Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2015
'B' Grade (CGPA 2.62)

Name of the Faculty: Science and Technology

CHOICE BASED CREDIT SYSTEM

Structure

Name of the Course: B.Tech (Computer Science & Engineering)

(Syllabus to be implemented from w.e.f. June 2021)

Programme Educational Objectives and Outcomes

A. Program Educational Objectives

1. To make students competent for professional career in Computers, IT & allied fields.
2. To build strong fundamental knowledge amongst student to pursue higher education and continueprofessional development in Computers, IT & other fields
3. To imbibe professional ethics, develop team spirit and effective communication skills to besuccessful leaders and managers with a holistic approach.
4. To nurture students to be sensitive to ethical, societal & environmental issues while conductingtheir professional work.

B. Program Outcomes Engineering Graduate will be able to –

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

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities withan understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to

assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. Program Specific Outcomes (PSOs)

1. Graduate has an ability to use technical skills necessary for design, maintenance, developmentand implementation of database systems and networking applications.
2. Graduate has an ability to provide IT solutions, develop mobile applications in multidisciplinaryareas using standard tools and techniques.
3. Graduate has an ability to utilize and apply software engineering tools for design and realizationof projects in various domains of Computer Science and Engineering.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of S.Y. B.Tech.(CSE) wef. 2021-2022
Semester – I

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS211	Applied Mathematics-I	3	1		4	70	30	25	125
CS212	Discrete Mathematical Structures	3	1		4	70	30	25	125
CS213	Data structures	3			3	70	30		100
CS214	Computer Graphics	3			3	70	30		100
CS215	Microprocessors	3			3	70	30		100
CS216	Python Programming	2			2		25		25
	Sub Total	**17**	**2**		**19**	**350**	**175**	**50**	**575**
	Environmental studies	2				50			50
	Laboratory/Workshop					**ESE / POE**			
CS213	Data structures			2	1	50		25	75
CS214	Computer Graphics			2	1			25	25
CS215	Microprocessors			2	1			25	25
CS216	Python Programming			2	1	50		25	75
	Sub Total			**8**	**4**	**100**		**100**	**200**
	Grand Total	**19**	**2**	**8**	**23**	**450**	**175**	**150**	**775**

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of S.Y. B.Tech.(CSE) wef. 2021-2022
Semester – II

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS221	Applied Mathematics-II	3	1		4	70	30	25	125
CS222	Theory of Computation	3	1		4	70	30	25	125
CS223	Computer Organization and Architecture	3			3	70	30		100
CS224	Computer Networks	3			3	70	30		100
CS225	Object Oriented Programming using Java	2			2		25		25
	Total	**14**	**2**		**16**	**280**	**145**	**50**	**475**
	Environmental studies	2				50			50
	Laboratory/Workshop					**ESE / POE**			
CS223	Computer Organization and Architecture			2	1			25	25
CS224	Computer Networks			2	1	50		25	75
CS225	Object Oriented Programming using Java			4	2	50		25	75
	Total			**8**	**4**	**100**		**75**	**175**
	Grand Total	**16**	**2**	**8**	**20**	**380**	**145**	**125**	**650**

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of T.Y. B.Tech.(CSE) wef. 2022-2023
Semester-I

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS311	Artificial Intelligence	3			3	70	30		100
CS312	Operating Systems	3			3	70	30		100
CS313	Database Engineering	3			3	70	30		100
CS314	Design and Analysis of Algorithm	3			3	70	30		100
CS315	Mobile Application Development	2			2		25		25
SL31	Self Learning Module I (HSS)				1	50			50
	Sub Total	**14**			**15**	**330**	**145**		**475**
	Laboratory/Workshop					**ESE / POE**			
CS311	Artificial Intelligence			2	1			25	25
CS312	Operating Systems			2	1			25	25
CS313	Database Engineering			2	1	50		25	75
CS314	Design and Analysis of Algorithm			2	1	50		25	75
CS315	Mobile Application Development			2	1	50		25	75
	Sub Total			**10**	**5**	**150**		**125**	**275**
	Grand Total	**14**		**10**	**20**	**480**	**145**	**125**	**750**

Note :

1. Batch size for the practical/tutorial shall be of 15 students. On forming the batches, if the strength of remaining student exceeds 7, then a new batch shall be formed.
2. Vocational Training (evaluated at Final Year B. Tech. Semester VII) of minimum 15 days shall be completed in vacation/s after S.Y. B. Tech. Semester IV but before Final Year B.Tech. Semester VII & the report shall be submitted and evaluated in Final Year B.Tech. Semester VII
3. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable.

4. **Self-Learning Module I at T.Y. B.Tech. – I**
   Curriculum for Humanities and Social Sciences, Self Learning Module - I is common for all under graduate engineering programs.

A. Student can select & enroll a Self Learning Module I Course from PAH Solapur University, Solapur HSS Course List (SL31-A) and appear for university examination.

SL31-A: P. A. H. Solapur University, Solapur: HSS Course List

1. Economics	4. Stress and Coping
2. Intellectual Property Rights for Technology Development and Management	5. Professional Ethics & Human Value
3. Introduction to Sociology	

OR

B.Student can select and enroll for university approved minimum eight weeks NPTEL HSS course (SL31-B), complete its assignments and appear for certificate examination conducted by NPTEL. The list of courses as shown in Table SL31-B will be updated from time to time by University authorities. Latest updated list will be valid for selection of self learning Module-I (HSS) courses.

More details about NPTEL are available at http://nptel.ac.in

SL31-B: University approved NPTEL- HSS course List

1. Soft skills	15. Management of Inventory Systems
2. Introduction to Modern India Political Thought	16. Economic Growth and Development
3. Intellectual Property	17. Ethic in Engineering Practice
4. Technical English for Engineers	18. Corporate Social Responsibility
5. Developing Soft Skills and Personality	19. Marketing Management –I
6. Educational Leadership	20. Marketing Research and Analysis
7. Microeconomics: Theory & Applications	21. Selected Topics in Decision Modeling
8. Engineering Economics	22. Innovation, Business Models and Entrepreneurship
9. Human Resource Development	23. Simulation of Business Systems: An Applied Approach
10. Project Management for managers	24. Sustainability through Green Manufacturing Systems: An Applied Approach
11. Data Analysis and Decision Making - I	25. Total Quality Management - I
12. E-Business	26. Introduction to Operations Research
13. Working Capital Management	27. Knowledge Management
14. Industrial Safety Engineering	

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of T.Y. B.Tech.(CSE) wef. 2022-2023
Semester-II

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS321	System Programming	3			3	70	30		100
CS322	Internet of Things	3			3	70	30		100
CS323	Software Engineering	3	2		5	70	30	25	125
CS324	Professional Elective-I	3			3	70	30		100
CS325	Web UI and UX Technology	2			2		25		25
CSO326	Open Elective	2			2	50			50
	Sub Total	**16**	**2**		**18**	**330**	**145**	**25**	**500**
	Laboratory/Workshop					**ESE / POE**			
CS321	System Programming			2	1			25	25
CS322	Internet of Things			2	1			25	25
CS324	Professional Elective-I			2	1			25	25
CS325	Web UI and UX Technology			2	1	50		25	75
CS327	Mini Project			2	1	50		25	75
	Sub Total			**10**	**5**	**100**	**0**	**125**	**225**
	Grand Total	**16**	**2**	**10**	**23**	**430**	**145**	**150**	**725**

Professional Elective – I	**Open Elective**
Cloud Computing	Biology for Engineers
Augmented Reality/Virtual Reality	Engineering Economics and Management
Network Security	Disaster Management

Note

1. Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining student exceeds 7, then a new batch shall be formed.
2. Vocational Training (evaluated at Final Year B. Tech. Semester VII) of minimum 15 days shall be completed in vacation/s after S.Y. B.Tech. Semester IV but before Final Year B.Tech. Semester VII & the report shall be submitted and evaluated in Final Year B.Tech. Semester VII
3. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable.
4. Mini Project shall consist of developing software, based on various tools & technologies.
5. Project groups shall not be of more than **five** students.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of Final Year B.Tech.(CSE) wef. 2023-2024
Semester-I

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS411	Software Testing and Quality Assurance	3			3	70	30		100
CS412	Compiler Construction	3			3	70	30		100
CS413	Professional Elective-II	3			3	70	30		100
CS414	Professional Elective-III	3			3	70	30		100
CS415	DevOps	2			2		25		25
SL41	Self Learning (Technical)				1	50			50
	Sub Total	**14**	**0**	**0**	**15**	**330**	**145**		**475**
	Laboratory/Workshop					**ESE / POE**			
CS411	Software Testing and Quality Assurance			2	1			25	25
CS412	Compiler Construction			2	1			25	25
CS413	Professional Elective-II			2	1			25	25
CS414	Professional Elective-III			2	1			25	25
CS415	DevOps			2	1	50		25	75
CS416	Seminar			2	1			25	25
CS417	Vocational Training				1			25	25
	Sub Total			**12**	**7**	**50**		**175**	**225**
	Grand Total	**14**	**0**	**12**	**22**	**380**	**145**	**175**	**700**

Professional Elective-II :
Business Intelligence
Data Mining
Distributed Systems
Management Information System

Professional Elective-III :
Human Computer Interaction
Big Data Analytics
Information Retrieval

Note :

1. Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 7, then a new batch shall be formed.
2. Vocational Training (evaluated at Final Year B.Tech Semester I) of minimum 15 days shall be completed in any vacation after S.Y. B.Tech Semester II but before Final Year B.Tech Semester I & the report shall be submitted and evaluated in Final Year B.Tech. Semester I.
3. Appropriate Professional Elective II& III Subjects may be added when required.
4. Project group for Final Year B.Tech. (Computer Science and Engineering) Semester I and Semester II shall not be of more than **five** students.
5. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of Final Year B.Tech.(CSE) wef. 2023-2024
Semester-II

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS421	Professional Elective-IV	3			3	70	30		100
CS422	Cyber Laws and Ethics	2			2	50			50
	Sub Total	**5**			**5**	**120**	**30**		**150**
	Laboratory/Workshop					**ESE** / **POE**			
CS423	Project			20	10	100		100	200
	Sub Total			**20**	**10**	**100**			**200**
	Grand Total	**5**		**10**	**15**	**220**	**30**	**100**	**350**

Professional Elective-IV :
Parallel Architecture
Blockchain Technology
Image Processing

Note:

1. Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 7, then a new batch shall be formed.
2. Appropriate Professional Elective IV Subjects may be added when required.
3. Project group for Final Year B.Tech. (Computer Science & Engineering) Semester II shall not be of more than **five** students.
4. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech (Computer Science & Engineering)
Semester-I
CS311 : ARTIFICIAL INTELLIGENCE

Teaching Scheme	**Examination Scheme**
Lectures– 3 Hrs/week, 3 Credits	ESE - 70 Marks
Practical – 2 Hrs/week, 1 Credit	ISE - 30 Marks
	ICA - 25 Marks

Introduction:
This course presents a basic introduction to the techniques used in developing Artificial Intelligent systems. It is a walkthrough to problem spaces and search algorithms, Knowledge representation, reasoning, logic programming and applications of Artificial Intelligence.

Course Prerequisite:
Student shall have some exposure to algorithms and programming.

Course Outcomes:
At the end of the course students will be able to
1. Formulate and solve sequence of actions for an agent as a search problem.
2. Infer from represented knowledge using logical and probabilistic reasoning methods.
3. Solve agent decision problems using probability theory.
4. Comprehend forms of learning and demonstrate their working.

SECTION - I

Unit 1 – Overview **(04)**
Foundations, scope, problems, and approaches of AI. Intelligent agents : reactive, deliberative, goal-driven, utility-driven, and learning agents

Unit 2 - Problem-solving through Search **(10)**
Forward and backward, state-space, blind, heuristic, problem-reduction, A, A*, AO*,minimax, constraint propagation, neural, stochastic, and evolutionary search algorithms,sample applications.

Unit 3 - Knowledge Representation and Reasoning **(05)**
Ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; first order logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications.

SECTION – II

Unit 4 - Representing and Reasoning with Uncertain Knowledge **(08)**
Probability, connection to logic, independence, Bayes rule, Bayesian networks, probabilistic inference, and sample applications.

Unit 5 - Decision-Making **(07)**
Basics of utility theory, decision theory, sequential theory, decision problems, elementary game, sample applications.

Unit 6 - Learning and Knowledge Acquisition **(08)**

Forms of Learning: Supervised, Unsupervised, Semi-supervised. Statistical learning, ReinforcementLearning: Q-learning, sample applications.

Unit 7 - Conclusions **(03)**

Philosophical Foundations, AI: The Present and Future.

Internal Continuous Assessment (ICA):

ICA should consist minimum 10 assignments using any programminglanguage with openly available tools, frameworks and resources based on thefollowing topics.

- Intelligent agents
- Problem solving through search
- First order logic
- Bayesian Networks
- Decision and Game theory
- Statistical Learning
- Q-learning.

In addition to above students shall undertake a case study on “Applications of AI: The Present and Future”

Text Books:

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Prentice Hall
2. A First Course in Artificial Intelligence, Deepak Khemani, McGraw Hill Education (India)
3. Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI.

Reference Book:

1. Artificial Intelligence, Elaine Rich and Kevin Knight, Tata McGraw Hill

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B. Tech. (Computer Science & Engineering)
Semester – I
CS312 – OPERATING SYSTEMS

Teaching Scheme	**Examination Scheme**
Lectures– 3 Hrs./week, 3 Credits	ESE – 70 Marks
Practical – 2 Hrs./week, 1 Credit	ISE – 30 Marks
	ICA – 25 Marks

Introduction:
This course introduces Fundamentals and basic knowledge of an operating system. It also covers the details Process Management, deadlock, Memory Management and IO subsystems.

Course Prerequisite:
Students should have knowledge of Computer Systems and basics of C programming language.

Course Outcomes:
Students will be able to:
1. Comprehend the features of the operating system to formulate its role and responsibilities.
2. Analyze the principles of process scheduling and process synchronization.
3. Simulate memory management technique for CPU performance.
4. Describe how the file system, mass storage, and I/O are handled in a modern computer system.

SECTION-I

Unit 1 - Introduction **(05)**
Operating system definition, Simple Batch System, Multiprogrammed Batch System, Time Sharing System, Personal Computer System, Parallel System, Real Time System, and System Calls.

Unit 2 - Process **(06)**
Process Concept, Process Scheduling, Operations on processes, Cooperating Processes, Threads, Inter-Process communication

Unit 3 - Process Scheduling **(06)**
Basic concept, Scheduling Criteria, Scheduling Algorithms, Multiple processor scheduling

Unit 4 - Inter-process synchronization **(05)**
Background, The critical section problem, Peterson's algorithm, Synchronization Hardware, Semaphores, Classical problems of synchronization, Monitors.

SECTION-II

Unit 5 – Deadlocks **(07)**
System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock, combined approach to deadlock.

Unit 6 - Memory Management **(06)**
Background, Logical Versus Physical Address space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with paging.

Unit 7 - Virtual Memory **(05)**

Background, Demand paging, Page replacement, Page replacement algorithms, Allocation of frames, thrashing (Only concept).

Unit 8 - IO System **(04)**

Overview, I/O hardware, Application I/O interface, Mass Storage Structure – Disk Scheduling (FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, C-SCAN Scheduling, LOOK Scheduling)

International Continuous Assessment (ICA) :

It should consist of laboratory assignments as follows:

1. Study of Unix commands
2. Program using system calls: fork (), exec(), suspend() , resume()
3. Implementation of FCFS scheduling algorithm
4. Implementation of SJF (non preemptive)
5. Implementation of round robin (RR).
6. Implementation of priority scheduling algorithm (nonpreemptive)
7. Implementation of Mutual Exclusion 1st / 2nd / 3rd algorithm.
8. Implementation of Mutual Exclusion using semaphore (wait & signal)
9. Implement Bankers Algorithm for Deadlock Avoidance
10. Implementation of RAG or WFG method for deadlock detection for single instance of resources.
11. Simulation of page replacement strategies (FIFO, LRU , Optimal)
12. Simulation of Memory Allocation Strategies (First Fit, Best Fit, Worst Fit)
13. Study of I/O subsystem

Text Books:

1. Operating System concepts, Silberschatz, Galvin, 7th or 8th Edition (John Wiley).
2. Operating Systems: Internals and Design Principles by William Stallings, 5th Edition (PHI).
3. The design of Unix Operating Systems- Maurice J. Bach(PHI)

Reference Books:

1. Operating system with case studies in UNIX, Netware and Windows NT by Achyut Godbole (TMGH).
2. Operating Systems, Deitel, Deitel, Choffnes, 3rd Edition, by Pearson Education.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech (Computer Science & Engineering)
Semester-I
CS313 : DATABASE ENGINEERING

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs/week, 3 Credits	ESE: 70 Marks
Practical: 2 Hrs/week, 1 Credit	ISE: 30 Marks
	ICA: 25 Marks
	POE: 50 Marks

INTRODUCTION:
In today's data-driven economy, no computer science or business curriculum would be complete without a course in databases and data management system. This course emphasizes the understanding of the fundamentals of relational database system including data models, database architectures, normalization, data integrity, security and data manipulation. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems with the help of Structured Query language (SQL).It ends with covering database transaction and recovery concepts. Upon completion, students should be able to design and implement normalized database structures by creating simple database.

COURSE PREREQUISITE:
No prerequisite knowledge of databases is required but basic understanding of data-structures and algorithms is assumed. Any general purpose programming language knowledge is needed.

COURSE OUTCOMES:
At the end of this course, the student will be able to -

1. Apply the principles of database system and relational query language.
2. Design database using E-R modeling and apply normalization techniques on a given scenario.
3. Formulate SQL queries to perform CRUD operations.
4. Apply appropriate indexing technique to optimize the performance of the database.
5. Demonstrate transaction processing techniques.

SECTION – I

Unit 1: Introduction **(04)**
Database System Applications, Purpose of Database Systems, View of data, Database Languages, Data Storage and Querying, Database Architectures, Database users and administrators, history of databases system.

Unit 2: Database Design and E-R Model **(07)**
Overview of design process, E-R Model, Constraints, Removing redundant attributes in entity sets, E-R diagrams, Reduction to relational schema, E-R design issues, and Extended E-R features. Relational Model: Structure of relational databases, Database schema, keys, Schema diagrams, Relational Query languages, Relational algebra, Tuple Relational Calculus, Domain Relational Calculus.

Unit 3: SQL and Advanced SQL **(08)**
SQL : Overview, SQL data definition, Basic structure of SQL Queries, Additional basic operations, Set operations, NULL values, Aggregate functions, Nested sub queries, Modification of the databases , Join operations, Views, Transactions, Integrity constraints, SQL data types and schemas, Authorization, Advanced SQL : Embedded SQL, Functions and Procedures, Triggers.

Unit 4: Relational Database Design **(08)**

Features of good Relational Designs, Atomic Domains, First Normal Form, Decomposition using Functional dependencies, Second Normal Form, BCNF, Third Normal Form, Functional-dependency theory, Fourth Normal Form.

SECTION – II

Unit 5: Indexing and Hashing **(06)**

Basic Concepts, Ordered Indices, B+ Tree Index Files, B Tree Index Files, Multiple Key Access, Static Hashing, Dynamic Hashing, Comparison of Indexing and Hashing, Bitmap indices, Index definition in SQL

Unit 6: Transactions **(04)**

Transaction concepts, A simple transaction Model, Storage structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity.

Unit 7: Concurrency Control **(04)**

Lock based protocol, Deadlock handling, Multiple granularity, Time Stamp-based protocols, Validation based protocols.

Unit 8: Recovery System **(04)**

Failure Classification, Storage, Recovery and Atomicity, Recovery algorithms, Buffer management.

Course Instructions:

Assignments 2 to 4 should be implemented in MySQL/Oracle/ PostGreSQL. Assignments 6 to 11 should be implemented in C++/Java.

Internal Continuous Assessment (ICA):

It should consist of 8-10 laboratory assignments as follows:

1. E-R Diagrams: Draw E-R diagram for any specific database application and create a data dictionary for the same.
2. a) Basic SQL DDL commands: write simple queries in SQL on above database application for schema creation and updation.
   b) SQL DML commands: insert, update, select command with different clauses, queries using aggregates, grouping and ordering.
3. a) Nested sub queries, Joins and Set operations: write queries in SQL using concept of nested sub queries, join and different set operations.
4. a) Views, Integrity constraints and Authorization: queries for creating views, different integrity constraints and authorization commands.
   b) Advanced SQL: queries on embedded SQL, functions and procedures, triggers
5. Convert the created database into 1NF, 2NF, 3NF and BCNF.
6. Given a set of functional dependencies, find canonical cover and closure of functional dependency.
7. Write a Java program for database (created in expt-2) connectivity using JDBC.
8. Write a program to implement B+ tree index (n=3 or n=5) on the database previously created.
9. Write a program to implement dynamic hashing on the database previously created.
10. Write a program to simulate log based protocol using immediate or deferred database modification.
11. Write a program to simulate any one concurrency control protocol.

Text Book:

1. Database system concepts by Abraham Silberschatz, Henry F. Korth, S. Sudarshan (McGraw Hill International Edition) sixth edition.

Reference Books:

1. Fundamentals of Database systems by Ramez ElMasri, S. B. Navathe (Pearson Education) Fifth edition.
2. Database Management Systems by Ramkrishnan Gehreke (Tata McGraw Hill) third edition.
3. Principles of Database Systems by J. D. Ullman (Galgotia Publications)
4. SQL The Complete Reference, 3rd Edition by James R Groff, Paul N. Weinberg and Andy Oppel
5. Database system concepts by Peter Rob, Carlos Coronel (Cengage Learning) ninth edition.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech. (Computer Science and Engineering)
SEMESTER - I

CS314 - DESIGN AND ANALYSIS OF ALGORITHM

Teaching Scheme
Lectures— 3 Hrs./week, 3 Credits
Practical— 2 Hrs./week, 1 Credit

Examination Scheme
ESE - 70 Marks
ISE - 30 Marks
ICA - 25 Marks
POE – 50 Marks

Introduction :
This course introduces the algorithms, strategies of algorithms and analysis of algorithms which will help to compare and determine good algorithms.

Course Prerequisite:
Students should have knowledge of basic programming. They should also have basic knowledge of data structure and graph theory.

Course Outcomes :
At the end of the course, students will be able to -
1. Derive time and space complexity of a given algorithm
2. Select appropriate algorithm design paradigm for a problem.
3. Apply algorithm design paradigm for a problem.
4. Describe and distinguish complexity classes of problems

SECTION-I

Unit 1 – Introduction **(08)**
Algorithm Specification: Pseudo code Conventions, Recursive Algorithm, Performance Analysis: Space Complexity, Time Complexity, Calculating worst case, best case and average case complexities, complexities Asymptotic Notations, Performance Measurement

Unit 2 - Divide and Conquer **(07)**
The general method, Binary search, Finding the maximum and Minimum, Quicksort, Selection Sort, Merge Sort.

Unit 3 - The Greedy method **(08)**
The general method, Knapsack Problem, Job Sequencing with deadlines, Minimum —cost spanning trees — Prim's and Kruskal's Algorithms, Optimal storage on tapes, Optimal merge patterns, Single source shortest paths

SECTION-II

Unit 4 - Dynamic Programming **(08)**
The general method, Multistage graphs, All pair shortest paths, Optimal binary search trees, 0/1 Knap sack, Reliability design, The Traveling Sales person problem. Flow shop scheduling

Unit 5 - **Backtracking** **(07)**
The general method, 8-queen problem, sum of subsets, Knapsack Problem, Hamilton Cycle, and Graph Coloring.

Unit 6 - **NP-Hard and NP-Complete problems** **(07)**

Tractable and Intractable Problems: Computability. The Halting problem, Computability classes — P, Np- class, NP-complete and NP-hard, Standard NP-complete problems, NP-Hard Problem (Only Basics problems).

Internal Continuous Assessment (ICA) :

ICA shall consist of minimum ten practical assignment problems.

1) The nature of the problems shall be with objectives to assess student's ability to
    a. Compare and choose an appropriate algorithm design paradigm on time and space complexity
    b. Apply algorithm design paradigm to provide a solution to the problem using either C, C++, Python, Java or any other programming language the student is proficient in.
    c. Effectively assess performance of provided solutions w.r.t programming language's runtime implementation.

Text Book:

1. Fundamentals of Computer Algorithms, Horowitz, Sahni & Rajasekaran (Galgotia Publications)
2. Fundamental of Algorithm, Gilles Brassard, Paul Bratley (Pearson Publication)
3. Introduction to Algorithms, Thomas Cormen (Pearson Publication)

Reference books :

1. Introduction to Design and Analysis of Algorithm, Goodman (McGrawhill)
2. Design and analysis of algorithms, Aho, Hopfcraft and Ullman (Addison wesley)
3. Design & Analysis of Algorithms, Sharma, Khanna Publishing House, N.Delhi
4. Design & Analysis of Algorithms, S. Sridhar, Oxford

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B. Tech. (Computer Science & Engineering)
Semester – I
CS315 – MOBILE APPLICATION DEVELOPMENT

Teaching Scheme	**Examination Scheme**
Lectures– 2 Hrs./week, 2 Credits	ISE – 25 Marks
Practical – 2 Hrs./week, 1 Credit	ICA - 25 Marks
	POE – 50 Marks

Introduction: Mobile application development course will build your skills in creating mobile apps for Android platform as well as for Cross platform. This course includes Android application development and Xamarin Application development with basic User Interface design, basic building blocks, data handling, Testing mobile apps and how to take app to the market.

Course Prerequisite: Knowledge of programming paradigms and object-oriented programming principles.

Course Outcomes:
At the end of this course students will be able to
1. Select suitable development practices for a mobile application
2. Build cross platform mobile application for a given problem scenario.
3. Choose suitable method of testing, signing, packaging and distribution for a mobile application.

Section I : Mobile application development for Android using Java/Kotlin

Unit 1 - USER INTERFACE DESIGN (04)
Activity, Activity states, Activity Life Cycle, UI Resources, Layout Resources, String Resources, Image Resources, UI Elements and Events, Interaction between Activities, Exchanging data among activity, Fragments, Life Cycle of Fragments, Interaction between Fragments.

Unit 2 - MOBILE APPLICATION FUNCTIONALITY (04)
Beyond UI, App functionality beyond user interface - Threads, Asynchronous Tasks, Services – states and life cycle, Intent and Bound Service, Notifications, Intents and Intent Resolution, Broadcast receivers, Telephony and SMS APIs.

Unit 3 - NATIVE DATA HANDLING (04)
Native data handling On-device File I/O, data persistent and access using shared preferences, mobile databases such as SQLite and implementation for CRUD, and enterprise data access (via Internet/Intranet).

Unit 4 - TESTING & DISTRIBUTION OF MOBILE APPS (02)
Debugging mobile apps, White box testing, Black box testing, and Unit testing for Android. Versioning, signing and packaging mobile apps, distributing apps on mobile market place, Google play store.

Section II : Cross platform mobile application development using Xamarin

Unit 5 - C# PROGRAMMING GUIDE (04)
Inside a C# Program, Main() and Command-Line Arguments, Statements, Expressions, and Operators, Types, Classes and Structs, Interfaces, Inheritance and Polymorphism in C#, Delegates,

Arrays, Strings, Properties, Indexers, Events, Generics, Iterators, Namespaces, Assemblies in .NET, Attributes, Collections, Exceptions and Exception Handling, Multi-threading.

Unit 6 - GETTING STARTED WITH XAMARIN (04)

Introducing native cross-platform applications with Xamarin, Hello MVVM—creating a simple cross-platform app using MVVM, MVVM—the model-view–view model design pattern, Hello again, MVVM—understanding and enhancing our simple MVVM app, An introduction to multithreading for Xamarin apps.

Unit 7 - BUILDING APPS (06)

Designing MVVM cross-platform apps, Building cross-platform models, Building cross-platform view models, Building simple Android views, Building more advanced Android views, Building simple iOS views, Building more advanced iOS views

Unit 8 - FROM WORKING CODE TO THE STORE (02)

Running mobile apps on physical devices, Testing mobile apps using Xamarin UITest, Using App Center to build, test, and monitor apps, Deploying apps to beta testers and the stores.

ISE Evaluation: ISE Evaluation for the course will consists of three hands on tests based on the topics mentioned in the syllabus.

Internal Continuous Assessment (ICA): Minimum 10 assignments requiring students to design, develop and test cross platform mobile applications for real world problem/use-case/scenario.

Text Books :

1. Android Application Development - All in one for Dummies, Barry Burd
2. Mobile Apps Development, Anubhav Pradhan, Anil V Deshpande
3. Xamarin in Action: Creating native cross-platform mobile apps by Jim Bennett, Manning Publications; 1st edition.

Reference books :

1. Android Developer Tools Essentials by Mike Wolfson (O'Reilly Media)
2. Embedded Android-Porting, Extending, and Customizing, Karim Yaghmour, (O'Reilly Media)

---

e-resources :

1. Android Developer Resources: http://developer.android.com
2. Xamarin documentation - Xamarin | Microsoft Docs: https://docs.microsoft.com/en-gb/xamarin/

Modalities for conducting End Semester Examination/Practical Oral Examination (POE):

- Practical and Oral Examination will be conducted by a panel of examiners assigned by university. A pair of examiners shall assess a batch @36 students in a day.
- The chairman shall prepare problem statements for a batch adhering to following guidelines:

1. At least Four Problem statements shall be set for a batch.
2. Problem statements shall be set in the context of course outcomes as defined in the course.
3. Problem Statements shall not be direct statements stating implement concept/topic etc.
4. Problem Statements shall be based on real world problem/use case/scenario etc.
5. Problem statement shall be at the minimum cognitive level of 'Apply' & above.
6. Problem Statements must be well described with no ambiguity and shall be of unseen nature.
7. Problem statements formulated shall be solvable by faculty in 2 hours and average students in 2.5 hrs in the examination duration.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech. (Computer Science & Engineering)
Semester-I
SELF LEARNING MODULE – I (H.S.S.)
SL31A-1 ECONOMICS

Teaching Scheme **Examination Scheme**
Credits :- 2 Credits **ESE:** 50 Marks

Course Outcomes:
Upon completion of this course, students will be able to
1. Identify the Basic Economic problems, Resource Constraints.
2. Apply various theories of economics for economic growth.
3. Identify causes of Inflation consequence and remedies.
4. To assess the impact of International Trade, foreign exchange on Indian economy.

Unit 1: Introduction
History of Economic thought, Basic Economic problems, Resource Constraints and Welfare maximization
Nature of Economics: Positive and Normative Economics, Micro and Macro Economics, Basic concepts in Economics, The role of State in economic activity, Market and Government failures, New economic Policy in India.

Unit 2: Theories of Economics
Theory of utility and consumer's choice, Theories of Demand, supply and market equilibrium, Theories of firm, production and costs, Market structures, Perfect and imperfect competitions, oligopoly, monopoly.

Unit 3: Macroeconomics
An overview of Macroeconomics, measurement and determination of national income, Consumption, saving and investment.

Unit 4: Banking & Inflation.
Commercial and Central Banking, Relationship between money, output and prices. Inflation causes, consequences and remedies.

Unit 5: International Influences on Economics
International Trade, foreign exchange and balance payments, stabilization policies, Monetary, Fiscal and exchange rate policies.

ASSIGNMENTS
Students shall complete five assignments, based on syllabus. (One assignment for every unit of the syllabus)
In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Text books:
1. Economics: P.A. Samuelson & W.D Nordhaus, McGraw Hill, New York, 1995
2. Modern Microeconomics : A. Koutsoyiannis, Macmillan,1975

Reference Books:

1. Microeconomics: R. Pindyck and D.L. Rubinfield, Macmillan New York, 1989
2. Microeconomics: Gordon, 4th edition, Little Brown & Co., Boston,1987
3. The Organization of Industry: William F. Shughart II, Richard D. Irwin, Illinois, 1990

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B. Tech. (Computer Science & Engineering)
Semester – I
SELF LEARNING –I (HSS)
SL31A-2 : INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT

Teaching Scheme
Credits: 2 Credits

Examination Scheme
ESE : 50 Marks

Course Outcomes:

Upon completion of this course, students will be able to,

1. Appreciate the intellectual property rights coming out of research and intellectual works
2. Demonstrate their knowledge about the process of acquiring the patents and copyrights for the innovative works.
3. Elaborate the role of Indian IPR system and role of WTO in protecting IntellectualProperty Rights
4. Avoid the plagiarism in their thesis, research papers etc. which can be questioned legally.

Unit 1:

Dynamics of Knowledge evolution, creation of ownership domains in the knowledge space using various instruments of IPR

Unit 2:

Outlines concepts of confidentiality and information security, explores their role in technology development and transfer integrating Intellectual Property in project planning, execution & commercialization

Unit 3:

Discussion on the shifting paradigms of R&D and their linkage to IPR, Introduction to concepts of Valuation of IP & Value Realization,

Unit 4:

Comparison the Indian IPR system with international IPR frameworks especially in the context of WTO, followed by a few sessions on IPR litigations both for the enforcement of rights and business strategy.

Unit 5:

Discussion on contentious issues of current interest such as Biotechnology and Intellectual Property, Protection of Traditional Knowledge, IPR and Electronic Commerce, TRIPS and Access to Medicines, Copyright issues in creative works, etc.

ASSIGNMENTS

Students shall complete five assignments, based on syllabus. (One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Text books:

1. Prabuddha Ganguli: Intellectual Property Rights Unleashing the Knowledge Economy. TataMcGraw Hill, New Delhi, 2001
2. Prabuddha Ganguli: Gearing Up for Patents The Indian Scenario. Universities Press India Ltd., Hyderabad, 1998
3. P. Narayan: Patent Law. Eastern Law Co., Calcutta

Reference Books:

1. Global Dimensions of Intellectual Property Rights in Science and Technology, Author: National Research Council , National Academies Press, 1993.
2. Technology Transfer: Intellectual Property Rights, C Sri Krishna, ICFAI University press(2008)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B. Tech. (Computer Science & Engineering)
Semester – I
SELF LEARNING –I (HSS)
SL31A-3 : INTRODUCTION TO SOCIOLOGY

Teaching Scheme
Credits: 2 Credits

Examination Scheme
ESE : 50 Marks

Course Outcomes:
Upon completion of this course, students will be able to -

1. Interpret the effect of various social phenomena on sociology
2. Elaborate the role of urbanization on the society
3. Appreciate the need of social institutions for better society.
4. Assess the role of modernization, industrialization, environmental/ecological changes in the development of society.

Unit 1:
What is sociology, some sociological concepts: social structure, status, role, norms, values etc., Socialization, and culture and change.
Social stratification - various approaches and concept of social mobility.

Unit 2:
Population and society - Trends of demographic change in India and the world, Human Ecology, Trends of Urbanization in the developing countries and the world.

Unit 3:
Major social institutions - Family and marriage, caste and tribe and organizations:
i. Formal organization (bureaucracy)
ii. Informal Organization

Unit 4:
Processes of social change- Modernization (including Sanskritization), industrialization, environmental/ecological changes and development.

Unit 5:
Social movements - protest movements, reformist movement and radical movements in India.

ASSIGNMENTS
Students shall complete five assignments, based on syllabus. (One assignment for every unit of the syllabus)
In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

TEXT BOOKS

1. Sociology, L. Broom, P. Selznick and D. Dorrock, 11th Edn. 1990 (Harper International).
2. Sociology: Themes and Perspectives, M. Haralambos, Oxford University Press, 1980.
3. General Introduction to Sociology, Guy Rocher, A. , MacMillan, 1982.

REFERENCE BOOKS

1. Social movements in India, vols. 1-2, 1984, M.S.A. Rao, Manohar Publications.
2. Society in India, David Mandelbaum, 1990, Popular Publications.
3. Social change in modern India, M.N. Srinivas, 1991, Orient Longman Publications.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B. Tech. (Computer Science & Engineering)
Semester – I
SELF LEARNING –I (HSS)
SL31A-4 : STRESS AND COPING

Teaching Scheme
Credits: 2 Credits

Examination Scheme
ESE : 50 Marks

Course Outcomes:
Upon completion of this course, students will be able to,
1. Identify various sources and nature of a stress.
2. Elaborate the effects of medical, psychological and behavioral stress.
3. Appreciate the social support to mitigate the stress.
4. Adopt various stress management techniques.

Unit 1:
Concept of stress-current and historical status. The nature of the stress response.

Unit 2:
Common sources of stress biological, personality and environmental.

Unit 3:
Coping styles defensive behaviors and problem-solving. Consequences of stress - medical, psychological and behavioral.

Unit 4:
The role of social support in mitigating stress.

Unit 5:
Stress management techniques-relaxation, meditation, cognitive restructuring, self-control, bio-feedback and time management, Preparing stress profile of a student.

ASSIGNMENTS
Students shall complete five assignments, based on syllabus. (One assignment for every unit of the syllabus)
In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

TEXT BOOKS

1. Walt, S. "Stress Management for Wellness". Harcourt Brace & Jovanovich, N.York, 1994.
2. D. Girdano and G. Everly., "Controlling Stress and Tension", Prentice-Hall, 1986.
3. Monat and R. Lazarus, "Stress and Coping: An Anthology", Columbia Univ. Press, 1985.

REFERENCE BOOKS

1. Weisman, "The Coping Capacity", Human Services Press, 1984.
2. Stress and Coping: The Indian Experience, D.M. Pestonjee, SAGE India; Second edition (1998)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B. Tech. (Computer Science & Engineering)
Semester – I
SELF LEARNING –I (HSS)
SL31A-5 : PROFESSIONAL ETHICS & HUMAN VALUES

Teaching Scheme | **Examination Scheme**
Credits: 2 Credits | ESE : 50 Marks

Course Outcomes:

Upon completion of this course, students will be able to,

1. Inculcate the human values in their behavior.
2. Demonstrate the Engineering ethics in their professional practice.
3. Practice the safety and responsibility and professional rights in their professional practice.
4. Incorporate the code of ethics of Global organizations such as ASME, ASCE, and IEEE

Unit 1: Human Values

Morals, Values and Ethics, Integrity, Work Ethics, Service Learning, Civic Virtue, Respect for others, Living Peacefully, Caring, sharing, Honesty, Courage, Valuing Time, Cooperation, Commitment, Empathy, Self-Confidence, Character, spirituality

Unit 2: Engineering Ethics

Senses of engineering ethics, Variety of Moral Issues, Types of inquiry, Moral Dilemmas Moral Autonomy, Kohlberg's Theory, Gilligan's Theory, Consensus and Controversy, Models of Professional Roles, Theories about Right Action, Self Interest , Customs and Religion.

Unit 3: Safety, Responsibilities and Rights

Safety and Risk, Assessment of safety and Risk, Risk Benefit Analysis and Reducing Risk, The Three Mile Island and Chernobyl Case Studies.

Collegiality and Loyalty, Respect for Authority, Collective Bargaining, Confidentiality, Conflicts of Interest, Occupational Crime, Whistle Blowing, Professional Rights – Employee Rights, Intellectual Property Rights (IPR) – Discrimination

Unit 4: Global Issues

Multinational Corporations, Environmental Ethics, Computer Ethics, Weapons Development, Engineers as Managers, Consulting Engineers, Engineers as Expert Witnesses and Advisors, Sample Code of Ethics of ASME, ASCE, IEEE, Institution of Engineers (India), etc.

ASSIGNMENTS

Students shall complete five assignments, based on syllabus. (One assignment for every unit of the syllabus)

In addition to the above, the institute may prescribe additional modes of assessment such as Unit test, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

Text books:

1. Bayles, M.D.: Professional Ethics, California: Wadsworth Publishing Company, 1981.
2. Koehn, D.: The Ground of Professional Ethics, Routledge, 1995.
3. R.S. Naagarazan, A Text Book of Professional Ethics & Human Values, New Age International, 2006

Reference Books:

1. Camenisch, P.F.: Grounding Professional Ethics in a Pluralistic Society, N.Y.: Haven Publications, 1983.
2. Wuest, D.E.: Professional Ethics and Social Responsibility, Rowman & Littlefield, 1994

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech. (Computer Science & Engineering)
Semester – II
CS321 – SYSTEM PROGRAMMING

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs./week, 3 Credits	ESE – 70 Marks
Practical – 2 Hrs./week, 1 Credit	ISE – 30 Marks
	ICA - 25 Marks

Introduction: This course introduces Language Processing activities, which helps to understand the basics of design and development of various professional languages, along with understanding of all the system software involved in executing a particular code written in a particular language.

Course Prerequisite: Students should have knowledge of Data Structures, Computer Organization, Microprocessors, Advanced C Concepts.

Course Outcomes:
Student will be able to
1. Describe the basic principles of system software and tools.
2. Implement Assembler and Macros to provide program generation facilities.
3. Use LPDT tools for a relevant problem to generate a scanner and parser.
4. Apply linkers and loaders for execution of a program.

SECTION - I

Unit 1 - Language Processors **(08)**
Introduction, language processing activities, Fundamentals of language processing, Fundamentals of language, Specification, language Processor development tools, UNIX programming Tools-lex & yacc, Recognizing words with Lex, Parser lexer communication, the parts of Speech lexer, A Yacc parser, The rules section of yacc, running lex and yacc on Unix.

Unit 2 - Assemblers **(07)**
Elements of assembly language programming, A simple assembly scheme, Pass structure of assemblers, design of a two pass assembler, A single pass assembler for IBM PC.

Unit 3 - Macros and Macro Processors **(06)**
Macro definition and call, Macro Expansion, Nested macro calls, Design of Macro preprocessor-Design overview.

SECTION – II

Unit 4 - Compilers and Interpreters **(07)**
Aspects of compilation, compilation of expressions, code optimization, Static and dynamic memory allocation, Memory allocation in block structured languages (Scope Rules, Memory allocation and access, Dynamic pointer), Interpreters

Unit 5 – Linkers **(06)**
Relocation and linking concepts, design of a linker, Self-relocating programs, linking for overlays.

Unit 6 - Loaders **(07)**
Function of loader, General loader scheme, Absolute loader, Relocating loader, Direct linking loader, Dynamic loading, Design of direct linking loader.

Internal Continuous Assessment (ICA) :

ICA consists of minimum 8 to 10 experiments based on the following guidelines.

1. Design Lex specifications for the tokens – keywords, identifiers, numbers, operators, white spaces.
2. Implementation of simple Lexical Analyzer in C which will generate the different tokens.
3. Implementation of syntax recognizer using grammar rules.
4. Simulation of text editor.
5. Introduction of TASM.
6. Symbol Table generation for *.c or *.asm file.
7. Design and Implementation of two pass assembler.
8. Design and Implementation of Single pass assembler.
9. Implementation of Macros.
10. Implementation of Nested macros.
11. Implementation of Toy-code generator.
12. Simulation of linkers.
13. Simulation of loaders.

Text Books:

1. System Programming and operating systems, D.M. Dhamdhere, 2nd Edition (TMGH) (Unit-1,2,3,4,5)
2. System Programming, J. J. Donovan, Mc-Graw Hill, (Unit 6)
3. Unix Programming Tools – lex & yacc , John R. Levine, Tony Mason & Doug Brown, (O"REILLY) (Unit 1)

Reference Books:

1. System Software - An Introduction to Systems Programming, Leland L. Beck, 3rd Edition (Pearson Education)
2. System Programming with C and Unix, Adam Hoover, Pearson,2010
3. Language Implementation Patterns, Terence Parr, SPD,2009

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech. (Computer Science & Engineering)
Semester – II
CS322 – INTERNET OF THINGS

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs./week, 3 Credits	ESE – 70 Marks
Practical – 2 Hrs./week, 1 Credit	ISE – 30 Marks
	ICA - 25 Marks

PREREQUISITES :
1. Fundamentals of Communication and computer network.
2. Micro controller, Network Security and Web programming.

COURSE OUTCOMES:
At the end of this course, students will be able to
1) Explain what Internet of Things is.
2) Describe components of IoT Architecture and platforms of IoT ecosystem.
3) Choose Sensors and actuators for a given IoT system.

SECTION – I

Unit 1: Introduction to IoT **(06)**
Definition, Applications and characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels

Unit 2: IoT Architecture and Communication Technologies **(07)**
IoT Architecture by Oracle, Sources of IoT, M2M Communication, IoT/M2M systems, layers and design standards, Communication Technologies

Unit 3: Elements of IoT **(08)**
Sensor Technology, Participatory Sensing – Industrial IoT and Automotive IoT, Actuator, Sensor Data Communication Protocols, RFID, WSN Technology

SECTION – II

Unit 4: IoT Standards and Connectivity **(08)**
Constrained Application Protocols (CoAP), Representational State Transfer (REST), Zigbee / IEEE 802.15.4, Bluetooth and its low energy profile, IEEE 802.15 WPAN, 6LoWPAN

Unit 5: IoT Security and Business model **(07)**
Introduction to IoT Privacy, Security and Vulnerabilities, Use case and Misuse cases, IoT Security Tomography and Layered attacker model, Business model and business model innovation for IoT, Value Creation in the IoT, Business model scenarios for IoT

Unit 6: Case Studies **(06)**
Domain Specific IoTs: Home Automation, Smart Cities, Environments, Energy, Agriculture, Industry, Health and Lifestyle

---

Internal Continuous Assessment (ICA) :
Minimum 8-10 assignments on the above topics.

Text Book :

1. Internet of Things: A Hands-on approach, ArshdeepBahga, Vijay Madisetti, Universities Press (Unit 1 and 6)
2. IoT Architecture and Design Principles, Raj Kamal, McGraw Hill Education (Unit 2, 3 & 5)
3. Building the IoT with IPv6 and MIPv6, Daniel Minoli, Wiley Publication (Unit 4)

Reference Books:

1. The Internet of Things: Applications and Protocols, Wiley publications. Author(s): Oliver Hersent, David Boswarthick, Omar Elloumi

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Third Year B.Tech (Computer Science & Engineering)
Semester-II
CS323 - SOFTWARE ENGINEERING

Teaching Scheme
Lecture: 3 Hrs/week, 3 Credits

Examination Scheme
ESE: 70 Marks
ISE: 30 Marks

Introduction : Current Software engineering methods and techniques have made us much better at building large and complex systems than we were. However, there are still too many projects that are late, over budget, and do not deliver the software that meets customer's needs. The main aim of introducing this course is to understand the methods, processes, techniques, and approaches which are required to develop high-quality software products within schedule and budget. On top of that this course ensures understanding of the complete Software Development Life Cycle (SDLC) for the development of software products as per the customer's needs. Further, it ensures the knowledge of various quality standards used in the software system and the Agile Project Management Process.

Course Prerequisite:
Student shall have undergone a course on Object Oriented Programming through C++. An understanding of Object Oriented Analysis and Design and Programming skills.

Course Outcomes:
At the end of the course Student will be able to
1. Apply the appropriate lifecycle model for software development.
2. Prepare SRS and SDS accordingly for a given problem.
3. Apply appropriate software testing method.
4. Ensure the quality of a product by applying the quality management process.

SECTION-I

Unit 1 - Introduction to Software Engineering (11)

Introduction, The Problem Domain, Software Engineering Challenges and Approach, Software Process, Characteristics of Software Process, Software Development Process Models: Waterfall model, Prototype model, Iterative development model: Incremental Model, Spiral model, Rational unified Process model, Time Boxing model, Agile process model.

Unit 2 - Software Requirement Analysis & Specification (06)

Need of SRS, Characteristics of Good SRS, Requirement Process, Requirements specification, Functional Specification with Use Cases, Other Approaches for Analysis: Data Flow Diagram, EntityRelationship Diagram,

Unit 3 - Software Architecture and Design (08)

Introduction to Software Design, Software Architecture: Role of Software Architecture, Architecture Views, Component & Connector View, Architecture Style for Component & Connector view, Documenting Architecture Design, Design Concepts: Design Principles, Conceptual Design and Technical Design, Coupling, Cohesion, Open Closed Principle, Function-Oriented Design, Object Oriented Design, High Level Design, Detailed Design, Verification, Metrics.

SECTION-II

Unit 4 - Testing **(04)**

Testing Fundamentals, Testing Process, Black-Box Testing, White-Box Testing, Object-Oriented Software testing methods, Functional testing, Unit testing, System testing, User satisfaction testing.

Unit 5 - Project Planning and Management **(08)**

Project management process, The Inspection and Audit Process, Software Configuration Management process, Effort estimation, Project Schedule and Staffing, Quality planning: Quality Concepts, Qualitative quality management planning. CMM project management process, Risk Management Planning, Project Monitoring Plan, Detailed Scheduling.

Unit 6 - Agile Project Management **(08)**

Introduction to APM, Implementation, Iterative Project Management Life Cycle, Adaptive Project Management Life Cycle, Adaptive & Integrating the APM toolkit, The Science of Scrum, New Management Responsibilities.

Text Books:

1. An Integrated Approach to Software Engineering, Pankaj Jalote, 3rd Edition (Narosa Publishers)
2. Effective Project Management Traditional, Agile, Extreme, Robert K. Wysocki, 6th Edition,WILEY INDIA
3. Software project management in practice, Pankaj Jalote Pearson India Ltd.

Reference Books :

1. Software Engineering, Ian Sommerville, 6th edition, Pearson education Asia.
2. Software Engineering Fundamentals, Ali Behforooz and Frederick j. Hudson (Oxford UniversityPress).
3. Project Management with Scrum, Ken Schwaber.
4. Software Engineering-A precise approach, Pankaj Jalote Wiley Precise Precise Textbook.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Third Year B.Tech (Computer Science & Engineering)

Semester-II

CS324A - Professional Elective – I : Cloud Computing

Teaching Scheme	**Examination Scheme**
Lectures : 3 Hours/Week, 3 credits	ESE - 70 Marks
Practical : 2 Hour/Week,1 credit	ISE - 30 Marks
	ICA-25 marks

Introduction:

Cloud computing has recently emerged as one of the buzz words in the ICT industry. Numerous IT vendors are promising to offer computation, storage, and application hosting services and to provide coverage in several continents, offering service-level agreements (SLA)-backed performance and uptime promises for their services.

The course introduces to introduction to Cloud Computing, Virtual Machines Provisioning and Migration Services, understanding Services and Applications by Type, Integration of Private and Public Clouds, Understanding of Cloud Security, Legal Issues in Cloud Computing.

Prerequisites:

Programming Skills, Database fundamentals & SQL, Operating Systems and Networking.

COURSE OUTCOMES:

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

1. Analyze various hardware & software to choose appropriate one for implementation of cloud environment.
2. Identify different cloud based solutions to meet a set of given requirements.
3. Determine financial and technological implications for selecting cloud computing platforms.
4. Identify Security and Privacy concerns in cloud computing for data management.

SECTION I

Unit1 : Introduction to Cloud Computing BU (8)

Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired Features of a Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks, Migrating into a Cloud, Introduction, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud.

Unit 2 : Virtual Machines Provisioning and Migration Services (7)

Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action, Provisioning in the Cloud Context.

Unit 3 : Understanding Services and Applications by Type (8)

Defining Infrastructure as a Service (IaaS), IaaS workloads, Pods, aggregation, and silos, Defining Platform as a Service(PaaS), Defining Software as a Service (SaaS), SaaS characteristics, Open SaaS and SOA, Salesforce. Command CRM SaaS, Defining Identity as a Service,What is an identity? Networked identity service classes, Identity system codes of conduct, IDaaS interoperability, User authentication Authorization markup languages, Defining Compliance as a Service(CaaS)

SECTION II

Unit 4: Integration of Private and Public Clouds (8)

Aneka: Introduction, Technologies and Tools for Cloud Computing, Aneka Cloud Platform, Aneka Resource Provisioning Service, Hybrid Cloud Implementation. Comet: Comet Cloud Architecture, Autonomic Behavior of Comet Cloud, Overview of Comet Cloud-based Applications.

Unit 5: Understanding of Cloud Security (8)

Securing the Cloud, The security boundary, Security service boundary, Security mapping, Securing Data, Brokered cloud storage access, Storage location and tenancy, Encryption Auditing and compliance, Establishing Identity and Presence, Identity protocol standards, Windows Azure identity standards

Unit 6:Legal Issues in Cloud Computing (6)

Introduction, Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Commercial and Business Considerations-A Cloud User's Viewpoint.

Internal Continuous Assessment (ICA):

Minimum 10 assignments must be of nature, which require students to identify and implement the use case scenarios for Cloud and Cloud enabled technologies mentioned above.

Text Book :

1. Cloud Computing : Principles and paradigms By Raj Kumar Buyya, ames Broberg, Andrezei M.Goscinski, 2011 Cloud Computing, By Michael Miller, 2008. [1,2,4,6]
2. Cloud Computing Bible by Barrie Sosinsky by WileyPublications [3,5]
3. https://arpitapatel.files.wordpress.com/2014/10/cloud-computing-bible1.pdf
4. Cloud Computing for dummies, By Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper,2009. Download E-book
5. Cloud Computing: Black Book, by Kalish Jayaswal, J. Kallakurchi, Donald J. Houde, Dr. Deven Shah Kogent learning Solutions Inc. Dream techpress

---

Reference Book:

1. Cloud Security, A comprehensive Guide to Secure Cloud Computing by Krutz, Ronald L.; Vines, Russell Dean
2. Cloud computing : Implementation, management and security By Ritting house,John,W.
3. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, McGraw Hill, 2013

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Third Year B.Tech (Computer Science & Engineering)

Semester-II

CS324B - Professional Elective – I : Augmented Reality and Virual Reality

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours /Week, 3 credits	ESE - 70 Marks
Practical: 2 Hour/Week, 1 credit	ISE - 30 Marks
	ICA - 25 Marks

Introduction:

This course will introduce Virtual Reality and Augmented Realty, with an emphasis on designing interactive virtual and augmented reality experiences. This will course will cover the history of the area, fundamental theory, interaction techniques, and specific application areas.

Prerequisite:

Basic Programming knowledge

COURSE OUTCOMES:

After completion of course, students would be able:

1. To demonstrate the basic concept and framework of virtual reality
2. To analyse the hardware and software requirements for VR and AR
3. To use the different 3D interaction techniques.
4. To design 3D interfaces
5. To explore VR & AR applications

Unit 1 **(10)**

Virtual reality and virtual environments: the historical development of VR, scientific landmarks computer graphics, real-time computer graphics, virtual environments, requirements for VR, benefits of virtual reality.

Hardware technologies for 3D user interfaces: visual displays, auditory displays, haptic displays, choosing output devices for 3D user interfaces.

Unit 2 **(14)**

3D user interface input hardware: input device characteristics, desktop input devices, tracking devices, 3d mice, special purpose input devices, direct human input, home -brewed input devices, choosing input devices for 3D interfaces.

Software technologies: database - world space, world coordinate, world environment, objects - geometry, position / orientation, hierarchy, bounding volume, scripts and other attributes, VR environment - VR database, tessellated data, LODs, Cullers and Occluders, lights and cameras, scripts, interaction - simple, feedback, graphical user interface, control panel, 2D controls, hardware controls, room / stage / area descriptions, world authoring and playback, VR toolkits, available software in the market.

Unit 3 **(08)**

3D interaction techniques: 3D manipulation tasks, manipulation techniques and input devices, interaction techniques for 3D manipulation, design guidelines – 3D travel tasks, travel techniques, design guidelines - theoretical foundations of way finding, user centered way finding support, environment centered way finding support, evaluating way finding aids, design guidelines - system control, classification, graphical menus, voice commands, Gestrual commands, tools, mutimodal system control techniques, design guidelines, case study: mixing system control methods, symbolic input tasks, symbolic input techniques, design guidelines, beyond text and number entry.

Unit 4 **(07)**

Designing and developing 3D user interfaces: strategies for designing and developing guidelines and evaluation.

Advances in 3D user interfaces: 3D user interfaces for the real world, AR interfaces as3D data browsers, 3D augmented reality interfaces, augmented surfaces and tangible interfaces, agents in AR, transitional AR-VR interfaces - the future of 3D user interfaces, questions of 3D UI technology, 3d interaction techniques, 3d UI design and development, 3D UI evaluation and other issues.

Unit 5 **(04)**

Virtual reality applications: engineering, architecture, education, medicine, entertainment, science, training.

Text Books/References:

1. Paul Mealy, Virtual & Augmented Reality for Dummies, John Wiley & Sons.
2. Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality
3. Applications: Foundations of Effective Design", Morgan Kaufmann.
4. Jan Erik Solem, Programming Computer Vision with Python, Shroff Publisher/O'Reilly Publisher
5. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach".
6. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User
7. Interfaces, Theory and Practice", Addison Wesley, USA

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Third Year B.Tech (Computer Science & Engineering)
Semester-II
CS324C - Professional Elective – I : Network Security

Teaching Scheme:
Lectures-3 Hours/week, 3 Credits
Practical - 2 Hours/ week,1 Credit

Examination Scheme
ESE-70 Marks
ISE - 30 Marks
ICA – 25 Marks

COURSE OUTCOMES :

At the end of course the student will be able to:

1. Describe the issues addressed by Network Security and understand the concepts of cryptography and Network security.
2. Apply cryptographic techniques and algorithms to provide security to the transmitted information.
3. Analyze the concepts of Authentication and Hash functions.
4. Analyze System level security issues.

SECTION-I

Unit – I **(08)**

Introduction: OSI Security Architecture, Classical Encryption techniques: Symmetric Cipher Model, Substitution Techniques, Transportation Techniques. Block Ciphers and Data Encryption Standards: Traditional Block Cipher Structure, The Data Encryption Standard, A DES Example, The Strength of DES. Advanced Encryption Standard: AES Transformation Functions, AES Key Expansion, An AES Example, AES Implementation.

Unit – II **(07)**

Public Key Cryptography and RSA: Principles of Public-Key Cryptosystems, The RSA Algorithm. Other Public-Key Cryptosystems: Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Pseudorandom Number Generation Based on an Asymmetric Cipher.

Unit – III **(07)**

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithm (SHA), SHA-3.

SECTION-II

Unit – IV **(06)**

Message Authentication Codes: Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs, MACs Based on Hash Functions: HMAC, MACs Based on Block Ciphers: DAA and CMAC, Authenticated Encryption: CCM and GCM, Pseudorandom Number Generation Using Hash Functions and MACs. Digital Signatures: Digital Signatures, Elgamal Digital Signature Scheme, Schnorr Digital Signature Scheme, NIST Digital Signature Algorithm, Elliptic Curve Digital Signature Algorithm, RSA-PSS Digital Signature Algorithm.

Unit – V **(08)**

Network Access Control and Cloud Security: Network Access Control, Extensible Authentication Protocol, IEEE 802.1X Port-Based Network Access Control. Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security.

Unit – VI **(08)**

Electronic Mail Security: Internet Mail Architecture, Email Formats, Email Threats and Comprehensive Email Security, S/MIME, Pretty Good Privacy, DNSSEC, DNS-Based Authentication of Named Entities, Sender Policy Framework, Domain Keys Identified Mail. IP Security: Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange.

Internal Continuous Assessment (ICA) :

It should consist of the 08 practical based on following guidelines.

1. Implementation of Substitution Cipher
2. Implementation of Poly alphabetic Cipher (Vigenere Cipher and Vernam Cipher)
3. Implementation of Transposition Cipher
4. Implementation of Play fair Cipher
5. Implementation of Secure file transfer in Client/Server environment (use any one of above method for encryption and decryption)
6. Write a program to simulate RSA algorithm
7. Install and understand docker container

Text Books :

1. Cryptography And Network Security - Principles and Practices, William Stallings Pearson Education Limited, 7th Edition, 2017. ISBN-13: 978-0134444284 ISBN-10: 0134444280.
2. Cryptography and Network Security, Behrouz A. Forouzan, Tata McGraw-Hill, 2008, ISBN-13: 978-0-13-187319-3. RV College of Engineering® Digital Communication Engineering 10
3. Computer Security: Principles and Practice, William Stallings, Lawrie Brown, Pearson Education Limited, 4th Edition. ISBN-10: 9780134794105.
4. Cryptography and Network Security, Atul Kahate, Tata McGraw-Hill, 2003, ISBN-81:203-2186-3.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech (Computer Science & Engineering)
Semester – II
CS325 - Web UI and UX Technology

Teaching Scheme	**Examination Scheme**
Lecture : 2 Hours/week,2credits	ISE – 25 Marks
Practical : 2 Hours/week,1credits	ICA- 25 marks
	POE – 50 marks

Introduction :
Web Technology alludes to the different tools and techniques that are used during the process of communication between various sorts of gadgets over the web or internet. This course includes different technologies which help to build the front end and back end for websites and web applications.

COURSE OUTCOMES:
At the end of course, students will be able to
1. Design web pages using HTML, CSS and JavaScript
2. Analyse client / server-side scripting technologies to meet requirements of web application and choose an appropriate one.
3. Develop a web application using client / server-side scripting technologies for a given problem.

SECTION - I

Unit1 : UI Design **(05)**
HTML5: Features of HTML5, designing frontend using HTML5, Designing Graphics using Canvas API, Web storage(Session and local storage).
CSS3: Features of CSS3, Styling front end using CSS3
JavaScript: Syntax and Semantics of JavaScript, Document Object Model, Event Handling, Browser Object Model, Form handling, and validations. Object-Oriented Techniques in JavaScript. XML.
JSON : Introduction to AJAX. Introduction to JQuery and D3JS, Java Script in Browser.

Unit 2 : REACT JS **(05)**
Introduction, Fundamentals of React JS, Working with Lists and Conditionals, Styling React Components and Elements, Debugging React apps, Understanding HTTP Requests in React in the context of AJAX

Unit3 : Electron JS **(05)**
Introduction, Fundamentals of Electron JS, Creating cross-platform applications, Deployment of Electron JS application

SECTION - II

Unit4: RESTful Web Services **(05)**

REST and the Rebirth of HTTP, RESTful Architectural Principles, The Object Model, Model the URIs, Defining the Data Format, Assigning HTTP Methods, JAX-RS

Unit 5 : Introduction to Server-side JS Framework–Node.js **(05)**

Introduction - What is Node JS, Architecture, Feature of Node JS, Installation and setup, creating web servers with HTTP (Request & Response), Event Handling, GET & POST implementation - Connect to NoSQL Database using Node JS, Implementation of CRUD operations.

Unit 6 : PHP and MySQL **(05)**

Introduction to PHP5 and PHP6, variables and constants, program flow, functions, arrays and files and directories, Forms and Databases, integration with MySQL applications on PHP

Internal Continuous Assessment(ICA) :

1. Minimum 12 assignments based on the above topics.
2. Objective of assignments should be to test students' understanding and assess their ability to put into practice the concepts and terminologies learned.
3. Assignments must be of nature, which requires students to identify the use case scenarios for using technologies mentioned in the syllabus.

Text Books / Reference Books:

1. BenFrain,"ResponsiveWebDesignwithHTML5andCSS3",PacktPublication
2. Jon Duckett,"Java Script and jQuery : Interactive Front-End Web Development"
3. Official documentation of Open API standardhttp://spec.openapis.org/oas/v3.0.3
4. Official documentation of Node.js:https://nodejs.org/en/
5. Official documentation of Electron JS https://www.electronjs.org/docs
6. Official documentation of ReactJS https://reactjs.org/docs/getting-started.html
7. Official documentation of PHP https://www.php.net/docs.php
8. Web link for MongoDB : https://www.mongodb.com/

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech (Computer Science & Engineering)
Semester - II
OPEN ELECTIVE

CSO326A: PRINCIPLES OF MANAGEMENT: PRACTICING ETHICS, RESPONSIBILITY, SUSTAINABILITY

Teaching Scheme
Lectures : 2 lectures/week, 2 Credits

Examination Scheme
ESE – 50 Marks

Introduction:
This course introduces to the concepts of Ethics, Responsibility, Sustainability. Having a clear management structure in place is vital for any successful organization. Efficient andwell intentioned management sets the tone for the rest of the staff. It is common for the attitude approach of managers to filter through the entire organization, so having managers working in an exemplary way is an excellent.

Course Prerequisite: Basics of ethics

Course Outcomes:
Students will be able to
1. Develop cognizance of engineering ethics and professionalism.
2. Comprehend the knowledge of professional responsibilities.
3. Identify technological solution for global sustainability and sustainable development.

SECTION I

Unit 1 - Engineering Ethics **(07)**
Introduction, Definition of Engineering Ethics, Sense of Engineering Ethics, Varity of Moral issues, Type of Inquery,Moral Dilemmas, Moral Autonomy, Theories of Moral Autonomy. Computer Ethics: Power Relationships, Property and Privacy.

Unit 2 - Profession, Professional and Professionalism **(08)**
Models of Professional Roles, Profession, Professional and Professionalism Professional Responsibility: Self direction virtues, Public spirited virtues, Team work virtues and Proficiency virtues. Engineers as responsible experimenters.

SECTION II

Unit 3 - Technology Solution for Global Sustainability **(07)**
Resource Innovation, Resource Conservation, Resource Recycling, Switch over to Renewable Resources, Resource Technology Symbiosis, Indian mission mode initiatives, Indian water mission, Indian energy mission and Indian Environment mission.

Unit 4: Economic & Governance of Sustainable Development **(08)**
Basis of economic sustainability, Munasinghe hypotheses of sustainability, Economics of exhaustible resources, Some further economic critique, Consumers Cost and benefit from environment change, Some reflection on environment accounting, Governance for sustainable development, Corporate governance for sustainable development, Visionaryagenda for sustainable world.

Text Books:

1. Professional Ethics and Human Values –M.P.Raghavan
2. Sustainable Development :Environment ,Energy &Water Resources:M.K.Ghosh Roy
3. Demand-side management from a sustainable development perspective-Pierre Baillargen & Annie Caron.

Reference book:

1. Principles of Management: P.C.Tripathi and P.N.Reddy
2. Ethics, Indian Ethos and Management –S.Balachandran, K.C.R.Raja and B.K.Nair

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech (Computer Science & Engineering)
SEMESTER - II
OPEN ELECTIVE
CSO326B: ENGINEERING ECONOMICS AND MANAGEMENT

Teaching Scheme | **Examination Scheme**
Lectures : 2 lectures/week, 2 Credits | ESE – 50 Marks

COURSE OUTCOME:

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

1. Demonstrate To basics of Economics and Management applied to engineering.
2. Apply concepts & principles of Economics with respect to a firm/organization Under different market conditions.
3. Apply concepts and principles of management to real world applications.

SECTION-I

Unit 1: **Introduction to Economics** **(04)**

Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics Theory of Demand & Supply; meaning, determinants, law of demand, law of supply, equilibrium between demand & supply Elasticity; elasticity of demand, price elasticity, income elasticity,cross elasticity

Unit 2: Theory of production **(04)**

Production function, meaning, factors of production (meaning & characteristics of Land, Labour, capital & entrepreneur), Law of variable proportions & law of returns to scale Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, numerical

Unit 3 : Markets and Money **(05)**

Types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Completion, Oligopoly) National Income; stock and flow concept, NI at current price & constant price, GNP, GDP, NNP,NDP, Personal income, disposal income. Basic economic problems;
Monetary policy- meaning, objectives, tools, fiscal policy-meaning, objectives, tools Banking; meaning, types, functions, Central Bank- RBI; its functions, concepts; CRR, bank rate, repo rate, reverse repo rate, SLR

SECTION-II

Unit 4 : Introduction to Management **(06)**

Definitions, Nature, scope Management & administration, skill, types and roles of managers Management Principles; Scientific principles, Administrative principles, Maslow's Hierarchy of needs theory, Functions of Management; Planning, Organizing, Staffing, Directing, Controlling (meaning, nature and importance) Organizational Structures; meaning, principles of organization, types-formal and informal, line, line & staff, matrix, hybrid (explanation with merits and demerits), span of control, departmentalization

Unit 5: Introduction to Marketing Management **(05)**

Marketing Mix, concepts of marketing, demand forecasting and methods, market segmentation Introduction to Finance Management; meaning, scope, sources, functions

Unit 6: Introduction to Production Management **(06)**

Definitions, objectives, functions, plant layout-types & factors affecting it, plant location- factors affecting it. Introduction to Human Resource Management; definitions, objectives of manpower planning, process, sources of recruitment, process of selection, Corporate Social Responsibility; meaning, importance Business Ethics; meaning, importance.

Text Books :

1. Engineering Economics, R.Paneerselvam, PHI publication
2. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
3. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning

---

Reference Books:

1. Principles and Practices of Management by L.M.Prasad
2. Principles of Management by Tripathy and Reddy
3. Modern Economic Theory, By Dr. K. K. Dewett & M. H. Navalur, S. Chand Publications

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B.Tech (Computer Science & Engineering)
Semester - II
OPEN ELECTIVE
CSO326C : DISASTER MANAGEMENT

Teaching Scheme	**Examination Scheme**
Lectures : 2 lectures/week, 2 Credits	ESE – 50 Marks

COURSE OUTCOMES :

The students will be able to

1. Classify the types of disasters, its causes and impact on environment and society.
2. Acquaint a awareness regarding prevention or reduction of losses that occur due to hazards, disaster and emergencies.
3. Apply various disaster mitigation, preparedness and management techniques

---

SECTION-I

Unit- 1 : Introduction to Disaster Management (5)

Concept of Disaster, Causes and Types of Disasters, Summary of Types of Disasters, Dimensions of Natural and Anthropogenic Disasters, Aims of Disaster Management, Principles and Components of Disaster Management.

Unit-2 : Disaster Management and Planning (5)

Nature, Scope and Management Process, Policy of Disaster Management, Types of Plans: Management by Objectives, SWOT Analysis, Hazard and Vulnerability Analysis, Identifying Crisis Situations: A Framework, Organisational Structure and Design, Authority, Delegation and Decentralisation.

Unit-3 : Disaster Mitigation (4)

Disaster Mitigation: Meaning and Concept, Structural Mitigation, Non-Structural Mitigation, Disaster Mitigation Strategies, Importance of Information and Communication in Disaster Mitigation, Emerging Trends in Disaster Mitigation.

SECTION-II

Unit-4 : Disaster Preparedness (4)

Introduction to Disaster Preparedness, The Three A's of Disaster Preparedness, Principles of Disaster Preparedness, Steps of Disaster Preparedness, Organisational Structure for Disaster Preparedness, Essential Services Preparedness and Logistical Readiness, Contingency Planning.

Unit-5 : Disaster Response (5)

Aims of Response, Control Process and Measurement, Security Issues, Profile of an Effective Crisis Leader, Leading at the Time of Crisis: Competencies and Challenges, Evacuation and Migration, Administering First-Aid, Handling of Injured at Hospitals: Challenges and Issues, Mobilization and Restoration of Essential Services, Search and Rescue Work.

Unit-6 : Disaster Recovery (5)

Introduction to Medium- and Long-Term Recovery Aspects, Community Participation in Defining Objectives and Their Priorities, Identifying and Ascertaining Impact of Disaster, Participative Rehabilitation: Physical and Social Infrastructure, Social and Economic Rehabilitation: Capacity Building for Reconstruction and Rehabilitation, Recovery and Rebuilding Works.

Text Books:

1. Disaster Management Dr. Mrinalini Pandey, WILEY, Publishers, ISBN: 9788126549245
2. Disaster Management S.C.Sharma Khanna Book Publishers, ISBN: 9789386173386
3. Disaster Management, R.B. Singh, Rawat Publication, New Delhi, 2000.

Reference Books :

1. Disaster Management in India – A Status Report, National Disaster Management Division, Ministry of Home Affairs, Govt. of India, 2004.
2. Disaster Management and Preparedness, Collins Larry R. and Scheind Thomas D. (2000)., Taylor and Francis, 2000
3. Tushar Bhattacharya, Disaster Science and Management, McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science and Technology
Third Year B. Tech (Computer Science & Engineering)
Semester – II
CS327 : MINI PROJECT

Teaching Scheme
Practical: 2 Hrs/week, 1 Credit

Examination Scheme
ICA : 25 Marks
POE – 50 marks

Course Outcomes :

At the end of this course, student will be able to

1. Select mini project problem of societal relevance in selected domain
2. Design system architecture with due consideration of environment, sustainability and ethics.
3. Develop the solution to the problem using tools, resources and frameworks.
4. Engage in teamwork and communicate effectively, while observing professional ethics.
5. Inculcate habit of self study and lifelong learning.

Note :

1. There should be a group of preferably 4/5 students.
2. Students should be given projects in Hardware, Software, Embedded or any contemporary topic.
3. One guide should be allocated per group.