computing Broker for Cloud Marketplace.	3
Week 7: Open Source and Commercial Clouds, Cloud Simulator Mobile Cloud Computing-I, Mobile Cloud Computing-II, Fog Computing-I, Fog Computing-II, Use Case-Geo-Spatial Cloud.	2



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Week 8: Research trend in Cloud Computing, Fog Computing Introduction to DOCKER Container, Green Cloud, Sensor Cloud Computing, IoT Cloud, Course Summary and Research Areas	3
Week 9: VM Resource Allocation, Management and Monitoring Cloud-Fog Computing - Overview, Resource Management -I, Resource Management - II, Cloud Federation	2
Week 10: Cloud-Fog-Edge enabled Analytics VM Migration - Basics Migration strategies, VM Migration - Basics Migration strategies, Containers Container based Virtualization Kubernetes Docker Container, Docker Container – Overview Docker – Components Docker – Architecture, Docker Container - Demo, Docker Container - Demo.	3
Week 11: Server less Computing and FaaS Model Dew Computing, Server less Computing - I, Server less Computing-- II, Sustainable Cloud Computing - I, Sustainable Cloud Computing - II.	2
Week 12: Case Studies and Recent Advancements Cloud Computing in 5G Era, CPS and Cloud Computing, Case Study I (Spatial Cloud Computing), Case Study II (Internet of Health Things) (Part-A), Case Study II (Internet of Health Things) (Part-B).	3

Text Books:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010

Reference Books:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley- India, 2010

Online Resources:

1. NPTEL Course - <https://nptel.ac.in/courses/106105167>



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Intellectual Property Right										
Course Code:231CSEHSSML201				Semester: III						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	2	-	-	-	-	50	-	-	-	50

Prerequisite: Basic understanding of Intellectual Properties, Patents, Trademarks, Copyrights and designs.

Course Description:

Intellectual property rights (IPR) refer to the legal rights given to the inventor or creator to protect his invention or creation for a certain period of time. These legal rights confer an exclusive right to the inventor/creator or his assignee to fully utilize his invention/creation for a given period-of time.

Course Objectives:

1. To raise student awareness of their rights to protect their inventions.
2. To equip students with knowledge on registering their inventions, designs, and written work in India and abroad, covering patents, copyrights, trademarks, designs, and the Information Technology Act.
3. To identify different types of intellectual property rights (IPRs).

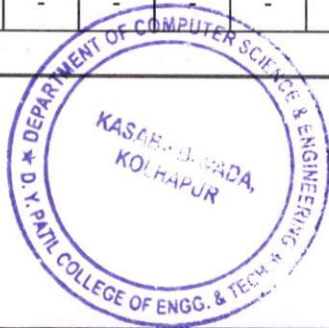
Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
HSSM201.1	Explain importance of Intellectual Property right.	II
HSSM201.2	Demonstrate the filing procedure for patents and copyrights.	II
HSSM201.3	Demonstrate Registration procedure of Trademark & Design.	II
HSSM201.4	Explain IT Act for Intellectual property Right.	II

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
HSSM201.1	-	-	-	-	-	-	-	2	-	-	-	-	-	-	II
HSSM201.2	-	-	3	-	-	-	-	2	-	-	-	-	-	2	II
HSSM201.3	-	-	3	-	-	-	-	2	-	-	-	-	-	-	II
HSSM201.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	II



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Content	Hours
Unit 1: Introduction to IPR Meaning of property, Meaning of Intellectual Property Rights, Kinds of Intellectual property rights— Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication.	6
Unit 2: Patent Rights and Copy Rights Origin, Meaning of Patent, Types, Inventions which are not patentable, Registration Procedure, Rights and Duties of Patentee, Assignment and license. Copy Rights—Origin, Definition & Types of Copy Right, Registration procedure, Assignment & license, Terms of Copy Right, Piracy.	6
Unit 3: Trade Marks Origin, Meaning & Nature of Trade Marks, Types, Registration of Trade Marks, Infringement & Remedies, Offences relating to Trade Marks, Passing Off, Penalties.	6
Unit 4: Design Meaning, Definition, Object, Registration of Design, Cancellation of Registration, International convention on design, functions of Design.	6
Unit 5: Patent Acts in India Patent Act 1950 & 1970 – amendments of 1999, 2000, 2002 and 2005. Patentability criteria, non-patentable inventions. Case Study: Patent Act in UK 1977 & 2023, Rules And Regulation filing the Patent UK.	6

List of Experiments			
No.	Name of Experiment	S/O	Hours
1	The Structure of the Intellectual Property Offices of India is as under.	S	2
2	Flow chart of patent granting system.	S	2
3	Flow chart of trademark application filing up to acceptance.	S	2

S-STUDY, O-OPERATIONAL

Text Books:

1. Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy.
2. Intellectual Property A Primer for Academia, Prof. Rupinder Tewari, Bureau Panjab University Chandigarh.
3. IPR by P. Narayanan 4. Law of Intellectual Property, Asian Law House, Dr. S. R. Myneni.



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Online Resources:

1. https://onlinecourses.nptel.ac.in/noc22_hs59/preview
2. World Intellectual Property Organization - <https://www.wipo.int/about-ip/en/>
3. Introduction to Intellectual Property, By KAPILA IPR committee, IIT Kharagpur



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Liberal Learning										
Course Code: 231CSECCAP201				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	Grade
Grade	2	-	-	-	-	-	50	-	-	Grade

1. Coding Club - Code to evolve

Overview:

Club provide students with an opportunity to learn coding skills, collaborate with peers and work on coding projects beyond traditional classroom setting. Club shall promote the best coding practices among students and enhances their employability. While club may initially seem, like a fun and engaging activity for student. Club also offer numerous benefits that can positively impact their academic and future professional careers

Aims:

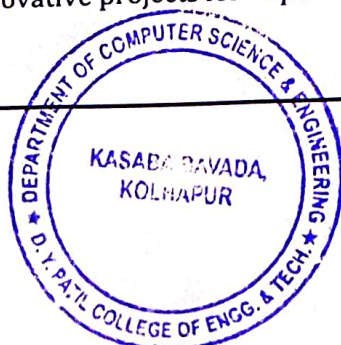
- To promote excellence in Computer Science and Engineering education and overall practice.
- To advance the development and exchange of relevant knowledge. Gain technical and collaborative skills to design real-life projects.
- To be a forum for interaction among students of the institute.
- To conduct more coding competitions to reach every student on campus
- To conduct workshops on areas of computer science like web development, application development, machine learning, IoT etc

Objectives:

- Motivate students to learn programming with enthusiasm.
- Guide the students in solving programming problems in different points of view.
- Improve the programming skills of students by conducting more coding competitions through online platform like CodeChef, HackerRank, Leetcode etc.

Outcomes:

- Improved programming skills among students in their programming domains or areas of interest
- Student participation in events like Codeathons and Hackathons.
- Taking up innovative projects for implementation by students.



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3rd Sem.: (Data Structure): -

Sr. no	Content	Hrs
1	Array (Arrays, Pointers to array, access or change the array element, omit elements, get array size, multidimensional Arrays, passing array to functions)	2
2	Searching Technique (Linear Search, Sentinel Linear Search, Binary Search, Fibonacci Search)	2
3	Sorting Technique (Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Heap Sort, Radix Sort)	4
4	Queue (Introduction to Queue, Operation of Queue, Application of Queue)	4
5	Stack (4 hours) (Introduction To Stack, Operations of Stack, Application of Stack)	4
6	Linked list (6 hours) (Singly Linked List, Doubly Linked List, Circular Linked List Circular Doubly Linked List)	6
7	Tree (4 hours) (Introduction to Tree, Terminologies of Tree, Representation of tree, Types of Trees, Basic Operation of Tree, Application of Tree)	4
8	Graphs (5 hours) (Graph Data Structure, Components of graph, difference between Tree and Graph, Breadth First Search, Depth first Search, Difference between BFS and DFS, cycles in Graph)	5

❖ AICTE-EDUSKILLS Courses:

1. All students have to mandatorily select the one course within one semester.
2. The evaluation will be done at the end of the two consecutive semester.

Company	Course Name
SS&C Blueprism	Intelligent Automation Virtual Internship
UiPath	RPA Developer Viral Internship

Evaluation:

1. Attendance -10
2. Practical Assignments -10
3. 50 Days of coding (+Programs) -10
4. Oral -10
5. Surprise Test -10

Total -50



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Students should practice the question on the platforms like Geeks for geeks, HackerRank, CodeChef, HackerEarth or LeetCode.

Second Year: -

Sem. III- 50 Marks + *(5 Marks or 2 Marks) + #5 Marks

***Marks- Additional marks per semester**

5 Marks – Achievements in National level and State Level competition (coding hackathons)

2 Marks – Participation in National level and State Level competition (coding hackathons)

#Marks –

5 Marks- Additional marks for certification of Eduskills and Paper Publications.

If Student completes an industrial project during a semester, then student will get full marks.

Grades: -

Marks	50 + (*/#)	50-45	45-35	35-25	25-20	Less than 20
Grades	O	A	B	C	D	F

Note: - O for Outstanding Performance.



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2. Google Developer Students Club (GDSC)

Overview:

The Google Developer Student Club (GDSC) at D. Y. Patil College of Engineering and Technology (Kolhapur) is a student-run community group passionate about building technical skills and fostering innovation. Founded in 2021, it empowers students across all academic backgrounds to explore the world of Google developer technologies, collaborate on projects, and contribute to the local community.

Aim:

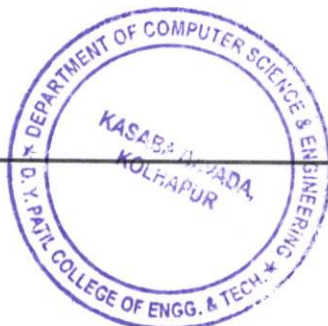
The Google Developer Student Club at D. Y. Patil College of Engineering and Technology (GDSC DYPCET) fosters a collaborative community of students passionate about technology and innovation. Our goal is to provide a platform for skill development, knowledge sharing, and hands-on experience with cutting-edge technologies. We support peers in learning and interacting effectively, enhancing their technical skills, expanding their networks, and aiding in career development through workshops, events, and project-building activities. Led by passionate leaders and committed members, we strive to apply new knowledge to solve local problems and make a positive impact on our community.

Objectives

The objectives of the program include:

- **Learning:** To provide a platform for students to learn about various Google technologies, including Google Cloud Platform, Android, TensorFlow, and more.
- **Community Building:** To create a community of students who are passionate about technology and interested in learning and sharing their knowledge with others.
- **Skill Development:** To provide opportunities for students to develop their technical skills, including coding, design, project management, and entrepreneurship.
- **Collaboration:** To encourage collaboration among students, faculty members, and industry experts to work on real-world projects and solve challenging problems.
- **Career Development:** To help students prepare for careers in technology by providing them with access to industry leaders, job opportunities, and mentorship programs.

Overall, the Google DSC program aims to create a network of student developers who are well-equipped to succeed in the tech industry and contribute to the development of their local communities.



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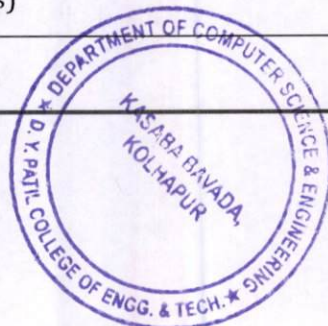
Semester-III & IV (Academic Year: 2024-25)

Outcomes

Skill Enhancement: Participants acquire practical skills in coding, problem solving, and project management. **Networking Opportunities:** GDSC DYP CET connects students with industry professionals, fostering valuable networking opportunities.

Real-world Projects: Engaging in projects provides hands-on experience and strengthens problem-solving abilities. **Community Engagement:** By participating in community-driven initiatives, students learn the importance of collaboration and giving back to society

Sr. no	Content	Hrs
1	Unit 1: Foundations of Java - Overview of Java and its significance (30 min) - Installation of Java Development Kit (JDK) and Integrated Development Environment (IDE) (30 min) - Basic syntax, data types, and variables (2 hours)	3
2	Unit 2: Control Flow and OOP Basics - Conditional statements (if, else, switch) (1 hour) - Looping constructs (for, while, do-while) (1 hour) - Object-Oriented Programming (OOP) Basics (4 hours) - Understanding Classes and Objects & Memory Management (2 hour) - Introduction to Inheritance and Polymorphism (2 hour) - Introduction to Encapsulation and Abstraction (1 hour)	7
3	Unit 3: Error Handling and File Operations - Exception Handling basics (1 hour) - Working with try-catch blocks and the 'finally' keyword (1 hour) - File Handling in Java (2 hours) - Reading and writing to files - Working with text and binary files (Serialization & Deserialization)	4
4	Unit 4: Collections - Introduction to Java Collections (List, Set, Map) (2 hours) - Basic operations and iteration with collections	2
5	Unit 5: GUI Programming - Basics of GUI Programming in Java: AWT, Swing, and JavaFx(1 hour) - Creating Simple GUI Applications: Building Windows and Adding Components (2 hour) - Event Handling: Implementing Event Listeners (2 hour)	5
6	Real time problem statement. (Based on above topics problem statements will be given to students and assessed based on this)	6



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Department of Computer Science & Engineering

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Semester-III & IV (Academic Year: 2024-25)

Evaluation:

Sr. no.	Rubrics	Marks (50)
1	Attendance	10
2	Continuous Assessment - Performance (10 marks) - Coding problems (10 marks)	20
3	Practical Oral Examination - Oral (10 marks) - Coding (10 marks)	20

Students should practice the question on the platforms like Hackerrank, codeChef, LeetCode.

Second Year: -

Sem III- 50 Marks + *(5 Marks or 2 Marks) + #5 Marks

Sem IV- 50 Marks + *(5 Marks or 2 Marks) + #5 Marks

***Marks- Additional marks per semester**

5 Marks – Achievements in National level and State Level competition (coding hackathons)

2 Marks – Participation in National level and State Level competition

(coding hackathons) / Google Cloud Arcade (2 or more badges required)

#Marks –

5 Marks- Additional marks for submitting a solution at Google Solution Challenge.

If Student completes an industrial project during a semester then student will get full marks.

Grades: -

Marks	50 + (*/#)	50-45	45-35	35-25	25-20	Less than 20
Grades	O	A	B	C	D	F

Note: - O for Outstanding Performance.



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3. Microsoft Learn Student Ambassadors (MLSA)

Overview:

Microsoft Learn Student Ambassadors (MLSA) is a distinguished global program specifically designed to empower students in their pursuit of knowledge, network expansion, and the application of technology for the betterment of their communities.

Aim:

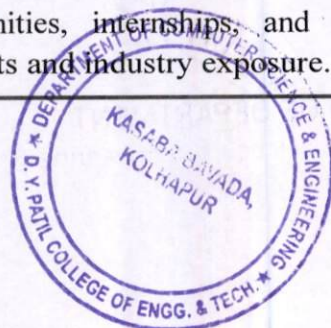
- 1. Skill Growth:** Enhance technical and soft skills in areas like coding, leadership, and community building.
- 2. Global Community:** Connect with students from over 100 countries, fostering online communities and expanding influence.
- 3. Certifications:** Receive training and earn certifications to validate expertise in various technologies.
- 4. Impact:** Become agents of change, making a lasting impact on important projects and communities.
- 5. Career Boost:** Boost resumes, personal growth, and online influence to kick start careers.
- 6. Access to Technologies:** Gain access to cutting-edge Microsoft technologies like Microsoft 365, Visual Studio Enterprise, and Azure.

Objectives:

1. Fostering a Community of Tech Enthusiasts
2. Enhancing Technical Proficiency.
3. Hosting Webinars and Microsoft Learn Challenges.
4. Technical Workshops and Training Sessions.
5. Participation in Microsoft Events and Competitions

Outcomes:

1. Graduates will demonstrate heightened technical skills acquired through hands-on participation in coding challenges, webinars, and Microsoft Learn Challenges, providing them with a competitive edge in the job market.
2. Students will exhibit proficiency in organizing and hosting technical events, such as webinars, Microsoft Learn Challenges, showcasing their ability to plan and execute successful projects.
3. Graduates will contribute positively to the local community by leveraging their technical skills and knowledge gained through MLSA chapter involvement, fostering a culture of collaboration and making a tangible difference in the community.
4. Students will establish valuable connections within the tech industry, leading to mentorship opportunities, internships, and collaborative projects, thereby enhancing their career prospects and industry exposure.



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Semester-III & IV (Academic Year: 2024-25)

Content Unit	Hours
Unit 1: Getting Started with LinkedIn <ul style="list-style-type: none">• Introduction to LinkedIn• Creating Your LinkedIn Account• Setting Up Your Profile• Connecting with Others• Following Companies and Influencers• Understanding LinkedIn's Benefits	6
Unit 2: Optimizing Your LinkedIn Profile <ul style="list-style-type: none">• Adding Your Work Experience• Highlighting Your Education• Showcasing Your Skills• Including Projects and Achievements• Managing Recommendations and Endorsements	6
Unit 3: Using LinkedIn for Career Development <ul style="list-style-type: none">• Effective Job Searching on LinkedIn• Expanding Your Professional Network• Engaging in LinkedIn Groups• Accessing Learning Resources on LinkedIn• Exploring Premium Features	6
Unit 4: Understanding Git <ul style="list-style-type: none">• Introduction to Version Control Systems• What is Git?• Key Concepts in Git (Commits, Branches, Repositories)• Installing Git• Setting Up Your Git Configuration• Basic Git Commands (Init, Clone, Add, Commit, Push)	6
Unit 5 : Getting Started with GitHub <ul style="list-style-type: none">• Introduction to GitHub• Creating a GitHub Account• Setting Up Git with GitHub• Creating Your First Repository• Using GitHub Desktop	6



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<ul style="list-style-type: none">• Collaborating on GitHub (Fork, Clone, Pull Request)	
Unit 6: Advanced GitHub Usage <ul style="list-style-type: none">• Branching and Merging in Git• Managing Collaborative Projects• Reviewing Changes with Pull Requests• Using Issues and Labels• GitHub Pages for Hosting Projects	6

Evaluation Guidelines:

1. Attendance (10marks)
2. Collaboration and Teamwork(10marks)
3. Practical Assignments(10marks)
4. MSE (Member Self-Evaluation) (10marks)
5. ESE (External Stakeholder Evaluation) (10marks)

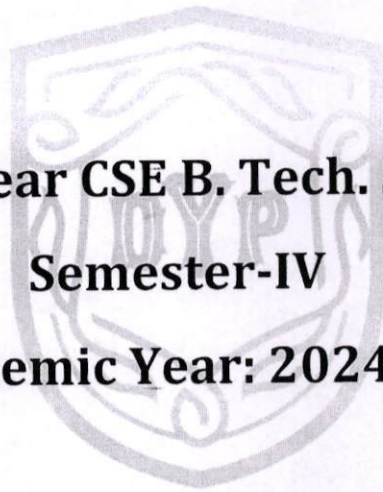


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Second Year CSE B. Tech. Syllabus

Semester-IV

Academic Year: 2024-25





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Semester-III & IV (Academic Year: 2024-25)

Course Title: Automata Theory										
Course Code:231CSEPCL205				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
3	3	-	-	20	30	50	-	-	-	100

Prerequisite: Discrete Mathematical Structures.

Course Description:

Automata theory is the theory of Computer Science which deals with the study of abstract machines and automata, as well as the computational problems that can be solved using them. This course introduces the fundamental concepts of Finite Automata, Regular Languages, Grammar for formal languages, Pushdown Automata and Turing Machines. Automata theory is important because it allows scientists to understand how machines solve problems. Learning how to design automata machines helps to improve the logical thinking capability of the students.

Course Objectives:

1. To expose the students to the mathematical foundations of computation, the theory of formal languages and grammars.
2. To analyze and design finite automata, pushdown automata, grammar for formal languages & Turing machines.
3. To strengthen the students' ability to carry out formal and higher studies in computer science.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
PCC205.1	Explain and identify types of formal languages and their acceptor.	II
PCC205.2	Design grammars, Parsers and recognizers for different formal language	III
PCC205.3	Design a various computation machines like finite state machines, Push Down Automata and Turing Machines.	III
PCC205.4	State and justify theorems in Automata Theory	III



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Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
PCC205.1	3	3	1	3	-	-	-	-	-	-	-	1	3	-	II
PCC205.2	3	3	1	3	-	-	-	-	-	-	-	1	3	-	III
PCC205.3	3	3	1	3	1	-	-	-	-	-	-	1	1	-	III
PCC205.4	3	3	1	3	-	-	-	-	-	-	-	1	1	-	III

Content	Hours
Unit 1: Regular Languages and Finite Automata Regular Expressions and Regular Languages, Finite Automata, Union, Intersection & Complement of Regular Languages, Applications of FA. Introduction to Output producing FAs: Mealy and Moore machine, Example Solving	10
Unit 2: Non determinism and Kleene's Theorem Nondeterministic finite automata, NFA with null transition, Equivalence of FA's, Kleene's Theorem Part I along with its proof, Kleene's Theorem Part II only introduction to statement, Minimal State Finite Automata, Example Solving	7
Unit 3: Context Free Grammar Definition, Types of Grammar (Chomsky Hierarchy), Derivation trees and ambiguity, Union, Concatenation and Kleene Star (*) of CFLs to construct Grammar, Simplified Forms and Normal Forms i.e., Converting CFG to CNF, Introduction to GNF, BNF, Example Solving	7
Unit 4: Push Down Automata and Parsing Definition and Examples of Pushdown Automata, Applications of PDA, Deterministic PDA, NPDA, Equivalence of CFG's & PDA's, Top-Down Parsing, Bottom-Up Parsing	7
Unit 5: Context Free Languages CFL's and non CFL's, Pumping Lemma for Regular language and CFL, Properties of CFL: Union, Concatenation and Kleene * of CFLs, intersections and complements of CFLs	7
Unit 6: Turing Machine Definition, TM as language acceptors, combining Turing Machines, Computing partial function with a TM, Variants of TM and Universal TM, Applications of Turing Machine, Example Solving	7



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Semester-III & IV (Academic Year: 2024-25)

Text Books:

1. John C. Martin, "Introduction to Languages & the Theory of Computations" - (Tata MGH 3rd Edition)

Reference Books:

1. John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation - (Pearson Edition)
2. Michael Sipser, Introduction to theory of Computations - (Thomson Books/Cole)
3. Vivek Kulkarni, Theory of Computation. Compiler construction D.M. Dhamdare Mc-Millan

Online Resources:

1. <https://nptel.ac.in/courses/111/103/111103016/>
2. <https://nptel.ac.in/courses/106/106/106106049>



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Data Structures										
Course Code:231CSELPC206				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
3	3	-	-	20	30	50	-	-	-	100

Prerequisite: Basic knowledge of algorithms and C programming.

Course Description:

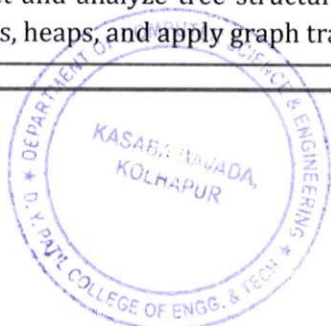
This course provides a comprehensive introduction to data structures and algorithms, essential for efficient data organization and manipulation in computer science. It covers basic data structures, searching and sorting techniques, stacks, queues, linked lists, trees, and graphs. The course emphasizes understanding operations, implementations, and applications of each data structure, along with algorithm complexities and analysis.

Course Objectives:

1. To gain a comprehensive understanding of data structures including their types, operations, and algorithm complexities.
2. To develop proficiency in searching techniques like linear search, binary search, hashing, and sorting algorithms such as bubble sort, merge sort, and quick sort.
3. To understand and manipulate stack and queue operations using both array and linked list representations. Explore linked lists including singly, doubly, and circular linked lists for various applications.
4. To explore tree structures like binary trees, binary search trees (BST), AVL trees, heaps, and graph traversal techniques (BFS and DFS).

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
PCC206.1	Define and classify data structures, analyze their operations, and evaluate their algorithmic complexities.	II
PCC206.2	Apply effective searching and sorting techniques to solve computational problems.	III
PCC206.3	Describe stack, queue, and linked list data structures using both array and linked list representations, and apply them to solve real-world problems.	III
PCC206.4	Construct and analyze tree structures such as binary trees, binary search trees (BST), AVL trees, heaps, and apply graph traversal methods (BFS and DFS).	IV



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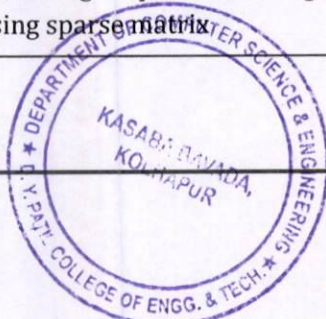
Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Table with 16 columns: COs, POs (1-12), PSOs (1-2), and BTL. Rows include PCC206.1 through PCC206.4.

Table with 2 columns: Content and Hours. Rows include Unit 1. Basic of Data Structures (4), Unit 2. Searching and Sorting Techniques (9), Unit 3. Stacks and Queues (8), Unit 4. Linked Lists (8), Unit 5. Trees (10), and Unit 6. Graphs (6).



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Semester-III & IV (Academic Year: 2024-25)

Text Books:

1. Seymour Lipschutz (MGH), Data Structures; Mc Graw Hill publications, Third Edition (1 July 2017).
2. Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft, Addison-Wesley Series, Data Structures and Algorithms (1983).

Reference Books:

1. Jean-Paul Tremblay, Paul.G. Soresan, "An introduction to data structures with Applications" Tata Mc-Graw Hill International Editions, 2nd edition.
2. Richard F. Gilberg and Behrouz A., Data Structures- A Pseudo code Approach with C, 2nd Edition (15 Nov.2007).
3. A. M. Tanenbaum, Y. Langsam, Data Structure using C; M. J. Augenstein, PHI publication, 2nd Edition, (1996).

Online Resources:

1. NPTEL: <https://nptel.ac.in/courses/106102064>



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Data Structures Laboratory										
Course Code:231CSEPCCP207				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
1	-	-	2	-	-	-	25	-	25	50

Prerequisite: Basic knowledge of algorithms and C programming.

Course Description:

The Data Structures Lab is designed to provide hands-on experience with fundamental data structures and their applications. This course complements the theoretical concepts learned in the Data Structures lecture course, allowing students to implement, test, and analyze various data structures and algorithms. Students will gain practical skills in using arrays, linked lists, stacks, queues, trees, and graphs to solve computational problems. By the end of this course, students will be adept at selecting and implementing appropriate data structures for different types of problems, analyzing their performance, and applying them in real-world scenarios.

Course Objectives:

1. To understand and implement basic and advanced data structures.
2. To develop proficiency in using data structures to solve computational problems.
3. To analyze the performance of different data structures.
4. To enhance problem-solving skills through practical applications of data structures.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
PCC207.1	Implement and manipulate various data structures such as arrays, linked lists, stacks, and queues.	III
PCC207.2	Apply searching and sorting algorithms effectively.	III
PCC207.3	Develop programs that use data structures like binary trees, BSTs, AVL trees, and heaps.	III
PCC207.4	Utilize graph traversal methods (BFS and DFS) in solving problems.	III



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Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

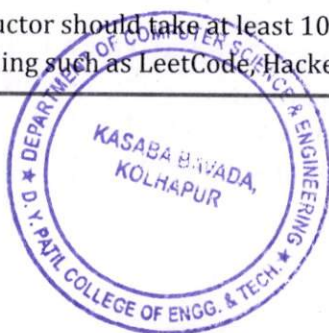
COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
PCC207.1	3	2	-	-	-	-	-	-	-	-	-	-	3	1	III
PCC207.2	3	3	2	-	-	-	-	-	-	-	-	-	3	2	III
PCC207.3	3	3	3	2	-	-	-	-	-	-	-	-	3	2	III
PCC207.4	3	3	2	2	1	-	-	-	-	-	-	2	3	2	III

List of Experiments

No.	Name of Experiment	S/O	Hours
1	Program to demonstrate various operations on Array	0	2
2	Program to perform various operations on matrix.	0	2
3	Programs to implement Searching techniques.	0	2
4	Programs to implement Sorting techniques.	0	2
5	Programs to implement Stack using array and Linked List.	0	2
6	Programs to implement Queue using array and Linked List.	0	2
7	Programs to implement various operations on Singly & Doubly Linked List.	0	2
8	Programs to implement traversals on Binary Tree	0	2
9	Program to implement traversals on Binary Search Tree.	0	2
10	Case Study on - (A) AVL Tree (B) B Tree (C) B+ Tree	S	2
11	Programs to implement BFS & DFS.	0	2

S-STUDY, O-OPERATIONAL

Note: The instructor should take at least 10 to 12 experiments from the list. It is recommended to use online platform for coding such as LeetCode, HackerRank, CodeChef etc.



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Semester-III & IV (Academic Year: 2024-25)

Text Books:

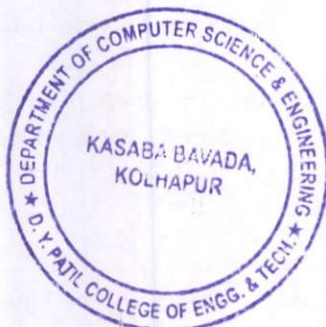
1. Data Structures using C – Seymour Lipschutz (MGH), Mc Graw Hill publications, Revised 1st Edition. (1 July 2017)
2. C- A. M. Tanenbaum, Y. Langsam, M. J. Augenstein, Data Structure using; PHI publications, 2nd Edition, (2017).

Reference Books:

1. Ellis Horowitz, S. Sahni, D. Mehta, Fundamentals of Data Structures in C++, Galgotia Book Source, New Delhi 1995 ISBN16782928.
2. Jean-Paul Tremblay, Paul. G. Soresan, An introduction to data structures with Applications, Tata Mc-Graw Hill International Editions, 2nd edition 1984, ISBN-0-07-462471-7.

Online Resources:

1. Virtual Lab: <https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html>
2. NPTEL videos: <https://nptel.ac.in/courses/106102064>



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Advanced Object-Oriented Concepts										
Course Code:231CSEPCCP208				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
3	2	-	2	-	-	-	50	-	50	100

Prerequisite: Basic knowledge of C programming and object-oriented programming.

Course Description:

This course provides the object-oriented approach using Java programming constructs. The course includes basics of Java language, the different object-oriented features, packages, file handling and multithreading. This course enables the students to develop the GUI based applications using advanced features-such as swing, database handling, networking. This course provides the basics for developing android applications, games, and many more programming language applications in the different fields.

Course Objectives:

1. To introduce the concepts of object-oriented programming using JAVA programming constructs.
2. To expose the students with the JAVA concepts using inheritance, interface, package, I/O and exception handling mechanisms.
3. To develop the problem-solving ability using GUI designing components.
4. To build the foundations of advanced java programming for application development.

Course Outcomes:

CO	Upon successful completion of this course, the students will be able to:	BTL
PCC208.1	Use the java programming constructs for solving the problems with object-oriented approach.	III
PCC208.2	Develop a reliable and user -friendly application using inheritance, interface, package, I/O and exception handling mechanisms.	III
PCC208.3	Create the applications using the GUI designing components with the use of modern tools.	III
PCC202.4	Apply the knowledge of the advanced java programming concepts for developing the applications from different domains.	III



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Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Table with 16 columns: COs, POs (1-12), PSOs (1-2), and BTL. Rows include PCC208.1, PCC208.2, PCC208.3, and PCC208.4.

Table with 2 columns: Content and Hours. Content includes Unit 1: Fundamental Programming in Java, Unit 2: Inheritance, Interface and Package, Unit 3: Exception and I/O Streams, and Unit 4: Graphical User Interfaces using Swing.



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Kasaba Bavada, Kolhapur 416 006



D.Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY

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Kasaba Bawada, Kolhapur-416006

Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Event Handling: Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low-Level Events in the AWT, Low-Level Event Types.	
Unit 5: Multithreading Processes and Threads, Runnable Interface and Thread Class, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Thread States, Thread Properties, Synchronization	3
Unit 6: Database Programming and Networking Database Programming: The Design of JDBC, The Structured Query Language, Basic JDBC Programming Concepts, Query Execution, Result Sets. Networking: Overview of Networking, Networking Basics, Sockets, reading from and Writing to a Socket, Writing the Server Side of a Socket	4

List of Experiments			
No.	Name of Experiment	S/O	Hours
1	Implementation of a problem statement using class and object	0	2
2	Design and develop the programs for different types of inheritance	0	2
3	Implementation of stack/queue operations using Interface	0	2
4	Implement a program for creation of user defined packages and its use.	0	2
5	Implementation a program for Exception Handling	0	2
6	Implementation of different I/O operations using I/O Streams.	0	2
7	Implementation of a program for designing the GUI using swing components.	0	2
8	Implementation of different types of event handling.	0	2
9	Implementation of programs for demonstrating the different types of Layout Managers.	0	2
10	Design and develop an application for demonstration of multithreading	0	2
11	Implementation of different database operations using JDBC	0	2
12	Develop any application using networking.	0	2
13	Design and develop the mini project for solving the different real time problems using java language in the group of 4-5 students	0	2

S-STUDY, O-OPERATIONAL



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Note:

1. The instructor should take at least 10 to 12 experiments from the list. Assignment no. 13 is mandatory
2. Students should use the open-source IDE/Compilers for execution of the programs.
3. It is mandatory to use the online repositories to store the programs e.g. GitHub

Text Books:

1. Cay Horstmann and Gary Cornell, Core Java- Volume I Fundamentals Pearson, Eight edition (Unit 1 to Unit 4).
2. Cay Horstmann and Gary Cornell, Core Java- Volume II Advanced Features, Pearson, Eight edition (Unit 5 and Unit 6).

Reference Books:

1. Herbert Schildt, JAVA-The Complete Reference, Mcgraw Hill, Ninth edition.

Online Resources:

1. <https://nptel.ac.in/courses/106/105/106105191/>
2. <https://java-iitd.vlabs.ac.in/List%20of%20experiments.html>



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Automation and Manual Testing (MDM-II)										
Course Code: 231CSEMDML202				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	2	-	-	20	-	30	-	-	-	50

Prerequisite: Basic Knowledge of Computer, Software Engineering

Course Description:

This course contains an introduction to software testing and discussion of the main types of software testing techniques. Students will learn about the levels of testing at different phases of software development and also important aspects of manual and automation testing.

Course Objectives:

1. To provide knowledge about manual and automation testing.
2. To reveal the different techniques of testing.
3. To describe the fundamentals of automation frameworks.
4. To make students to understand testing tools.

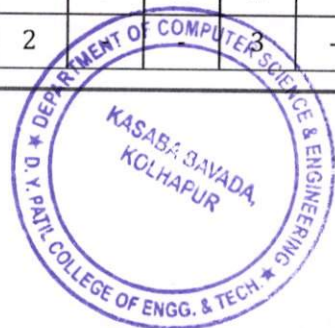
Course Outcomes:

CO	Upon successful completion of this course, the students will be able to:	BTL
MDM202.1	Understand basics of software testing life cycle.	II
MDM202.2	Apply different techniques of manual testing.	III
MDM202.3	Understand the basics of automation techniques.	II
MDM202.4	Describe different automation tools.	II

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
MDM202.1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	II
MDM202.2	3	2	2	-	-	-	-	-	-	-	-	-	-	-	III
MDM202.3	-	-	3	2	3	-	-	-	-	-	-	3	3	-	II
MDM202.4	3	2	-	-	-	-	-	-	-	-	-	-	2	-	II



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Semester-III & IV (Academic Year: 2024-25)

Content	Hours
Unit 1: Introduction to testing Software Development Life Cycle, SDLC Models, Introduction to Testing process, Importance of testing, Software Testing Life Cycle, Incremental Testing Approach, Quality of Testing, Differences between Manual and Automation Testing,	5
Unit 2: Black-Box (or Functional) Testing Techniques Introduction to Black-Box testing, Boundary Value Analysis (BVA), Types of black box testing, Equivalence Class Testing, Decision Table Based Testing, Cause-Effect Graphing Technique, Comparison on Black-Box (or Functional) Testing Techniques	5
Unit 3: White-Box (or Structural) and Gray-Box Testing Techniques Introduction to White-Box Testing or Structural Testing, Static versus Dynamic White-Box Testing, Dynamic-White-Box-Testing-Techniques, Mutation Testing Versus Error-Seeding—Comparison of Black-Box and White-Box Testing in Tabular Form, Practical Challenges in White-Box Testing, Gray-Box Testing, Comparison of White-Box, Black-Box, and Gray-Box Testing Approaches	5
Unit 4: Automated Testing Introduction of Automated Testing, Types of Testing Tools-Static V/s Dynamic, Problems with Manual Testing, Benefits and limitations of Automated Testing, Criteria for Selection of Test Tools, Characteristics of Modern Testing Tools	5
Unit 5: Automation Frameworks Structure of a System Test Plan, Test Suite Structure, Test Environment, System Test Automation, Stages of Automation Framework Design, Scaling in Automation, Hybrid Framework with a Combination of Data-Driven, Keyword-Driven, Method-Driven and Behavior-Driven.	6
Unit 6: GIT and Automation Tools GIT, Features of GIT, Why GIT, GitHub, Testing tools - Selenium: Introduction, Features of Selenium, Basic terminology, Components of Selenium, Selenium Web Driver, How Does Selenium Work, Cucumber: Introduction, How cucumber works, Advantages of Cucumber, Difference between Selenium and Cucumber.	4

Text Books:

1. Rajiv Chopra, "Software Testing – A Self Teaching Introduction", Mercury Learning and Information, 2018 (Unit 1,2,3,4)
2. Panjkaj Jalote, "Software Engineering- A precise approach", Wiley India, 2010(Unit 2,3)
3. Kshirasagar Naik, Priyadarshi Tripathi, "Software Testing and Quality Assurance – Theory and Practices", Wiley, 2008 (Unit 5)



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Reference Books:

1. Aditya P. Mathur, Foundations of Software testing, Pearson, 2nd Edition
2. Software Testing and Automation, Technical Publication, 1st Edition

Online Resources:

1. <https://www.javatpoint.com/selenium-tutorial>
2. <https://www.javatpoint.com/cucumber-testing>
3. <https://www.javatpoint.com/git>
4. https://onlinecourses.nptel.ac.in/noc20_cs19/preview

ISE2:

Each student must submit the reports on any two software testing Tools listed below:

1. Jmeter
2. Selenium
3. Cucumber
4. TestNJ
5. Junit
6. Rational Robot
7. Win Runner
8. Skill Test
9. Load Runner



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Environmental Studies										
Course Code:231CSEVECL202				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	2	-	-	-	-	50	-	-	-	50

Prerequisite: Understanding of Environmental Education course

Course Description:

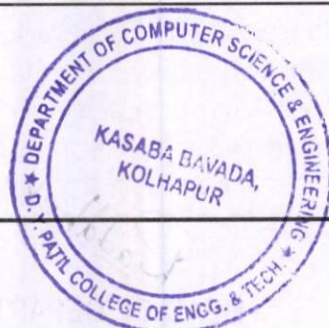
The main objective of course is to create awareness among students regarding environmental issues and its impact on society. Knowledge regarding environmental components, its degradation and protection of environment is need for sustainable future ahead.

Course Objectives:

1. To understand the scope and importance of Environmental Studies and sustainable development
2. To understand connection between environmental health and developmental activities
3. To understand the importance of Environmental Management for its protection through technical and legislative point of view
4. To acquire problem solving skills through visits to different locations, identifying the Environmental problems and proposing solution for societal benefits

Course Outcomes:

CO	Upon successful completion of this course, the students will be able to:	BTL
VEC202.1	Understand the scope and importance of Environmental awareness and Sustainable development.	II
VEC202.2	Understand various Environmental issues due to development.	II
VEC202.3	Understand various modes of Environmental management through technology and legislation.	III
VEC202.4	Acquire problem solving attitude through actual field experience, reporting it in the form of Field project work.	III



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Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
VEC202.1	-	-	-	-	-	1	3	2	-	-	-	2	-	-	II
VEC202.2	-	-	-	-	-	1	3	1	-	-	-	2	-	-	II
VEC202.3	-	-	-	-	-	1	3	1	-	-	-	2	-	-	III
VEC202.4	-	-	-	-	-	2	3	1	-	1	1	2	-	-	III

Content	Hours
<p>Unit 1: Our Environment Introduction to Environment, Scope of Environmental studies, importance of environmental awareness (1), Concept of sustainability, Sustainable Development- history and Goals, environmental ethics, Sustainability ethics (3), Population growth of world and reduced health content of the environment (1)</p>	5
<p>Unit 2: Development and Environmental health I. Natural resources (8): Types (renewable and non-renewable), developmental benefits, Forest - Benefits, problems (Deforestation), Biodiversity-- importance, threats, conservation, Ecosystems - importance, problem associated with major ecosystems, ecological restoration, Air - Benefits, problems (Pollution, climate change), Water- Benefits, problems (Depletion, pollution), Soil/Land - Benefits, problems (Degradation, loss of fertility, desertification), Mineral - Benefits, problems (Mining, over exploitation, depletion, pollution), Energy resources - Benefits, problems (depletion, energy crisis). II. Urbanization and Environmental health (2): Urban problems, Solid waste- Effects of MSW, Plastic waste, Hazardous waste, E- waste</p>	10
<p>Unit 3: Environmental Management Renewable energy technologies- current, new(Bio gas, Bio fuel, hydrogen, etc) (1). Pollution abatement - 5R, ZLD, carbon credit, bio remedies (1). Soil/Land reclamation, Sustainable agriculture (1). Concept of EIA, Environmental audit, ISO certification (ISO 14001) (2). Role of CPCB and MPCB in Environmental protection of India (1). Emerging technologies for environmental management - GIS, Remote sensing, Smart bin, IoT integration, Waste-to-Energy Technologies, Recycling Automation, Advanced Data Analytics, Circular Economy Practices, Sustainable Packaging Solutions, Community Engagement and Education, Decentralized Waste Treatment, Zero-Waste Initiatives, Legislative and Regulatory Changes (2). Environmental legislation- Environmental Protection Act, Air Act, Water Act, Solid waste Management Act, Hazardous waste Management Rule, E- Waste</p>	10



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Semester-III & IV (Academic Year: 2024-25)

(Management) Rules, 2022 (2).	
Unit 4: Field project work Case studies based on site visit (Each candidate has to go for field visit and complete a project work on Environmental issues and probable solutions)	5

Text Books:

1. Handbook of Environmental Studies by Dr. G. R. Parihar, Publisher: Satyam Publishers and Distributors (1 January 2013), ISBN-10 : 9382664408, ISBN-13 : 978-9382664406
2. Environmental Studies by Anubha Kaushik, New Age International Private Limited (1 January 2007), ISBN-10: 8122422403, ISBN-13: 978-8122422405
3. Introduction to Environmental Engineering and Science 3e, by Masters, Publisher : Pearson Education India; 3rd edition (1 January 2015), ISBN-10 : 9332549761, ISBN-13 : 978-9332549760
4. Solid-Waste Management in developing countries, by Bhide A. D. and Sundersen B. B. - Indian National Scientific Documentation Centre, New Delhi

Reference Books:

1. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I &II, Environmental Media
2. Ecology And Environment Pb, by P. D. Sharma, Rastogi Publications (1 January 2011)

Online Resources:

1. Environmental English Book 1-3-2022 Final Corrected copy_compressed.pdf, Manual on Municipal Solid Waste Management- Ministry of Urban Development, Govt. of India



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Technologies for Project Management and Start-Up										
Course Code:231CSEHSSMP202				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	1	-	2	-	-	-	50	-	-	50

Prerequisite: No Prerequisite Required, this course is designed for beginners.

Course Description:

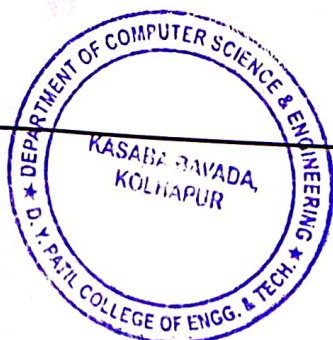
This course provides a comprehensive overview of project management fundamentals and the startup ecosystem. Students will learn to manage projects and gain hands-on experience by creating project plans and startup pitches.

Course Objectives:

1. To understand project management fundamentals, including lifecycles and stakeholder roles.
2. To learn planning techniques and communication strategies for successful projects.
3. To explore the start-up ecosystem, including key players, growth stages, and challenges.
4. To develop skills in building and pitching start-up ideas using project management and entrepreneurial tools.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
HSSM202.1	Understand and explain project management and startup fundamentals.	II
HSSM202.2	Apply WBS, SMART goals, and Gantt charts in project planning.	III
HSSM202.3	Analyze resource management strategies and communication effectively.	IV
HSSM202.4	Analyze the startup landscape, including key players, growth stages, challenges, and opportunities.	IV
HSSM202.5	Create and present innovative startup ideas with project plans, MVPs, and pitch decks using entrepreneurial tools.	VI



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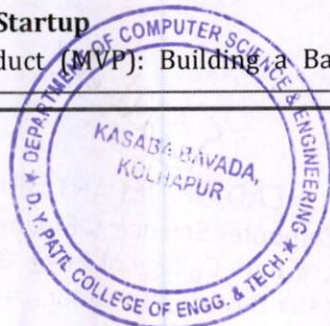
Semester-III & IV (Academic Year: 2024-25)

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Table with 16 columns: COs, POs (1-12), PSOs (1-2), and BTL. Rows include HSSM202.1 through HSSM202.5.

Table with 2 columns: Content and Hours. Rows include Unit 1: Project Management Fundamentals (3 hours), Unit 2: Planning & Scheduling (2 hours), Unit 3: Resource Management & Communication (2 hours), Unit 4: The Startup Ecosystem (3 hours), and Unit 5: Developing a Startup (3 hours).



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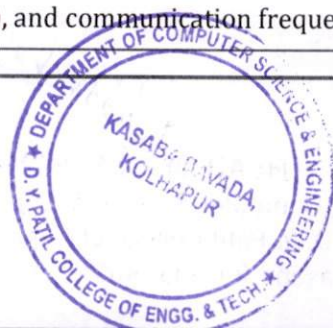
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Semester-III & IV (Academic Year: 2024-25)

Methodology: Build-Measure-Learn Cycle for Continuous Improvement. Crafting a Startup Pitch: Identifying Key Elements and Storytelling Techniques. Presenting Your Startup Idea: Developing a Pitch Deck using Design Tools.	
Unit 6: Putting It into Practice Develop a project management plan for a simulated engineering project (scope, schedule, resources); Present your plan and receive feedback (optional: include budget considerations). Develop a Startup Idea & Pitch: Identify a problem (engineering or general) and propose a solution (your startup idea); Build (Optional): Create a basic Minimum Viable Product (MVP) prototype (online tools/basic coding); Pitch: Present your startup idea focusing on the problem, solution, and target market.	2

List of Assignments (Lab)

No.	Name of Assignment	S/O	Hours
1	Project Life Cycle Simulation (Lab 1): Simulate a project lifecycle using a board game or online tool. Players take on roles (project manager, team members, client) and experience the different phases (initiation, planning, execution, monitoring & control, closure).	0	2
2	Stakeholder Identification & Responsibilities (Lab 2): Choose a real-world project (e.g., campus event, building renovation) and identify key stakeholders. Analyze their roles, responsibilities, and communication needs.	0	2
3	Work Breakdown Structure (WBS) Creation (Lab 3): Select a common engineering task (e.g., designing a bridge, building a robot). Break down the task into a hierarchical WBS using project management software (e.g., Asana, Trello) or a mind map tool.	0	2
4	SMART Goal Setting & Scheduling (Lab 4): Define SMART goals for a personal or academic project. Use project management software to create a schedule with tasks, deadlines, & dependencies using Gantt charts.	0	2
5	Resource Allocation & Management (Lab 5): Simulate a resource allocation scenario. Students are assigned limited resources (e.g., materials, budget) and tasked with completing project tasks within those constraints. Analyze trade-offs and resource conflicts.	0	2
6	Communication Plan Development (Lab 6): Develop a communication plan for a hypothetical engineering project. Identify stakeholders, communication channels (meetings, emails), and communication frequency.	0	2



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7	Startup Ecosystem Research (Lab 7): Research a specific industry and identify key players (entrepreneurs, investors, accelerators) relevant to startups in that field.	0	2
8	Business Model Canvas Workshop (Lab 8): Conduct a workshop where students learn about and practice using the Business Model Canvas to explore potential startup ideas.	0	2
9	Minimum Viable Product (MVP) Prototyping (Lab 9): Students choose their startup ideas (developed in Unit 6) and create a basic MVP prototype using online tools or basic coding (optional).	0	2
10	Pitch Deck Creation (Lab 10): Using design tools and presentation software, students develop a pitch deck for their startup ideas, highlighting the problem, solution, target market, and team.	0	2
11	Project Management Plan Presentation (Combined with Unit 6 Activity): Students present their project management plans developed for a simulated engineering project, including scope, schedule, and resource allocation. Feedback is provided.	0	2
12	Startup Idea Pitch Presentation (Combined with Unit 6 Activity): Students deliver their final startup idea pitches, focusing on the problem, solution, target market, and MVP prototype. Feedback is provided.	0	2

S-STUDY, O-OPERATIONAL

Note: The list of assignments is suggestive and is to be conducted during practical hours. These assignments can be both study and operational in nature.

Text Books:

1. Project Management: A Systems Approach to Planning, Scheduling, and Controlling, by Harold Kerzner, 12th Edition, 2017, (or the recent edition), (Units 1, 2, 3, 6).
2. Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, by Eric Ries, (any recent edition), (Units 4, 5, 6).

Reference Books:

1. Scrum: The Art of Doing Twice the Work in Half the Time, by Jeff Sutherland
2. The Startup Way: How Modern Companies Use Entrepreneurial Management to Transform Culture and Drive Long-Term Growth" by Eric Ries.

Online Resources:

1. Y Combinator: <https://www.ycombinator.com/library>
2. <https://www.ycombinator.com/library/8g-how-to-get-startup-ideas?carousel=Startup%20School>



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Trending Techno Laboratory										
Course Code:231CSEAECP201				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	-	-	4	-	-	-	50	-	-	50

Prerequisite: Software engineering concepts and programming languages knowledge.

Course Description:

This course encourages the student for self-learning on the trending technology topics and applies that technology to develop the solutions for real-world and Industry problems.

Course Objectives:

1. To understand the trending technology based on the self-study.
2. To identify the real-world/industry /research /etc. problems.
3. To provide the solution for the problem identified using applicable technology/tools.
4. To develop the problem-solving skills and abilities helpful for professional career enrichment

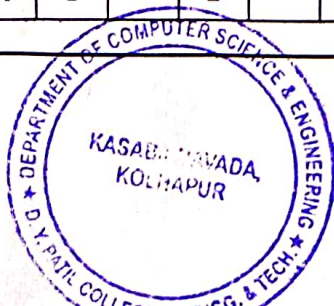
Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
AEC201.1	Understand the new trending technology knowledge on their own.	II
AEC201.2	To identify the real world and industry problem statements from any domain.	III
AEC201.3	To identify optimal solution for real time problems.	III
AEC201.4	To design and develop the mini project for providing the solution for the problems.	III

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
AEC201.1	1	-	-	-	-	-	-	-	-	-	-	3	-	-	II
AEC201.2	1	-	-	-	1	-	-	-	-	-	-	3	1	-	III
AEC201.3	1	2	-	-	-	-	-	-	-	-	-	3	1	-	III
AEC201.4	1	-	2	-	1	-	-	-	-	1	-	3	1	-	III



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Course Guidelines:

The trending technologies are to be learnt on their own based on self-study and practice by the students. The Mini project is to be carried out based on the new technology. However, evaluation will be carried out on the contribution made by the individual. The following are the guidelines –

1. The faculty mentor should guide the students to finalize the trending technology topics. Based on that, student should work for whole semester.
2. Every student should make the presentation based on the new trending technological topic learnt in the practical slots.
3. At a time of the practical, the coding practices should be done based on the part of the topic learnt.
4. Student should identify the problem statement and formulate based on real-world problems/industry-based problem etc.
5. The student should provide the solution for the above problems using the trending technology and the knowledge gained in the earlier semesters. The solution may be in the form of design of system architecture/framework/adding patches to the existing systems using newer technology and tools. Implementing the solution, analyzing the results, writing test cases, specific observations, Pros and Cons, feasibility and advancement of knowledge, technology, tools etc. The work can be in the research track and accordingly the contributions are to be made by the students.
6. Evaluation for ISE and INT to be done by checking the progress of project through presentations. Individual student is expected to submit a report on the work done at the end of the semester.

Online Resources:

Generative AI

1. <https://learn.microsoft.com/en-us/training/paths/introduction-generative-ai/>
2. <https://www.coursera.org/learn/introduction-to-generative-ai>
3. <https://www.coursera.org/learn/prompt-engineering>

Flutter

1. <https://flutter.dev/learn>
2. <https://www.youtube.com/c/TheFlutterWay>
3. <https://github.com/Solido/awesome-flutter>

Go

1. https://go.dev/doc/effective_go
2. <https://exercism.org/tracks/go>
3. <https://youtube.com/@golangda>
4. https://www.linkedin.com/in/rahulsidpatil?utm_source=share&utm_campaign=share_via&utm_content=profile&utm_medium=android_app
5. <https://github.com/rahulsidpatil/golang-basic-exercises>

AWS

1. <https://docs.aws.amazon.com/>

Azure

1. <https://learn.microsoft.com/bs-latn-ba/azure/cloud-services/>

MERN

1. <https://reactplay.io>



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**D.Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY**

(An Autonomous Institute)

Kasaba Bawada, Kolhapur-416006

Department of Computer Science & Engineering**Second Year B. Tech. Curriculum****Semester-III & IV (Academic Year: 2024-25)**

Course Title: E-Commerce and Digital Marketing (OEC-II)										
Course Code: 231CSEOECL204				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	2	-	-	-	-	50	-	-	-	50

Prerequisite: Knowledge of social media channels.**Course Description:**

This course consists of introductory knowledge of E-commerce, all fundamental terminologies and basic concepts of Digital Marketing Strategy and SEO.

Course Objectives:

1. To get the knowledge about business advantages of E-commerce and digital marketing and its importance.
2. To develop a digital marketing plan and to make SWOT analysis.
3. To introduce various digital channels and business tools in social networking.
4. To understand the website and search engine optimization.

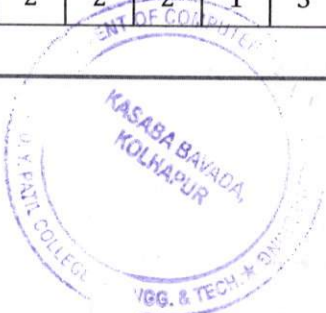
Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
OEC204.1	Classify the importance of the e-commerce & digital marketing for successful business.	II
OEC204.2	Create a digital marketing plan with SWOT analysis & a target groups.	III
OEC204.3	Identify digital channels and business tools used in social networking.	II
OEC204.4	Identify business tools for search optimization for web site	II

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
OEC204.1	2	3	3	2	3	1	1	-	1	2	1	1	-	-	II
OEC204.2	2	3	2	2	3	-	-	-	1	1	-	-	-	-	III
OEC204.3	1	2	3	2	3	-	-	-	1	2	-	-	-	-	II
OEC204.4	2	2	2	1	3	-	-	-	-	-	-	-	-	-	II

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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

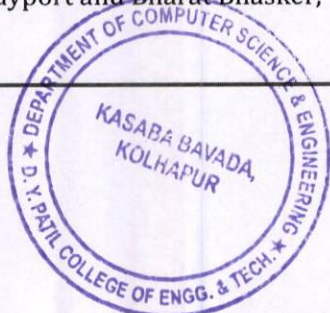
Content	Hours
Unit 1: Introduction to E-commerce, frameworks & architectures Introduction, the term E-Commerce, Business models related to E-Commerce, Technical and economic challenges, Frameworks and architectures, Actors and stakeholders, Fundamental sales process, Technological elements.	4
Unit 2: Business models of E - Commerce Business to Business, Business to customers, Customers to Customers, Business to Government, Business to Employee, E - Commerce strategy, Influencing factors of successful E- Commerce, Digital Signatures.	5
Unit 3: Introduction to Digital Marketing How digital technologies transformed marketing?, Definitions- digital marketing and multichannel marketing- Paid, owned and earned media, the growing range of digital marketing platform, digital marketing strategy-key features of digital marketing strategy, applications of digital marketing, benefits of digital marketing, alternative digital business models.	6
Unit 4: Online marketplace analysis & macro environment Introduction, situation analysis for digital marketing, the digital marketing environment, understanding customer journeys, online consumer behaviour and implications for marketing, business models for e-commerce, Online macro environment, technological forces, economic forces, political forces, Legal forces, social forces and cultural forces	5
Unit 5: Digital Marketing Strategy and SEO Digital Marketing strategy development, how to structure digital marketing strategy, strategy implementation, what is SEO, Advantages and Disadvantages of SEO, Best practice in planning and managing SEO	4
Unit 6: Electronic Payment System Introduction, Online payment Systems, prepaid payment systems- eCash, Mondex, Millicent, NetBill, post-paid payment systems- iKP, CyberCash, Requirement metrics of payment system.	6

Text Books:

1. Martin Kutz. & bookboon.com, "Introduction to E-commerce: Combining Business & Information Technology" 1st Edition, (2016), (Unit 1, 2).
2. Dave Chaffey, Fiona Ellis-Chadwick, "Digital Marketing: Strategy, Implementation and Practice", Pearson Education, 6th Edition (Unit 3,4,5,6).

Reference Books:

1. Pulizzi, J, "The Beginner's Guide to Digital Marketing ", Epic Content Marketing, McGraw Hill Education, (2015).
2. Jeffrey F Rayport and Bharat Bhasker, "Electronic Commerce", Tata McGraw Hill.



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Semester-III & IV (Academic Year: 2024-25)

3. Turban, Efraim, and David King, "Electronic Commerce: A Managerial Perspective", 2010, Pearson Education Asia, Delhi.
4. Romuald Andrade, "Beginners Guide to Digital Marketing: How to Flood Your Website with Traffic in 30 Days, (2015).

Online Resources:

1. <https://bookboon.com/en/introduction-to-e-commerce-ebook>
2. <https://bcw-global.com/genesisbcw/case-studies/world-food-india>
3. <https://www.makeinindia.com/article/-/v/world-food-india-2017-event-highlights>



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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Front End Development (OEC-II)										
Course Code: 231CSEOECL205				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	2	-	-	-	-	50	-	-	-	50

Prerequisite: Fundamentals of internet, web, WWW.

Course Description:

Web Development course aims to learn about front-end, back-end, and full-stack Web Development. It covers various points regarding web, web site and web development.

Course Objectives:

1. To provide Basic knowledge of web, www, internet
2. To introduce emerging Web technology concepts and tools
3. Introduce students with front end web designing.
4. To develop the ability to logically plan and develop web pages.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
OEC205.1	Understand basic concept of web technology	II
OEC205.2	Discuss various web technology languages and tools	II
OEC205.3	Explain front end web designing	II
OEC205.4	Develop static web pages by using HTML	III

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2		
OEC205.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	II
OEC205.2	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	II
OEC205.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	II
OEC205.4	3	2	3	-	2	-	-	-	2	-	-	-	2	-	-	III



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Semester-III & IV (Academic Year: 2024-25)

Content	Hours
Unit1: Introduction to Web Development Brief History, Basic Concepts of Web such as Web, Internet, WWW, and Web development life cycle, HTTP Protocol, Web Development Tools	4
Unit2: Hyper Text Markup Language-HTML HTML History, Basic HTML Structure, Text formatting on Web Pages, HTML Editors, HTML documents, The <!DOCTYPE> Declaration, HTML Headings, HTML Paragraphs, HTML Links, HTML images, HTML Elements, HTML Attributes, HTML comments.	6
Unit3:HTML Table Define an HTML Table, Table Cells, Table Rows, Table Headers, HTML Table Tags, HTML Table Borders, HTML Table Sizes, Table Headers, Table Padding & Spacing, Table Colspan & Rowspan, Table Styling	5
Unit4:HTML Frames, List HTML <frame> Tag, <iframe> tag, <frameset> tag, HTML Lists, Unordered HTML List, Ordered HTML List, HTML Description Lists, HTML List Tags, HTML Links - Hyperlinks, HTML Links - The target Attribute, Absolute URLs vs. Relative URLs, Use an Image as a Link, Button as a Link	6
Unit5:HTML Forms The <form> Element, The<input> Element, Text Fields, The <label> Element, Radio Buttons, Checkboxes, The Submit Button, The Name Attribute for <input>, HTML Form Attributes, The Action Attribute, The Target Attribute, The Method Attribute, HTML <form> Elements, HTML Input Types, HTML Input Attributes	6
Unit6: HTML Media HTML Multimedia, HTML Video, HTML <audio> Element, HTML <audio>Autoplay, HTML Audio Formats	3

Text Books:

1. "Pro HTML5 and CSS3 Design Patterns" Michael Bowers, DionysiosSynodinos and Victor Sumner, A press edition
2. "A Smarter Way to Learn HTML and CSS" by Mark Myers

Reference Books:

1. "Web Development with Node and Express" Ethan Brown Published by O'Reilly Media
2. "HTML, CSS, and JavaScript: All in One" by Jennifer Kyrnin and JuliMeloni, Pearson Publication

Online Resources:

1. <https://www.javascript.com/>
2. <https://www.w3schools.com>



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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Basics of Data Structures (OEC-II)										
Course Code:231CSEOECL206				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	2	-	-	-	-	50	-	-	-	50

Prerequisite: Fundamentals of C Programming Language.

Course Description:

This course will introduce the fundamentals of data structures and will provide understanding of how to systematically organize data in a computer system. Also, includes topics which focus on searching and sorting techniques, stack, queues, linked list, tress and graphs.

Course Objectives:

1. To make the students familiar with basic data structures.
2. To select appropriate data structures in computer applications.
3. To analyze different data structures and algorithms to find their complexity.

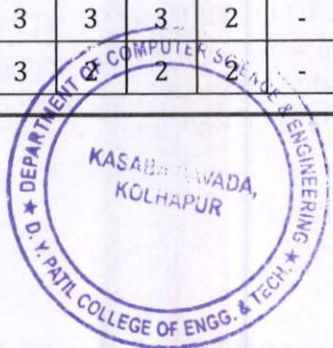
Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
OEC205.1	Explain data structures fundamental ideas, uses, and the algorithms.	II
OEC205.2	Select appropriate data structures, searching and sorting techniques in computer applications.	II
OEC205.3	Analyze Time complexity and memory management of different algorithms	IV
OEC205.4	Apply various data structure such as stacks, queues, trees and graphs to solve various computing problems.	III

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
OEC205.1	3	2	2	-	-	-	-	-	-	-	-	3	2	-	II
OEC205.2	3	3	3	2	-	-	-	-	-	-	-	3	3	-	II
OEC205.3	3	3	3	2	-	-	-	-	-	-	-	3	1	-	IV
OEC205.4	3	2	2	2	-	-	-	-	-	-	-	3	1	-	III



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Department of Computer Science & Engineering

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Semester-III & IV (Academic Year: 2024-25)

Content	Hours
Unit 1: Basic of Data Structures Data structure- Definition, Types of data structures, Data Structure Operations, Algorithms, Time and Space complexity.	2
Unit 2: Searching and Sorting Techniques Need of sorting and searching, Linear search, Binary search, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort, Radix sort, Complexity and analysis. Hashing-Definition hash function, collision.	4
Unit 3: Stacks and Queues Stack: Definition, operations, Array representation of stack, applications, Queue: Definition, operations, Array representation of queue, applications, Circular queue, Priority queue, Deque.	8
Unit 4: Linked Lists Dynamic memory management, Definition, representation, operations, implementation and applications of singly, doubly lists. Linked representation of stack and Queue.	6
Unit 5: Trees Terminology, representation, binary tree, traversal methods, binary search tree, AVL search tree, Heaps- Operations and their applications, Heap sort.	6
Unit 6: Graphs Basic concept of graph theory, storage representation, graph traversal techniques- BFS and DFS.	4

Text Books:

1. Seymour Lipchitz (MGH), Data Structures; Mc Graw Hill publications, Third Edition, (1 July 2017).
2. Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft, Addison-Wesley Series, Data Structures and Algorithms; (1983).
3. Richard F. Gilberg & Behrouz A. Forouzan, Data Structures and Pseudocode Approach with C, 2nd Edition.

Reference Books:

1. G A V Pai (McGraw Hill), Data Structures and Algorithms.
2. Jean-Paul Tremblay, Paul. G. Soresan, "An introduction to data structures with Applications" - Tata Mc Graw Hill International Editions, 2nd edition.

Online Resources:

1. NPTEL videos: <https://nptel.ac.in/courses/106102064>



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Web Development										
Course Code:231CSEVSECP201				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
2	1	-	2	-	-	-	50	-	-	50

Prerequisite: Fundamentals of Internet and Web.

Course Description:

Web Development course aims to learn about front-end, back-end, and full-stack Web Development and focuses on web designing. It covers various points regarding web, web site and web development for various types of applications.

Course Objectives:

1. To introduce students with front end web designing.
2. To develop the ability to logically plan and develop web pages.
3. To provide the basic knowledge of CSS.
4. To demonstrate and learn how to use the XML and related technology.

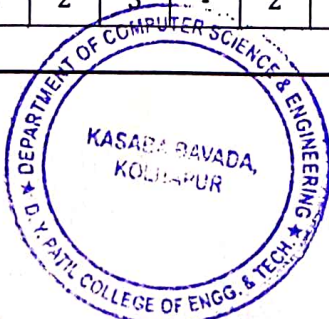
Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
VSEC201.1	Explain front end web designing	II
VSEC201.2	Develop static web pages by using HTML	III
VSEC201.3	Understand how to apply CSS to HTML pages.	II
VSEC201.4	Understand how XML documents can be transformed into other formats by using XSLT.	II

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
VSEC201.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	II
VSEC201.2	3	-	2	-	-	-	-	-	-	-	-	-	-	-	III
VSEC201.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	II
VSEC201.4	3	2	3	-	2	-	-	-	2	-	-	-	2	-	II



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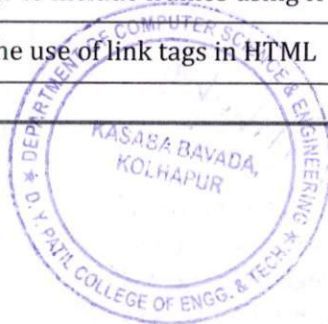
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Semester-III & IV (Academic Year: 2024-25)

Content	Hours
Unit 1: Introduction of HTML HTML History, Basic HTML Structure, Text formatting on Web Pages, HTML Editors, HTML documents, The <!DOCTYPE> Declaration, HTML Headings, HTML Paragraphs, HTML Links, HTML images, HTML Elements, HTML Attributes, HTML comments	3
Unit 2: HTML tags Define an HTML Table, HTML Frame tags, HTML List, HTML Form controls	2
Unit 3: CSS Introduction to CSS, Creating Style Sheet, importance of CSS, CSS building blocks, CSS Syntax, CSS selectors, The CSS element Selector, The CSS class Selector, The CSS Universal Selector, The CSS Grouping Selector, Box Model	2
Unit 4: Introduction to XML Introduction, The benefits of XML, How XML Works, XML Documents and XML Files, XML Elements Attributes, XML Names, Comments, Processing Instructions, The XML Declaration	3
Unit 5: XSLT XML Transformations: An example input document, xsl:style-sheet and xsl:transform, stylesheet Processors, Calculating the value of an Element with xsl:value-of, Applying Templates with xsl:apply-templates, Other XSLT Elements.	3
Unit 6: XPath The Tree Structure of an XML Document, Predicates, Xpath Axes, Xpath Expressions, Xpath Functions.	2

List of Assignments (Lab)			
No.	Name of Assignment	S/O	Hours
1	Study of Web Technology basics along with different web technology languages	0	2
2	Create static web pages by using HTML tags	0	2
3	Create a web page which defines all text formatting tags	0	2
4	Create a webpage using list tags of HTML	0	2
5	Create webpage to include image using HTML tag.	0	2
6	Create webpage to include frames using HTML tag	0	2
7	Demonstrate the use of link tags in HTML	0	2



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8	Demonstrate the use of list tags in HTML	0	2
9	Create employee registration webpage using HTML form objects.	0	2
10	Create resume as webpage using HTML tags.	0	2
11	Study and implementation of XML.	S	2
12	Implementation of XSLT to transform XML to XSLT	0	2
13	Implementation of student application using XSLT and conditional statement.	0	2

S-STUDY, O-OPERATIONAL

Text Books:

1. "Pro HTML5 and CSS3 Design Patterns" Michael Bowers, Dionysios Synodinos and Victor Sumner, A press edition
2. "A Smarter Way to Learn HTML and CSS" by Mark Myers XML in a Nutshell by Elliotte Rusty Harold, W. Scott Means O'Reilly Publication, 3rd Edition

Reference Books:

1. "Web Development with Node and Express" Ethan Brown Published by O'Reilly Media
2. "HTML, CSS, and JavaScript: All in One" by Jennifer Kyrnin and Juli Meloni, Pearson Publication
3. "XML Technologies" by Atul Kahate, 3rd Edition

Online Resources:

1. <https://www.javascript.com/>
2. <https://www.w3schools.com/>



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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: Liberal Learning										
Course Code: 231CSECCAP202				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
Grade	2	-	-	-	-	-	50	-	-	Grade

1. Coding Club - Code to evolve

Overview:

Club provide students with an opportunity to learn coding skills, collaborate with peers and work on coding projects beyond traditional classroom setting. Club shall promote the best coding practices among students and enhances their employability. While club may initially seem, like a fun and engaging activity for student. Club also offer numerous benefits that can positively impact their academic and future professional careers

Aims:

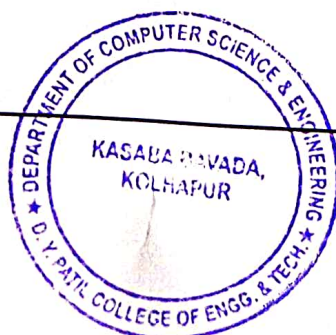
- To promote excellence in Computer Science and Engineering education and overall practice.
- To advance the development and exchange of relevant knowledge. Gain technical and collaborative skills to design real-life projects.
- To be a forum for interaction among students of the institute.
- To conduct more coding competitions to reach every student on campus
- To conduct workshops on areas of computer science like web development, application development, machine learning, IoT etc

Objectives:

- Motivate students to learn programming with enthusiasm.
- Guide the students in solving programming problems in different points of view.
- Improve the programming skills of students by conducting more coding competitions through online platform like CodeChef, HackerRank, Leetcode etc.

Outcomes:

- Improved programming skills among students in their programming domains or areas of interest
- Student participation in events like Codeathons and Hackathons.
- Taking up innovative projects for implementation by students.



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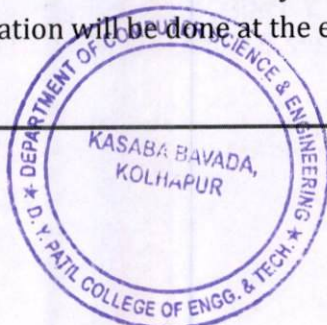
Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Sr.no	Content	Hrs
1	Introduction to python (Installation of python, Python Input/Output, Python Keyword)	2
2	Python Operator (Arithmetic Operators, Comparison Operators, Logical Operators, Bitwise Operators, Assignment Operators, Identity Operators and Membership Operators)	2
3	Data Types (Numeric, Boolean, Set, Dictionary, Binary Types, Sequence Type)	3
4	Python File handling (read file, write file, open file, read file)	2
5	Oops in python (Class, Objects, Polymorphism, Encapsulation, Inheritance Data Abstraction)	2
6	Library (NumPy, pandas, matplotlib, keras, TensorFlow)	4
7	Python Tkinter (Installation of Tkinter, Widgets, Event Handling, Geometry Managers, Styling and themes, Advanced Widgets, Dialogs)	5
8	Linear regression and Logical regression (Linear Regression-Definition, Equation, Simple vs. Multiple Linear Regression Logical regression-Classification, Evaluation Metrics, Sigmoid Function)	2
9	Clustering algorithms- k-means. (Definition, Objective, K, Euclidean Distance)	2
10	Random forest and decision trees (Random Forest-Definition, Splitting Criteria, Feature Selection Decision Trees- Ensemble Method, Bagging)	2
11	Image processing and object detection (Image processing: - Introduction to Image Processing, Image Enhancement, Image Transformation, Image Filtering, Practical Exercise Object Detection: - Introduction to Object Detection, Object Detection Techniques- Traditional Methods, Modern Methods, Practical Exercise)	4

❖ **AICTE-EDUSKILLS Courses:**

1. All students have to mandatorily select the one course within one semester.
2. The evaluation will be done at the end of the two consecutive semester.



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Company	Course Name
Juniper NETWORKS	Networking Virtual Internship
Celonis	Business Analyst Virtual Internship

Evaluation:

1.Attendance	-10
2.Practical Assignments	-10
3.50 Days of coding (+Programs)	-10
4.Oral	-10
5.Surprise Test	-10

Total	-50

Students should practice the question on the platforms like Geeks for geeks, HackerRank, CodeChef, HackerEarth or LeetCode.

Second Year: -

Sem IV- 50 Marks + *(5 Marks or 2 Marks) + #5 Marks

***Marks- Additional marks per semester**

5 Marks – Achievements in National level and State Level competition (coding hackathons)

2 Marks – Participation in National level and State Level competition (coding hackathons)

#Marks –

5 Marks- Additional marks for certification of Eduskills and Paper Publications.

If Student completes an industrial project during a semester then student will get full marks.

Grades: -

Marks	50 +	50-	45-35	35-25	25-20	Less than 20
	(*/#)	45				
Grades	O	A	B	C	D	F

Note: - O for Outstanding Performance.

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2. Google Developer Students Club (GDSC)

Overview:

The Google Developer Student Club (GDSC) at D. Y. Patil College of Engineering and Technology (Kolhapur) is a student-run community group passionate about building technical skills and fostering innovation. Founded in 2021, it empowers students across all academic backgrounds to explore the world of Google developer technologies, collaborate on projects, and contribute to the local community.

Aim:

The Google Developer Student Club at D. Y. Patil College of Engineering and Technology (GDSC DYP CET) fosters a collaborative community of students passionate about technology and innovation. Our goal is to provide a platform for skill development, knowledge sharing, and hands-on experience with cutting-edge technologies. We support peers in learning and interacting effectively, enhancing their technical skills, expanding their networks, and aiding in career development through workshops, events, and project-building activities. Led by passionate leaders and committed members, we strive to apply new knowledge to solve local problems and make a positive impact on our community.

Objectives

The objectives of the program include:

- **Learning:** To provide a platform for students to learn about various Google technologies, including Google Cloud Platform, Android, TensorFlow, and more.
- **Community Building:** To create a community of students who are passionate about technology and interested in learning and sharing their knowledge with others.
- **Skill Development:** To provide opportunities for students to develop their technical skills, including coding, design, project management, and entrepreneurship.
- **Collaboration:** To encourage collaboration among students, faculty members, and industry experts to work on real-world projects and solve challenging problems.
- **Career Development:** To help students prepare for careers in technology by providing them with access to industry leaders, job opportunities, and mentorship programs.

Overall, the Google DSC program aims to create a network of student developers who are well-equipped to succeed in the tech industry and contribute to the development of their local communities.



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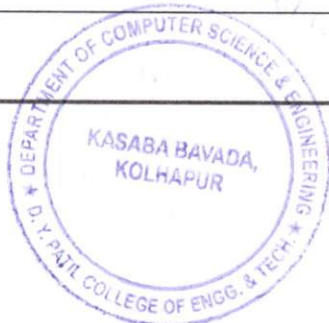
Outcomes

Skill Enhancement: Participants acquire practical skills in coding, problem solving, and project management. Networking Opportunities: GDSC DYP CET connects students with industry professionals, fostering valuable networking opportunities.

Real-world Projects: Engaging in projects provides hands-on experience and strengthens problem-solving abilities. Community Engagement: By participating in community-driven initiatives, students learn the importance of collaboration and giving back to society

Flutter Development

Table with 3 columns: Sr. no, Content, Hrs. It lists 6 units of Flutter development with their respective topics and durations.



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Evaluation:

Sr. no.	Rubrics	Marks (50)
1	Attendance	10
2	Continuous Assessment - Performance (10 marks) - Coding problems (10 marks)	20
3	Practical Oral Examination - Oral (10 marks) - Coding (10 marks)	20

Students should practice the question on the platforms like Hackerrank, codeChef, LeetCode.

Second Year: -

Sem III- 50 Marks + *(5 Marks or 2 Marks) + #5 Marks

Sem IV- 50 Marks + *(5 Marks or 2 Marks) + #5 Marks

***Marks- Additional marks per semester**

5 Marks – Achievements in National level and State Level competition (coding hackathons)

2 Marks – Participation in National level and State Level competition

(coding hackathons) / Google Cloud Arcade (2 or more badges required)

#Marks –

5 Marks- Additional marks for submitting a solution at Google Solution Challenge.

If Student completes an industrial project during a semester then student will get full marks.

Grades: -

Marks	50 +	50-45	45-35	35-25	25-20	Less than 20
	(*/#)					
Grades	O	A	B	C	D	F

Note: - O for Outstanding Performance.



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3. Microsoft Learn Student Ambassadors (MLSA)

Overview:

Microsoft Learn Student Ambassadors (MLSA) is a distinguished global program specifically designed to empower students in their pursuit of knowledge, network expansion, and the application of technology for the betterment of their communities.

Aim:

- 1. Skill Growth:** Enhance technical and soft skills in areas like coding, leadership, and community building.
- 2. Global Community:** Connect with students from over 100 countries, fostering online communities and expanding influence.
- 3. Certifications:** Receive training and earn certifications to validate expertise in various technologies.
- 4. Impact:** Become agents of change, making a lasting impact on important projects and communities.
- 5. Career Boost:** Boost resumes, personal growth, and online influence to kick start careers.
- 6. Access to Technologies:** Gain access to cutting-edge Microsoft technologies like Microsoft 365, Visual Studio Enterprise, and Azure.

Objectives:

1. Fostering a Community of Tech Enthusiasts
2. Enhancing Technical Proficiency.
3. Hosting Webinars and Microsoft Learn Challenges.
4. Technical Workshops and Training Sessions.
5. Participation in Microsoft Events and Competitions

Outcomes:

1. Graduates will demonstrate heightened technical skills acquired through hands-on participation in coding challenges, webinars, and Microsoft Learn Challenges, providing them with a competitive edge in the job market.
2. Students will exhibit proficiency in organizing and hosting technical events, such as webinars, Microsoft Learn Challenges, showcasing their ability to plan and execute successful projects.
3. Graduates will contribute positively to the local community by leveraging their technical skills and knowledge gained through MLSA chapter involvement, fostering a culture of collaboration and making a tangible difference in the community.
4. Students will establish valuable connections within the tech industry, leading to mentorship opportunities, internships, and collaborative projects, thereby enhancing their career prospects and industry exposure.



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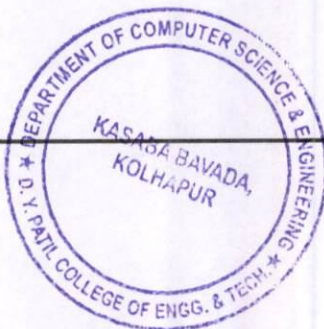
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Content Unit	Hours
Unit 1: Introduction to Power BI <ul style="list-style-type: none">• Overview of Business Intelligence (BI)• Introduction to Power BI• Key Features and Capabilities of Power BI• Installing Power BI Desktop• Signing Up for Power BI Service• Navigating the Power BI Interface	6
Unit 2: Getting Started with Power BI <ul style="list-style-type: none">• Connecting to Data Sources• Loading and Transforming Data• Creating Visualizations• Building Interactive Dashboards• Publishing Reports to Power BI Service• Sharing and Collaborating on Power BI Reports	6
Unit 3: Advanced Power BI Techniques <ul style="list-style-type: none">• Advanced Data Transformations• Modeling Data with Relationships• Using DAX (Data Analysis Expressions)• Creating Custom Visuals• Setting up Row-Level Security• Automating Reports with Power BI Service	6
Unit 4: Introduction to Copilot <ul style="list-style-type: none">• Overview of AI-Powered Coding• What is GitHub Copilot?• Key Features and Capabilities of Copilot	6
Unit 5: Getting Started with Copilot <ul style="list-style-type: none">• Using Copilot for Code Suggestions• Generating Code Snippets with Copilot• Handling Different Programming Languages	6



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Unit 6: Advanced Usage of Copilot

- Enhancing Productivity with Copilot
- Integrating Copilot in Development Workflows
- Privacy and Security Considerations

6

Evaluation Guidelines:

1. Attendance (10marks)
2. Collaboration and Teamwork(10marks)
3. Practical Assignments(10marks)
4. MSE (Member Self-Evaluation) (10marks)
5. ESE (External Stakeholder Evaluation) (10marks)



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Semester-III & IV (Academic Year: 2024-25)

Course Title: Fundamentals of Cyber Security (Honors Paper - I)										
Course Code:231CSEHCL201A				Semester: IV						
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
4	3	-	1	20	30	50	-	25	-	125

Prerequisite: Fundamental knowledge of Data Communication, Networking and Information Security.

Course Description:

The Cyber Security course teaches the students how to identify the computer system vulnerabilities, to recognize digital exploitation and also prevent damage such as loss of data, loss of money through viruses.

Course Objectives:

1. To gain knowledge of cyber security so as to secure digital data and secure computer networks and understand different cyber-crimes.
2. Identify the essential and up-to-date concepts, methodology and tools of cyber security.
3. To understand key terms and provisions in I.T. ACT.

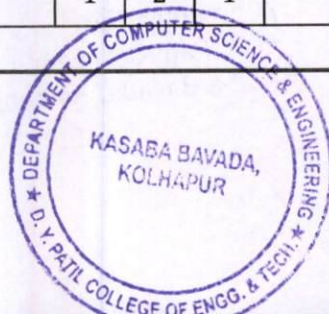
Course Outcomes (COs):

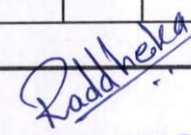
CO	Upon successful completion of this course, the students will be able to:	BTL
HC201A.1	Understand and use basic concepts of cyber security.	II
HC201A.2	Distinguish between different cyber-crimes and threats.	II
HC201A.3	Explore the concepts of digital forensics in various cyber-crimes.	II
HC201A.4	Use I.T. ACT in their day-to-day life.	III

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
HC201A.1	2	2	-	-	-	2	-	2	-	-	-	-	-	1	II
HC201A.2	2	3	-	-	-	2	-	2	-	-	-	-	-	1	II
HC201A.3	2	3	-	-	2	1	-	2	-	-	-	-	-	1	II
HC201A.4	2	2	-	1	2	1	-	2	-	-	-	-	-	1	III




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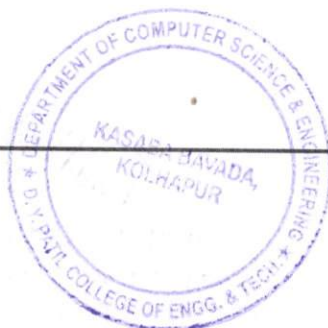
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Content	Hours
Unit 1: Introduction to Cyber Security Introduction, How Seriously Should You Take Threats to Network Security? Identifying Types of Threats, Basic Security Terminology, Concepts and Approaches, Online Security Resources Networks and the Internet Introduction, Network Basics, How the Internet Works, Basic Network Utilities, Advanced Network Communications Topics.	7
Unit 2: Cyber Space & Security Defining Cyberspace, Architecture of cyberspace, Concept of cyber security, Cyber security increasing threat landscape, Cyber security terminologies- Cyberspace, attack, attack vector, attack surface, threat, risk, vulnerability, exploit, exploitation, hacker., non-state actors, Cyber terrorism, Protection of end user machine, Critical IT and National Critical Infrastructure, Cyber warfare.	8
Unit 3 Cyber Crime: Classification of cyber-crimes, Common cyber-crimes- cyber-crime targeting computers and mobiles, cyber-crime against women and children, financial frauds, social engineering attacks, malware and ransom ware attacks, zero day and zero click attacks, Online scams and frauds- email scams, Phishing, Vishing, Smishing, Online job fraud, Online sextortion, Debit/ credit card fraud, Online payment fraud, Cyber bullying, website defacement, Cybersquatting, Pharming, Cyber espionage, Crypto jacking, Dark net- illegal trades, drug trafficking, human trafficking., Social Media Scams & Frauds- impersonation, identity theft, job scams, misinformation, cyber stalking.	8
Unit 4 Cyber security Management Compliance and Governance: Cyber security Plan- cyber security policy, cyber crises management plan., Business continuity, Risk assessment, Types of security controls and their goals, Cyber security audit and compliance, National cyber security policy and strategy	7
Unit 5 Computer Forensics: Computer Forensics Definition and Cardinal Rules Types of Computer Forensics Technology – Types of Computer Forensics Systems – Vendor and Computer Forensics Services. Computer forensics evidence and capture: Data Recovery – Evidence Collection and Data Seizure-Duplication and Preservation of Digital Evidence-Computer Image Verification and Authentication.	8
Unit 6 I.T. ACT: Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, I.T. Act, Intellectual Property, IP Theft, Copyright, Trademark, Privacy and Censorship	7



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List of Assignments (Lab)			
No.	Name of Assignment	S/O	Hours
1	Study of forensic tools such as a. <ul style="list-style-type: none">• The Sleuth Kit b.• Autopsy	S	2
2	Download and observe the working of any 3 tools from the list: <ul style="list-style-type: none">• Adobe Analytics• Contentsquare• FullStory• Google Analytics• Heap• Looker• Mixpanel• Pendo	S	2
3	Implement a program in python for image-based steganography	O	2
4	Study what are key loggers and its types.	S	2
5	Study operating system utilities like Net Stat, FC, open files.	S	2
6	Study some open-source tools for network monitoring	S	2

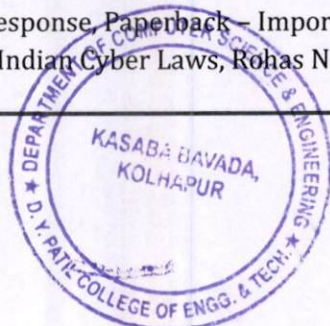
S-STUDY, O-OPERATIONAL

Text Books:

1. Computer Security Fundamentals - Chuck Easttoms, Pearson, third edition. (Unit 1)
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by SumitBelapure and Nina Godbole, Wiley India Pvt. Ltd. (Unit 2-4)
3. John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation", Cengage Learning, 2nd Edition, 2005 (Unit 5)
4. CYBER LAW-The Indian Perspective, PawanDuggal (2009) (Unit 6)

Reference Books:

1. Computer Security Fundamentals - Chuck Easttom, Pearson, third edition.
2. Jason Luttgens, Matthew Pepe, Kevin Mandia, Incident Response & Computer Forensics, McGraw-Hill Osborne Media, 3rd edition, 2014.
3. Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Real Digital Forensics: Computer Security and Incident Response, Paperback - Import, 2005.
4. 7 Years of Indian Cyber Laws, Rohas Nagpal (2008)



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Online Resources:

1. <https://legalserviceindia.com>
2. <https://infosecawareness.in/cyber-laws-of-india>
3. https://onlinecourses.nptel.ac.in/noc23_cs127/preview



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Semester-III & IV (Academic Year: 2024-25)

Course Title: UI/UX Design (Honors Paper - I)										
Course Code: 231CSEHCL201B							Semester: IV			
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
3	3	-	1	20	30	50	-	-	-	100

Prerequisite: Fundamental knowledge of Data Communication, Networking and Information Security.

Course Description:

This course includes basics of user interface design. The course will emphasize on understanding of user experience and cognition, which are the key factor to achieve user-friendly Interface Design. It gives details about different windows/mobile components and applications.

Course Objectives:

1. To acquaint the knowledge of user centered design.
2. To explore user centered methods in design, graphic design on screens, simulation and prototyping techniques.
3. To provide usability testing methods and interface technologies.

Course Outcomes (COs):

CO	Upon successful completion of this course, the students will be able to:	BTL
HC201B.1	Develop Proficiency in Figma	II
HC201B.2	Create effective UI/UX designs by implementing UI/UX design principles.	III
HC201B.3	Build Reusable Design Systems	III
HC201B.4	Create Interactive Prototypes	III

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
HC201B.1	2	-	-	-	3	-	-	-	-	-	-	-	-	3	II
HC201B.2	2	-	3	-	-	-	-	-	-	-	-	-	3	-	III
HC201B.3	2	-	-	-	3	-	-	-	-	-	-	-	-	3	III
HC201B.4	2	-	3	-	3	-	-	-	-	-	-	-	3	-	III



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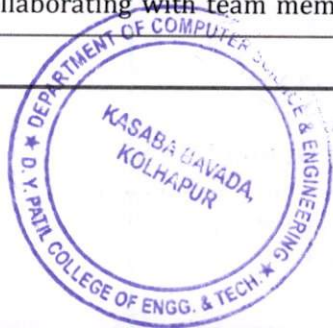
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Content	Hours
Unit 1: Introduction to Figma <ul style="list-style-type: none">• Overview of Figma and its advantages over traditional design tools• Understanding the differences between Figma and other design tools (e.g., Sketch, AdobeXD)• Setting up a Figma account and installing the desktop app• Navigating the Figma interface: layers panel, properties panel, toolbar, etc.• Creating a new project and understanding the different project settings• Exploring Figma's basic tools: selection tool, shape tools, text tool, etc.• Understanding the concept of frames and how to use them in Figma• Importing assets (images, icons, etc.) into Figma	8
Unit 2: Design Principles and Best Practices <ul style="list-style-type: none">• Understanding the importance of design principles in UI/UX design• Applying design principles (e.g., contrast, alignment, hierarchy) in Figma• Exploring design best practices for creating user-friendly interfaces• Using grids and layout techniques to create visually appealing designs• Choosing the right typography and using text styles effectively in Figma• Understanding color theory and applying it to your designs in Figma	7
Unit 3: Creating UI Elements <ul style="list-style-type: none">• Designing common UI elements (e.g., buttons, forms, navigation bars) in Figma• Using Figma's components and styles for creating reusable design elements• Organizing your design files using frames, groups, and pages in Figma• Using vector networks and Boolean operations to create complex shapes in Figma• Creating responsive designs in Figma using constraints and layout grids• Exporting assets from Figma for use in development	7
Unit 4: Prototyping and Interaction Design <ul style="list-style-type: none">• Understanding the basics of prototyping in Figma• Creating interactive prototypes with clickable elements and links• Adding animations and transitions to your prototypes in Figma• Using Figma's prototyping features to simulate user flows• Collaborating with stakeholders and gathering feedback on your prototypes in Figma• Exporting prototypes for user testing and sharing with clients	8
Unit 5: Design Systems and Collaboration <ul style="list-style-type: none">• Understanding the concept of design systems and their importance in UI/UX design• Creating a design system in Figma using components, styles, and shared libraries• Collaborating with team members using Figma's collaboration features (e.g., commenting,	8



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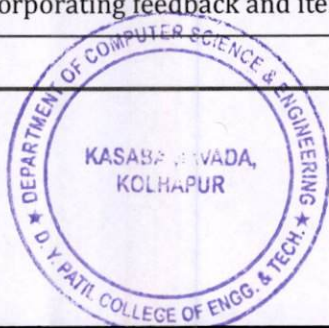
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sharing) <ul style="list-style-type: none">Using Figma's version control features to manage changes in your design filesIntegrating Figma with other tools (e.g., Zeplin, Jira) for a seamless design workflowConducting design reviews and presenting your work to stakeholders using Figma	
Unit 6: Advanced Techniques and Final Project <ul style="list-style-type: none">Exploring advanced tips and tricks for using Figma more efficientlyImplementing micro-interactions and advanced animations in FigmaUsing Figma's plugins to extend its functionality and automate repetitive tasksCompleting a final project that showcases the skills and techniques learned throughout the coursePresenting your final project to the class and receiving feedback from peers and instructorsReflecting on your learning journey with Figma and identifying areas for further improvement	7

List of Assignments (Lab)			
No.	Name of Assignment	S/O	Hours
1	UI Element Design: Design common UI elements such as buttons, forms, and navigation bars using Figma's tools and components.	0	2
2	Wireframing: Create wireframes for a website or mobile app using Figma's frames and basic shapes.	0	2
3	Prototype a User Flow: Design a user flow for a specific task (e.g., signing up for a newsletter) and create a clickable prototype in Figma.	0	2
4	Design System Creation: Develop a basic design system in Figma, including components, styles, and typography guidelines.	0	2
5	Responsive Design Practice: Design a responsive web layout using Figma's constraints and layout grids.	0	2
6	Icon Design: Create a set of custom icons for a specific theme or application using Figma's vector tools.	0	2
7	Collaboration Exercise: Collaborate with a partner to design a simple app interface, taking turns to add and edit elements in Figma.	0	2
8	User Testing Simulation: Use Figma's prototyping features to simulate user testing for a design, incorporating feedback and iterating on the design.	0	2



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9	Animation Practice: Add animations and transitions to a prototype in Figma, focusing on enhancing user interactions.	0	2
10	Design Critique: Participate in a design critique session with peers, sharing your Figma files and receiving feedback on your designs.	0	2
11	Real-world Project: Take on a freelance or personal project that involves designing a complete UI/UX experience in Figma, from wireframes to high-fidelity prototypes.	0	2
12	Portfolio Building: Use Figma to create a portfolio showcasing your UI/UX design projects, including case studies and process documentation.	0	2

S-STUDY, O-OPERATIONAL

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Department of Computer Science & Engineering

Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Course Title: UI/UX Design (Honors Paper - I)										
Course Code: 231CSEHCL201C							Semester: IV			
Teaching Scheme				Theory Marks			Practical Marks			Total Marks
Credits	L	T	P	ISE	MSE	ESE	INT	OE	POE	
3	3	-	1	20	30	50	-	-	-	100

Prerequisite: Fundamental knowledge of Data Communication, Networking and Information Security.

Course Description:

This course includes basics of user interface design. The course will emphasize on understanding of user experience and cognition, which are the key factor to achieve user-friendly Interface Design. It gives details about different windows/mobile components and applications.

Course Objectives:

- To acquaint the knowledge of user centered design.
- To explore user centered methods in design, graphic design on screens, simulation and prototyping techniques.
- To provide usability testing methods and interface technologies.

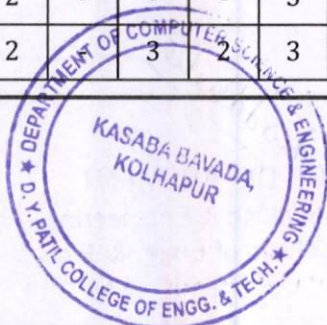
Course Outcomes (COs):

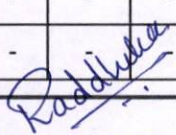
CO	Upon successful completion of this course, the students will be able to:	BTL
HC201C.1	Develop Proficiency in Figma	II
HC201C.2	Create effective UI/UX designs by implementing UI/UX design principles.	III
HC201C.3	Build Reusable Design Systems	III
HC201C.4	Create Interactive Prototypes	III

Course Articulation Matrix:

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
HC201C.1	2	-	-	-	3	-	-	-	-	-	-	-	-	3	II
HC201C.2	2	-	3	-	-	-	-	-	-	-	-	-	3	-	III
HC201C.3	2	-	-	-	3	-	-	-	-	-	-	-	-	3	III
HC201C.4	2	-	3	2	3	-	-	-	-	-	-	-	3	-	III




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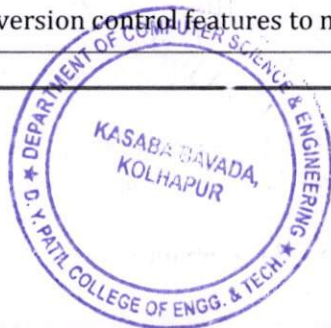
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Second Year B. Tech. Curriculum

Semester-III & IV (Academic Year: 2024-25)

Content	Hours
Unit 1: Introduction to Figma <ul style="list-style-type: none"> Overview of Figma and its advantages over traditional design tools Understanding the differences between Figma and other design tools (e.g., Sketch, AdobeXD) Setting up a Figma account and installing the desktop app Navigating the Figma interface: layers panel, properties panel, toolbar, etc. Creating a new project and understanding the different project settings Exploring Figma's basic tools: selection tool, shape tools, text tool, etc. Understanding the concept of frames and how to use them in Figma Importing assets (images, icons, etc.) into Figma 	8
Unit 2: Design Principles and Best Practices <ul style="list-style-type: none"> Understanding the importance of design principles in UI/UX design Applying design principles (e.g., contrast, alignment, hierarchy) in Figma Exploring design best practices for creating user-friendly interfaces Using grids and layout techniques to create visually appealing designs Choosing the right typography and using text styles effectively in Figma Understanding color theory and applying it to your designs in Figma 	7
Unit 3: Creating UI Elements <ul style="list-style-type: none"> Designing common UI elements (e.g., buttons, forms, navigation bars) in Figma Using Figma's components and styles for creating reusable design elements Organizing your design files using frames, groups, and pages in Figma Using vector networks and Boolean operations to create complex shapes in Figma Creating responsive designs in Figma using constraints and layout grids Exporting assets from Figma for use in development 	7
Unit 4: Prototyping and Interaction Design <ul style="list-style-type: none"> Understanding the basics of prototyping in Figma Creating interactive prototypes with clickable elements and links Adding animations and transitions to your prototypes in Figma Using Figma's prototyping features to simulate user flows Collaborating with stakeholders and gathering feedback on your prototypes in Figma Exporting prototypes for user testing and sharing with clients 	8
Unit 5: Design Systems and Collaboration <ul style="list-style-type: none"> Understanding the concept of design systems and their importance in UI/UX design Creating a design system in Figma using components, styles, and shared libraries Collaborating with team members using Figma's collaboration features (e.g., commenting, sharing) Using Figma's version control features to manage changes in your design files 	8



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<ul style="list-style-type: none"> Integrating Figma with other tools (e.g., Zeplin, Jira) for a seamless design workflow Conducting design reviews and presenting your work to stakeholders using Figma 	
Unit 6: Advanced Techniques and Final Project <ul style="list-style-type: none"> Exploring advanced tips and tricks for using Figma more efficiently Implementing micro-interactions and advanced animations in Figma Using Figma's plugins to extend its functionality and automate repetitive tasks Completing a final project that showcases the skills and techniques learned throughout the course Presenting your final project to the class and receiving feedback from peers and instructors Reflecting on your learning journey with Figma and identifying areas for further improvement 	7

List of Assignments (Lab)			
No.	Name of Assignment	S/O	Hours
1	UI Element Design: Design common UI elements such as buttons, forms, and navigation bars using Figma's tools and components.	0	2
2	Wireframing: Create wireframes for a website or mobile app using Figma's frames and basic shapes.	0	2
3	Prototype a User Flow: Design a user flow for a specific task (e.g., signing up for a newsletter) and create a clickable prototype in Figma.	0	2
4	Design System Creation: Develop a basic design system in Figma, including components, styles, and typography guidelines.	0	2
5	Responsive Design Practice: Design a responsive web layout using Figma's constraints and layout grids.	0	2
6	Icon Design: Create a set of custom icons for a specific theme or application using Figma's vector tools.	0	2
7	Collaboration Exercise: Collaborate with a partner to design a simple app interface, taking turns to add and edit elements in Figma.	0	2
8	User Testing Simulation: Use Figma's prototyping features to simulate user testing for a design, incorporating feedback and iterating on the design.	0	2
9	Animation Practice: Add animations and transitions to a prototype in Figma, focusing on enhancing user interactions.	0	2
10	Design Critique: Participate in a design critique session with peers, sharing your Figma files and receiving feedback on your designs.	0	2
11	Real-world Project: Take on a freelance or personal project that involves designing a complete UI/UX experience in Figma, from wireframes to high-fidelity prototypes.	0	2



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12	Portfolio Building: Use Figma to create a portfolio showcasing your UI/UX design projects, including case studies and process documentation.	0	2
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S-STUDY, O-OPERATIONAL

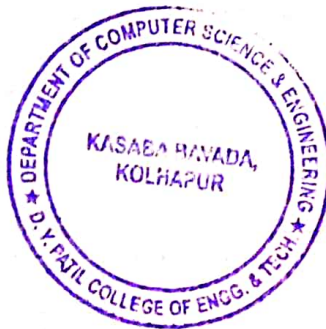
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