Bansilal Ramnath Agarwal Charitable Trust's

Vishwakarma Institute of Information Technology, Pune-48

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Curriculum for

T.Y.B.Tech.

(Information Technology)

(Pattern 2017)

Department of Information Technology

Vision and Mission of the Department

- **Vision**

  "To create professionally competent and globally acceptable IT engineers with social awareness".

- **Mission**

  - Educating budding engineers for, **industry, academia, research** and **entrepreneurial** pursuit through rigorous implementation of IT curriculum
  - Inculcating IT skills to develop **innovative solutions** relevant to **global issues**
  - **Imparting values** to practice social and **professional ethics.**

Program Specific Outcomes (PSOs)

At the end of program, students should be able to

- **PSO a:** An ability to understand, analyze and develop computer programs in the areas related to algorithms, web development and database management
- **PSO b:** An ability to apply knowledge of software engineering principles and practices for multidisciplinary applications to meet the needs of the industry and society

Program Outcomes (POs)

At the end of program, students should 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, social and environmental considerations.

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

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

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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

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

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

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

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

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

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T.Y.B.Tech.

2017 Pattern

Syllabus Structure

Bansilal Ramnath Agarwal Charitable Trust's

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Department of Information Technology

Third Year B. Tech. Information Technology (TYBT) - Semester V (Pattern 2017)

Course Code	Course	Course Type	Teaching Scheme			Examination Scheme					Total	Credits
						Formative Assessment			Summative Assessment			
						ISE		CE	ESE	PR/OR		
			L	T	P	T1	T2					
ITUA31171	Computer Networks*	TH	3	-	-	15	15	20	50	-	100	3
ITUA31172	Theory of Computation *	TH	3	-	-	15	15	20	50	-	100	3
ITUA31173	Database Management System*	TH	3	-	-	15	15	20	50	-	100	3
ITUA31174	Software Engineering	TH	3	-	-	15	15	20	50	-	100	3
IE31175	Elective – I (Interdisciplinary)	TH	3	-	-	15	15	20	50	-	100	3
ITUA31176	Lab Practice -III	CE-PR/OR	-	-	6	-	-	50	-	50	100	3
ITUA31177	Employability Skills	CE	2	-	2	-	-	50	-	-	50	3
ITUA31178	Mini Project	CE	-	1	2	-	-	50	-	-	50	2
A3	Audit Course	AU	-	-	-	-	-	-	-	-	-	-
	Total		**17**	**1**	**10**	**75**	**75**	**250**	**250**	**50**	**700**	**23**

Theory: 1Hr. = 1 Credit, Practical: 2 Hrs. = 1 Credit, #1 hr. = 1 Credit, Audit Course: No Credits

*Courses have lab practice component of 2 hrs. /week each under Lab Practice head.

Elective – I (Interdisciplinary)
1. IE31175CS: Internet of Things
2. IE31175ET: Industrial Automation
3. IE31175ME: Product Design and Engineering
4. IE31175CV: Optimization Techniques
5. IE31175IT: Human Computer Interaction

Audit Courses: Professional Ethics; Cyber Security; Value Engineering and Human Rights; Legislative Procedures; Technical Writing/Documentation; Sports/Yoga; Performing Art such as music, dance, and drama etc.; Languages; Online certification course (minimum two weeks); Participation in intercollegiate co-curricular and extra-curricular activities.

BoS Chairman **Dean Academics** **Director**

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Department of Information Technology

Third Year B. Tech. Information Technology (TYBT) - Semester VI (Pattern 2017)

Course Code	Course	Course Type	Teaching Scheme			Examination Scheme					Total	Credits
						Formative Assessment			Summative Assessment			
			L	T	P	ISE		CE	ESE	PR/ OR		
						T1	T2					
ITUA32171	Operating Systems*	TH	3	-	-	15	15	20	50	-	100	3
ITUA32172	Design and Analysis* of Algorithms	TH	3	-	-	15	15	20	50	-	100	3
ITUA32173 / CSUA32173	Elective II *	TH	3	-		15	15	20	50	-	100	3
ITUA32174	Lab Practice -IV	CE-PR/OR	-	-	6	-	-	50	-	50	100	3
ITUA32175A ITUA32175B	Internship / Value added course	CE-PR/OR	- 4	- -	16 8	-	-	50	-	50	100	8
A3	Audit Course	AU	-	-	-	-	-	-	-	-	-	-
	Total		**9/13**	**-**	**22/14**	**45**	**45**	**160**	**150**	**100**	**500**	**20**

Theory: 1Hr. = 1 Credit, Practical: 2 Hrs. = 1 Credit, #1 hr. = 1 Credit, Audit Course: No Credits

*Courses have lab practice component of 2 hrs./week each under Lab Practice head.

Course code	Elective II
CSUA32173A	Advanced Computer Networks
CSUA32173B	Artificial Intelligence
CSUA32173C	Software Design & Architecture
ITUA32173	Information Storage and Retrieval

Course code	Value Added Course
CSUA32175B1	User Interface Technology
CSUA32175B2	Software Testing
CSUA32175B3	Cyber Security
CSUA32175B4	CCNA
ITUA32175B	Oracle
IE32175B1	General Studies for Indian Services and National Service Scheme
IE32175B2	National Service Scheme and Social Entrepreneurship
IE32175B3	Social Enterprise and Entrepreneurship

Value added course (Theory 60 Hrs. and Practical 120 Hrs.) will have 4 Hrs. Theory/Week and 8 Hrs. Practical/Week. Students those who will register for Value added course will earn the required credits in the regular semester. However, Students who will register for internship, commencement of internship will start from 1st June and will be of Eight weeks (June-July)

BoS Chairman **Dean Academics** **Director**

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Department of Information Technology

T.Y.B.Tech

2017 Pattern

Syllabus Curriculum

SEMESTER – I

Bansilal Ramnath Agarwal Charitable Trust's

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Department of Information Technology

Computer Network (ITUA31171)

Teaching Scheme:
Credits: 3
Lectures / Week: 3 Hr

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites: Digital Electronics, Fundamentals of Data Communication

Course Objectives :

- To study the fundamentals of networking
- To understand functionalities of Physical and Data link layer
- To understand the functionalities of Network Layer
- To study various protocols at Transport and Application Layer
- To learn different techniques for routing and routing configuration.
- To learn and demonstrate VLAN, ACL and NAT in networking

Course Outcomes :

After completion of the course, student will be able to

1. Explore network design issues
2. Understand the functions of OSI layers & TCP/IP protocol stack
3. Understand the functionality of network layer
4. Understand the functionality of Transport and Application Layer
5. Analyze the routing requirements for a given network/LAN and decide the most appropriate routing strategy.
6. Design Switched networks and demonstrate the concepts of VLAN and ACL for switched networks.

Unit I – Explore the Network:

LANs, WANs, and the Internet, The Network as a Platform, Network Components, Network connecting devices, IEEE standards. Addressing: Physical &logical Addresses, Port Addresses, Specific Addresses.
Rules of Communication: Communication Fundamentals, Rule Establishment, Message Encoding, Message Formatting and Encapsulation, Message Size, Message Timing, Message Delivery options.

Unit II - Network Protocols, Physical Layer and Data Link Layer

Network Protocols and Standards: Protocols, Protocol Suites, Standard Organization, Benefits of using layered Model, OSI Reference Model, TCP/IP Protocol Model, Data Transfer in the Network: Data Encapsulation and Data Access. Physical Layer Protocols, Network Media, Data Link Layer Protocols, Media Access Control. Types of Errors: Redundancy, Detection Versus Correction, Forward Error Correction Versus Retransmission. Ethernet IEEE standards, Standard Ethernet, Fast Ethernet, Gigabit Ethernet. Ethernet Protocol, LAN Switches, Address Resolution Protocol.

Unit III – Network Layer

Network Layer Protocols, Routing, Routers, Configuring a Cisco Router.IP Addressing: IPv4 Network Addresses, IPv6 Network Addresses, Connectivity Verification.Subnetting IP Networks: Subnetting an IPv4 Network, Addressing Schemes, Address Schemes, Design consideration for IPv6.

Unit IV- Transport Layer and Application Layer

Transport Layer: Transport Layer Protocols, Role of transport layer, Responsibilities of Transport layer, Transport layer reliability. TCP and UDP: TCP communication Process, Reliability and flow control, UDP Communication, applications of TCP and UDP. Application Layer: Application Layer Protocols, Application layer protocols interaction with end-user applications, Presentation and Session layers. Well-Known Application Protocols and Services.	
Unit V - Routing Essentials	
Introduction to Routing, Router Functions and Configuration, Routing Decisions and Operations, Routing Table, Static Routing and Default Routing, Dynamic Routing and Protocols, The Routing table, Static vs. Dynamic Routing.	
Unit VI – Switched Networks	
Introduction to Switching, Switched and Converged Networks, Switching Domains, Switch Configuration and Security, Virtual LANs, Inter-VLAN Routing, Access Control Lists, NAT for IPv4.	
Text books :	1.S. Tanenbaum : "Computer, Networks", PHI Publication, 4th edition, ISBN: 8178087855 2.Fourauzan B., "Data Communications and Networking", 5th Edition, Tata McGraw- Hill, Publications, ISBN: 0 – 07 – 058408 – 7 3.Kurose, Ross ―Computer Networking a Top Down Approach Featuring the Internet‖, Pearson, ISBN-10: 0132856204
Reference Books :	1.Routers and Routing Basics CCNA 2 Companion Guide- Webdell Odom, Rick McDonald 2. CCNA Routing and Switching 200-125 Official Cert. Guide Library 3. Cisco CCNA Command Guide- An introductory Guide for complete beginners

Theory of Computation (ITUA31172)

Teaching Scheme:
Credits: 3
Lectures / Week : 3Hr

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites : Basic Mathematics, Discrete Structure

Course Objectives :

- Understand fundamentals of computer mathematics.
- Study the various abstract computing models.
- Study the Regular expression.
- Study the different types of languages& their relationships.
- Study the different types of grammar & ambiguity in the grammar
- Study the recursive & recursively enumerable languages.

Course Outcomes :

After completion of the course, student will be able to

1. Apply the mathematical preliminaries with the help of proofs and lemmas for language derivation.
2. Design of automata or hypothetical machines as language descriptors or recognizer .
3. Understand Regular expression & its conversion to automata & vice versa.
4. Understand the different application of Regular expression.
5. Understand the different types of languages, grammars & ambiguity in the grammar.
6. Understand the recursive & recursively enumerable languages.

Unit I - Theory of Automata:

Basic Mathematical Objects: Sets, Logic, functions, Relations, Strings.

Definition of finite Automata (FA), Description of FA, Transition Systems, Acceptability of a String by a FA , Non deterministic FA, Equivalence of DFA and NFA, FA with output: Moore and Mealy machines-Definitions, Models, inter-conversion, minimization of FA.

Unit II - Regular Expressions (RE) and Languages

Recursive definition of regular expression, regular set, identities of regular expressions, Conversion of NFA With epsilon moves to DFA, Conversion-RE to DFA , Conversion-DFA to RE, Equivalence of R.E, Equivalence of FA, Pumping lemma for regular languages, Closure properties of regular languages, Applications of R.E

Unit III – Grammar

Grammar- Definition, representation of grammar, Chomsky hierarchy, Context Free Grammar-Definition, Derivation, sentential form, parse tree, inference, derivation, parse tree, ambiguity in grammar and language, Simplifications of context free Grammar-Eliminating unit productions, useless symbols, and Null-productions, Normal Forms for CFG- Chomsky normal form, Greibach normal form .

Regular Grammar- Definition, left linear, right linear grammar, Interconversion between left linear

and right linear regular grammar	
Unit IV - Push Down Automata	
Push Down Automata- Definition, Notation, acceptance by final state, acceptance by empty stack, Equivalence of PDA and CFG- Grammar to PDA, PDA to Grammar, Deterministic PDA and Non Deterministic PDA. Closure Properties of CFLs.	
Unit V – Turing machines	
Turing machine Model, Representation of Turing machine, Language acceptability by Turing machine, Design of Turing machine. Types of TM. Halting Problem	
Unit VI - Recursively Enumerable Languages	
Recursively Enumerable and Recursive, Properties of recursive and recursively enumerable languages, Post correspondence problem, **Undecidability:** Reducing one problem to another, Other unsolvable Problems. Tractable and In Tractable Problems	
Text books :	1. Mishra K., Chandrasekaran N., 'Theory of Computer Science (Automata, Languages and Computation)", Second Edition, Prentice Hall of India 2. John C Martin. "Introduction to Language and Theory of Computation", Third edition, Tata McGraw- Hill.
Reference Books :	1. Hopcroft J., Motwani R., Ullman J., "Introduction to Automata Theory, Languages and Computations", Third edition, Pearson Education Asia.

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Department of Information Technology

Database Management System (ITUA31173)

Teaching Scheme :
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites : Discrete Mathematics, Data Structure and Algorithms

Course Objectives :

- To understand the fundamental concepts of database management.
- To provide a strong formal foundation in database concepts, technology.
- To give systematic database design approaches covering conceptual design, logical design and an overview of physical design.
- To learn basic issues of transaction management and concurrency control
- To learn a powerful, flexible and scalable general purpose database to handle big data
- To learn and understand various Database Architectures and Applications

Course Outcomes

After completion of the course, student will be able to

1. Understand and Design E-R Model for given requirements and convert the same into database tables.(Understand)
2. Apply database techniques such as SQL & PL/SQL(Apply)
3. Evaluate database design concept such as normalization.(Evaluate)
4. Evaluate transaction management techniques in relational database System.(Evaluate)
5. Understand and apply different database architectures in real time environment.(Understand)
6. Apply advanced database Programming concepts in Big Data.(Apply)

Unit I – Introduction to DBMS

Introduction to Database Management Systems, Advantages of a DBMS over file-processing Systems, Database-System purpose and applications, Levels of Database Systems, Database Languages, Data Models, Components of a DBMS and overall structure of a DBMS, Database Design and ER Model: Entity, Attributes, Relationships, Constraints, types of Keys, Design Process, Entity Relationship Model, ER Diagram, Design Issues, Extended E-R Features, converting E-R & EER diagram into tables.

Unit II - Relational Algebra, SQL and PL/SQL

Introduction to Relational Algebra and Calculus, **SQL:** Characteristics and advantages, SQL Data Types and Literals, DDL, DML, DCL, TCL, SQL Operators, Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updating using Views, Indexes, SQL DML Queries: SELECT Query and clauses, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries.

PL/SQL: Concept of Stored Procedures and Functions, Cursors, Triggers,Roles and Privileges , Embedded SQL, Dynamic SQL.

Unit III – Relational Database Design
Relational Model: Basic concepts, Attributes and Domains, CODD's Rules, Functional Dependencies: Basic concepts, closure of set of functional dependencies, closure of attribute set, canonical cover, Decomposition: lossless join decomposition and dependency preservation, The Process of normalization,1NF, 2NF, 3NF ,BCNF, 4NF, 5NF.
Unit IV - Database Transactions and Query Processing
Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Testing conflict and view serializability, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking Methods, Deadlocks, Time stamping Methods, Different Crash Recovery methods such as Shadow-Paging and Log-Based Recovery: Deferred and Immediate, Checkpoints, Introduction to Query Processing and Query Optimization, Performance Tuning in SQL.
Unit V – Database architecture
Introduction to Database Architectures: Multi-user DBMS Architectures, Parallel Databases: Speedup and Scale up, Architectures of Parallel Databases. Distributed Databases: Architecture of Distributed Databases, Distributed Database Design, Distributed Data Storage, Distributed Transaction: Basics, Failure modes, Commit Protocols, Concurrency Control in Distributed Database.
Unit VI - Advances in Databases and Big Data
XML: XML-Introduction ,XML DTD's Domain specific DTD's, Querying XML data , Introduction to NoSQL, Structured verses Unstructured data, Different NoSQL Data Models, NoSQL using MongoDB, CAP theorem and BASE Properties, Comparative study of SQL and NoSQL, Introduction to Big Data, HADOOP- Building blocks of Hadoop, components of Hadoop-HDFS, MapReduce, HBASE,HIVE. Introduction to data warehouse and Data mining.

Text books :	1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database system concepts", 5th Edition, McGraw Hill International Edition. 2. Elmasri R., Navathe S., "Fundamentals of Database Systems", 4* Edition, Pearson Education, 2003, ISBN 8129702282. 3. Pramod J. Sadalage and Martin Fowler, ―NoSQL Distilled‖, Addison Wesley, ISBN10: 0321826620, ISBN-13: 978-0321826626 4. "Managing and Using MySQL", Reese G., Yarger R., King T., Williums H, 2nd Edition, Shroff Publishers and Distributors Pvt. Ltd., ISBN 81 - 7366 - 465 – X 5. MongoDB: The Definitive Guide by Kristina Chodorow.

Reference Books :	1. .Ramkrishna R., Gehrke J., "Database Management Systems", 3rd Edition, McGraw-Hill, 2003, ISBN 0-07- 123151 –X. 2. C J Date, ―An Introduction to Database Systems‖, Addison-Wesley, ISBN: 0201144719 3. Connally T., Begg C., "Database Systems", 3rd Edition, Pearson Education, 2002, ISBN 81-7808-861-4 4. MongoDB , O'Reilly Publications. 5. Hadoop, O'Reilly Publications. 6. http://docs.mongodb.org/manual/ or SQL/XML/MongoDB (https://www.w3schools.com/) Margaret H. Dunham, "Data mining", Pearson publication

Bansilal Ramnath Agarwal Charitable Trust's

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Department of Information Technology

Software Engineering (ITUA31174)

Teaching Scheme
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites : Basic programming skill

Course Objective

- To learn and understand the principles of Software Engineering and software lifecycle process models.
- To introduce principles of agile software development, the SCRUM process and agile practices.
- To introduce the concepts in Requirements Engineering
- Learn importance and concepts of Risk Management and Configuration Management
- Understand Quality Process models and concepts of QA

Course Outcomes :

After completion of the course, student will be able to

1. Compare and choose a process model for a software project development
2. Describe principles of Agile development, discuss the SCRUM process and distinguish agile process model from other process models.
3. Identify unique features of various software applications to write in SRS and also to identify domains and classify software applications.
4. Create Risk mgmt. plan and decide CM strategy
5. Explain the concepts of QA
6. Describe project management techniques. Apply advanced software engineering techniques for global software development.

Unit I - Introduction to Software Engineering

Nature of Software, The Software Process, Software Myths, A Generic Process Model, Prescriptive Process Models, The Waterfall Model, Incremental Process Models , Evolutionary Process Models ,Concurrent Models , Specialized Process Models, Unified Process.

Unit II - Agile Development Process

Agile Development: Agile manifesto, agility and cost of change, agility principles, myth of planned development, toolset for the agile process., **Scrum-** process flow, scrum roles, events and artifacts, scrum cycle description, product backlog, sprint planning meeting, sprint backlog, sprint execution, daily scrum meeting, maintaining sprint backlog and burn-down chart, sprint review and retrospective.

Agile Practices: test driven development, refactoring, pair programming, continuous integration, exploratory testing versus scripted testing.

Unit III – Requirement Engineering

Requirements Elicitation: Concept of Software Requirement, Categories and types of Requirements, Elicitation Techniques- real life application case study.

Requirements Analysis and Documentation: Textual and Graphical Documentation ,UML models: Use Case Diagram and class diagram, data modeling, data and control flow model, behavioral modeling using state diagrams - real life application case study, Software Requirement Specifications (SRS).

Unit IV - Risk Management , Configuration Management

Project Risk Management : Risk Analysis & Management: Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Risks Monitoring and Management, The RMMM plan for case study project
Software Configuration Management: SCM basics, SCM repository, SCM process, SCM tools such as GitHub, CASE – taxonomy, tool-kits, workbenches, environments, components of CASE, categories (upper, lower and integrated CASE tools).

Unit V – Software Quality Assurance

Software Quality, Achieving Software Quality: Software engineering methods, Project Management techniques. Quality control and quality assurance. Software Reliability, SQA Tools, Goals and Metrics, **Introduction to Software Process Standards:** ISO, CMMI, PCMMI

Unit VI - Advanced Software Engineering

Project Management Fundamentals: PMBOK, Processes and Knowledge Areas, PM concepts and tools like Gantt chart, Network Diagram, WBS**,** Earned Value**.**

Emerging software engineering trends: technology evolution, collaborative development, , global software development challenges, Virtual Teams, Distributed Teams, Cultural Differences

Text books :	1. Roger S Pressman "Software Engineering : A Practitioner's Approach " 7th Edition Mcgraw- Hill ISBN:0073375977 2. Ian Sommerville " Software Engineering" 9th edition Pearson Education SBN-13: 978-0- 13-703515-1, ISBN-10: 0-13-703515-2 , pdf downloadable 3. Hong Zhu "Software Design Methodology", Elsevier ISBN: 978-81-312-0356-9 4. Scrum Guide- Software in 30 days- Ken Schwaber
Reference Books :	1. Carlo Ghezzi, "Fundamentals of Software Engineering", Prentice Hall India, ISBN-10: 0133056996 2. Rajib Mall, "Fundamentals of Software Engineering", Prentice Hall India, ISBN-13: 978-8120348981. 3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Springer, ISBN 13: 9788173192715. 4. S K Chang, "Handbook of Software Engineering and Knowledge Engineering", World Scientific, Vol I, II, ISBN: 978-981-02-4973-1 5. Tom Halt, "Handbook of Software Engineering", Clanye International, ISBN-10: 1632402939

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Department of Information Technology

Elective I-Internet of Things (IE31175CS)

Teaching Scheme
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites: Data Communication

Course Objectives :

- To understand fundamentals of IoT
- To understand Building Blocks of Iot and apply the knowledge for implementing small IoT systems
- To gain knowledge of IoT proctools
- To understand fundamentals of security in IoT
- To learn how secure infrastructure for IoT is implemented
- To learn real world application scenarios of IoT along with its societal and economic impact using case studies

Course Outcomes :

After completion of the course, student will be able to:

1. Understand the fundamental of IoT
2. Understand Building Blocks of Iot & Implement small IoT Systems
3. Learn the IoT protocols
4. Understand the security issues in IoT
5. Learn the concepts of Cloud & Fog Computing
6. Know the real world applications of IoT

Unit I – Introduction to IoT

IoT: Definition and characteristics of IoT, Internet of Things: Vision, Emerging Trends, Economic Significance, Technical Building Blocks, Physical design of IoT, Things of IoT, IoT Protocols, Logical design of IoT, IoT functional blocks, IoT communication models, IoT Communication APIs, IoT enabling technologies, IoT levels and deployment templates, IoT Issues and Challenges, Applications.

Unit II - Protocols for IoT

IoT Protocols Organization, IoT Protocols: CoAP, MQTT, AMQP, DDS, IPv6, ZigBee, Bluetooth, Wifi, Comparison of Traditional Networking Protocols and IoT Protocols, Issues with IoT Standardization.

Unit III – IoT & M2M

Machine to Machine, Difference between IoT and M2M, Software define Network, Software define Network for IoT, IoT Physical Devices and Endpoints: Basic building blocks of and IoT device, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino Introduction to Raspberry Pi, Raspberry Pi interfaces, Programming Raspberry Pi with Python.	
Unit IV - Security in IoT	
IoT Security: Vulnerabilities of IoT, Security Requirements, Challenges for Secure IoT, Threat Modeling, Key elements of IoT Security: Identity establishment, Access control, Data and message security, Non-repudiation and availability, Security model for IoT.	
Unit V – Cloud Computing and Fog Computing	
Introduction to Cloud Computing,Cloud of Things: Grid/SOA and Cloud Computing, Cloud Middle ware, Cloud Standards – Cloud Providers and Systems, Mobile Cloud Computing, The Cloud of Things Architecture. Challenges and issues in cloud Computing. Fog Computing,Need of Fog computing,Fog Computing Architecture.	
Unit VI – IoT Case Studies	
Case Studies: Home Intrusion Detection, Weather Monitoring,System, Air Pollution Monitoring, Smart Irrigation, Smart cities,Health Care.	
Text books :	1.Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, ISBN: 0: 0996025510, 13: 978-0996025515 2.Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012. ISBN : 9781439892992 3.Dieter Uckelmann, Mark Harrison, Florian Michahelles, "Architecting the Internet of Things", Springer, 2011. ISBN: 978-3-642-19156-5
Reference Books :	1.Olivier Hersent, Omar Elloumi and David Boswarthick, "The Internet of Things: Applications to the Smart Grid and Building Automation", Wiley, 2012, 9781119958345 2.Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012, ISBN:978-1-119-99435-0 3.Barrie Sosinsky, "Cloud Computing Bible", Wiley-India, 2010.ISBN : 978-0-470-90356-8 3.Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley, 2014, ISBN: 978-1-118-43063-7

Bansilal Ramnath Agarwal Charitable Trust's

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Department of Information Technology

Elective I- Industrial Automation (IE31175ET)

Teaching Scheme
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites: Basic Electronics devices and their operations, Basic understanding of Operational Amplifier, Controllers, analog and digital control actions.

Course Objectives :

- To give the students a comprehension of Industrial Instrumentation Design.
- To give the students a comprehension of the relation between Instrumentation and controller design in industrial applications.
- To make the students able to analyze the control loops and to achieve the control actions with different Controllers

Course Outcomes

After completion of the course, student will be able to:

1. Select an appropriate **sensor or transducer** to meet requirements of an industrial application.
2. Select and design a **signal conditioning circuit** for given application based on applied sensing method.
3. Design a **data acquisition system** using various Bus standards and communication Protocols.
4. Choose different **final control elements** and **Actuators**.
5. Design Industrial solutions for complex engineering problems using **Programmable Logic controllers**.
6. Understand **Advanced systems** in Industrial automations.

Unit I - Sensors and Transducers

Performance terminology - Displacement, Velocity and Motion sensors - Proximity sensors, Force, Pressure, Flow, Level and Temperature sensors – Humidity, pH and Conductivity sensors – Specifications and selection criteria – Inputting data by switches

Unit II - Transmitters, Signal conditioning and Converters

Analog signal conditioning for different sensors – Use of bridge circuits and Instrumentation amplifiers – Design guidelines – Signal converters V/I, I/V, V/F, F/V, I/P & P/I converters – Evolution of two wire transmitters – Isolated two wire transmitters – Smart and Intelligent transmitters

Unit III – Data Acquisition, Bus Standards and Protocols

Multichannel data logging and computer based data acquisition system like LABVIEW, – RS 232C standard, IEEE 488 bus, I2C bus, HART protocols – Foundation Field bus and Profibus

Unit IV - Actuators and Final Control elements

Pneumatic and hydraulic actuators- Directional control valves, Pressure control valves, Cylinders, Process control valves - Electrical actuators- Mechanical switches, Solid state switches, Solenoids, DC motors, AC motors and Stepper motors.	
Unit V – Programmable Logic Controllers, Applications and Interfacing	
PLC Architecture – Input / Output processing – Interfacing of Input / Output devices with PLC – Analog Input / Output - Ladder logic programming – Selection of PLC – PLC based automated systems.	
Unit VI – Advances in Industrial Automations	
Direct digital control systems, Distributed control systems (DCS): Introduction, DCS flow sheet symbols, architecture of DCS controller, DCS communication, DCS supervisory computer tasks, Features and advantages of DCS. Supervisory control and Data acquisition (SCADA): SCADA introduction, elements of SCADA, Features of SCADA.	
Text books :	1. K. Krishna Swamy, "Process Control"; New Age International Publishers. 2. C.S. Rangan, G.R. Sarma, V.S.V. Mani; " Instrumentation Devices and Systems "; Tata McGraw Hill; 2nd Edition 3. W. Bolton; " Mechatronics, Electronic Control Systems in Mechanical and Electrical Engineering "; Pearson Education; 3rd Edition
Reference Books :	1. Curtis Johnson, "Process Control Instrumentation Technology"; 8th Edition, Pearson Education. 2. Ernest O. Doebelin; " Measurement System Application and Design "; Mc-Graw Hill; 5th Edition 3. David G. Alciatore, Michael B Histand; " Introduction to Mechatronics and Measurement System "; Tata McGraw Hill

Elective I- Product Design and Engineering (IE31175ME)

Teaching Scheme	**Examination Scheme**
Credits: 3	Formative Assessment: 50
Lectures / Week: 3Hrs/week	Summative Assessment: 50

Prerequisites: Engineering Mechanics, Strength of Material, Material Science, CAE and CAMD, MD I and MD II

Course Objectives :

- To understand basic techniques for particular phases of product development
- Make and manage design teams for product development in a company.

Course Outcomes :

After completion of the course, student will be able to:

1. Describe an engineering design and development process
2. Employ engineering, scientific, and mathematical principles to execute a design from concept to finished product
3. Create 3D solid models of mechanical components from the perspective of aesthetic, ergonomic and functional requirement using CAD software
4. Work collaboratively on a team.
5. Create new product based on mechanical design engineering.
6. Investigate contemporary issues and their impact on provided solution

Unit I - Introduction to Product Design

Characteristics of Successful Product Development, Innovative Thinking, Challenges to Product Development, Product Development Process, Concept Development, Economics – Cost Vs Performance, Design Considerations

Unit II - Product Development Process

Product development process- Identification of customer needs- customer requirements, product development process flows. Product specifications and concept generation, concept selection, concept screening, concept testing, reverse engineering, product architecture

Unit III – Product Design Tools

Creativity and Problem Solving –Creativity methods-Theory of Inventive Problem Solving (TRIZ), Product function tree, Life cycle analysis, Quality Function Deployment, Competing Product Analysis, SWOT analysis, Failure Mode Effect Analysis.

Unit IV - Design for Manufacture and Assembly

Design for assembly, design for disassembly, design for environment, design for graphics and packaging

Unit V – Rapid Prototyping	
Understanding Prototypes, Principles of Prototyping, Prototyping Technologies, Planning for Prototypes	
Unit VI – Product Testing and Validation	
Time value of Money, Analytical technique, Product and Process, Evaluation of component, subassembly, assembly, Reliability Goals, Computer simulations and Bench test results, Comprehensive test plans and reports.	
Text books :	1. Product Design-Techniques in Reverse Engineering and New Product Development, Kevin Otto, Kristion Wood, Pearson Education, ISBN 978-81-7758-821-7. 2. Karl T.U. And Steven D.E., Product Design and Development, McGraw Hill, Ed 2000.
Reference Books :	1. Dieter GE, Engineering Design-Material and Processing Approach, McGraw Hill, Ed 2000

Elective I- Optimization Techniques (IE31175CV)

Teaching Scheme
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites:

Course Objectives :

- To introduce students to optimization techniques and applications of same in Civil Engineering.
- To impart the knowledge of different Stochastic Methods of optimization
- To equip the students with advance Linear Programming techniques.
- To impart the knowledge of Non-Linear Programming through unconstrained optimization techniques.

To make students aware of dynamic programming.

Course Outcomes

After completion of the course, student will be able to:

1. Discuss optimization techniques and its components
2. Implement sequencing, queuing theory and simulation to stochastic problems
3. Implement LPP with all its variants
4. Construct Linear optimization models
5. Use of NLP like constrained and unconstrained optimization
6. Use of Dynamic Programming for problems related to project investment

Unit I - Introduction of systems approach

Introduction to System approach, Operations Research and Optimization Techniques, Applications of systems approach in Civil Engineering.
Introduction to Linear and Nonlinear programming methods (with reference to objective function, constraints), Graphical solutions to LP problems.
Local & Global optima, unimodal function, convex and concave function.

Unit II - Stochastic Programming

Sequencing– n jobs through 2, 3 and M machines.
Queuing Theory: elements of Queuing system and it's operating characteristics, waiting time and ideal time costs, Kendall's notation, classification of Queuing models, single channel Queuing theory: Model I (Single channel Poisson Arrival with exponential services times, Infinite population (M/M/1): (FCFS/ /).
Simulation: Monte Carlo Simulation.

Unit III – Linear programming (A)

The Transportation Model and its variants.Assignment Model, and its variants.

Unit IV - Linear programming (B)

Formulation of Linear optimization models for Civil engineering applications. The simplex method. Method of Big M, Two phase method, duality.	
Unit V – Nonlinear programming	
Single variable unconstrained optimization: Sequential Search Techniques-Dichotomous, Fibonacci, Golden section. Multivariable optimization without constraints-The gradient vector and Hessian Matrix, Gradient techniques, steepest ascent/decent technique, Newton's Method. Multivariable optimization with equality constraints - Lagrange Multiplier Technique.	
Unit VI – Dynamic programming, Games Theory & Replacement Model	
Multi stage decision processes, Principle of optimality, recursive equation, Applications of D. P. Games Theory – 2 persons games theory, various definitions, application of games theory to construction Management. Replacement of items whose maintenance and repair cost increase with time, ignoring time value of money.	
Text books :	**1.** Operations Research by Premkumar Gupta and D.S.Hira, S. Chand Publications (2014). 2. Engineering Optimization: Methods and Application-- A. Ravindran, K. M. Ragsdell— Wiley India. 3. Engineering Optimization by S. S. Rao. 4. Operations Research by Hamdy A. Taha. 5. Quantitative Techniques in Management by N.D. Vohra (Mc Graw Hill). 6. Operations Research by Pannerselvam, PHI publications
Reference Books :	1. Topics in Management Science by Robert E. Markland(Wiley Publication). 2. An Approach to Teaching Civil Engineering System by Paul J. Ossenbruggen. 3. A System Approach to Civil Engineering Planning & Design by Thomas K. Jewell (Harper Row Publishers).
e – Resources:	1. Mathematical Model for Optimization (MMO Software). nptel.iitm.ac.in/courses/webcourse-contents/IISc-Bang/OPTIMISATION METHODS/Newindex1. html.

Elective I-Human Computer Interaction (IE31175IT)

Teaching Scheme	**Examination Scheme**
Credits: 3	Formative Assessment: 50
Lectures / Week: 3Hrs/week	Summative Assessment: 50

Prerequisites: Problem Solving and Object Oriented Technologies.

Course Objectives :

- To introduce the field of human-computer-interaction study.
- To gain an understanding of the human part of human-computer-interactions.
- To learn to do design and evaluate effective human-computer-interactions.
- To study HCI models and theories.
- To understand HCI design processes.
- To apply HCI to real life use cases.

Course Outcomes :

After completion of the course, student will be able to:

1. Explain the importance of HCI principles of user-centered design (UCD) approach.
2. Understand various human factors in HCI design.
3. Explore the models, paradigms and context of human interactions with computer system.
4. Design effective user-interfaces following a structured and organized UCD process.
5. Evaluate usability of a user-interface design.
6. Apply cognitive models for predicting human-computer-interactions.

Unit I – Introduction and basic concepts

Need for Design - Examples from Design of everyday things, case studies, Evolution of the web and digital interfaces, Design thinking and wicked problems .Exercise - Identify problems around us requiring design solution Or problems solved using design.

Unit II - Understanding the Human

Human senses: Human input-output channels, human memory, Thinking - reasoning and problem solving, Human emotions, individual differences, Designing interfaces for all, User research and techniques, Understanding Personae, Good and poor design, Ergonomics. Exercise - Creating personae for different application in everyday use.

Unit III – Understanding the Interaction

Understanding device specific interactions and human aspects involved, Interaction styles, Interacting with voice, visual and audio visual interfaces, Understanding Scenarios and context of use for user.Exercise - Listing down scenarios for an application/system, critical task list for each scenario.Understanding user journey and user journey maps.Exercise - Creating a user journey map for a particular task

Unit IV - HCI Design Process and Standards

Introduction to UX design process and case study, Understanding Information Architecture,
Exercise - Open and closed card sorting technique - Creating information architecture for a system

Understanding navigation models based on information architecture, High level concept sketches/wireframes Exercise - Creating low fidelity concept sketches for critical tasks of a system/problems ,Overview of tools	
Unit V – UI Evaluation Techniques	
What, why and when to evaluate, Design guidelines, Golden rules and heuristics, Goals of Evaluation, Evaluation criteria, Evaluation through: Expert analysis, User participation, Testing techniques - Formative and Summative testing, surveys, peer reviews and so on. Case study - ROI on UX/HCI methodology.	
Unit VI – HCI Models and Theories	
Cognitive models, Goal and Task hierarchy models, Linguistic models, Physical and Device models, Design principles. Exercise - Conduct evaluation of different sample interfaces using different models Introduction to Prototyping tools, UX - Industry overview.	
Text books :	1. Alan J, Dix. Janet Finlay, Rusell Beale, "Human Computer Interaction", Pearson Education, 3rd Edition, 2004, ISBN 81-297-0409-9 2. Preece, Rogers, Sharp, "Interaction Design-beyond human-computer Interaction", WILEY-INDIA, ISBN 81-265-0393-9
Reference Books :	1. Ben Shneiderman, "Designing The User Interface", Pearson Education, 2001, ISBN 81-7808-262-4 2. Alan Cooper, Robert Reimann, David Cronin, "The Essentials of Interaction Design", WILEY-INDIA, ISBN-10 81-265-1305-5 3. Wilbert O. Galitz, "The Essential Guide to User Interface Design", WILLY, ISBN 81-265-0280-0 4. Donald A. Norman, 2013, The Design of Everyday Things Basic Book, ISBN 978-0-465-07299-6.
Web-links:	1. http://hcibib.org 2. https://developer.android.com/guide/practices/compatibility 3. https://developer.apple.com/design/human-interface-guidelines

Bansilal Ramnath Agarwal Charitable Trust's

Vishwakarma Institute of Information Technology, Pune-48

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Department of Information Technology

Lab Practice –III (ITUA31176)

Teaching Scheme :
Credits: 3
Practical's / Week: 6Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisite: Data Structure and Files

Course objectives :

- To understand various network command and configuration of network equipment's
- To understand various network application protocols
- To Comprehend the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
- To provide a strong formal foundation in database concepts, recent technologies and best industry practices.
- To give systematic database design approaches covering conceptual design, logical design and an overview of physical design.
- To learn the SQL and NoSQL database system.
- To learn and understand various Database Architectures and its use for application development.
- To Comprehend the database security with respect to the different roles

Course Outcomes:

After completion of the course, student will be able to

1. Configure various network services on the server and check them through clients
2. Know various commands and utilities related to networking
3. To install and configure database systems.
4. To analyze database models & entity relationship models.
5. To design and implement a database schema for a given problem-domain
6. To understand the relational and document type database systems.
7. To populate and query a database using SQL DML/DDL commands.
8. To populate and query a database using MongoDB commands.

PART I- Computer Network Laboratory

1	Study of basic TCP/IP network commands and utilities (eg: ping, ifconfig, tracert, arp, tcpdump, whois, host, netsat, nslookup, ftp, telnet etc…)
2	Configure a router (Ethernet & Serial Interface) using router commands including access lists on any network simulator (eg. Packet Tracer)
3	Network design and implementation for small network using Packet Tracer
4	Network design & implementation of VLAN on Packet Tracer
5	Network analysis as well as packet header study with the help of any protocol analyzer/ packet

	sniffer.(eg: wireshark)
6	Socket Programming in C Language on Linux. a) TCP Client , TCP Server b) UDP Client , UDP Server
7	Installation and Configuration of Remote Login Service Telnet/SSH and access it through Telnet/SSH client
8	Installation and Configuration of FTP server and access it through FTP Client
9	Installation and configuration of DHCP Server in Wireless Environment using an Access Point (Packet Tracer)
10	Case Study of existing College network with IP Address Scheme.
	PART II-Database Laboratory
A	**Introduction to Databases (Study assignment – Any 2)**
1	Study and design a database with suitable example using following database systems: Relational: SQL / PostgreSQL / MySQL Key-value: Riak / Redis Columnar: Hbase Document: MongoDB / CouchDB Graph: Neo4J Compare the different database systems based on points like efficiency, scalability, characteristics and performance.
2	Install and configure client and server for MySQL and MongoDB (Show all commands and necessary Steps for installation and configuration).
3	Study the SQLite database and its uses. Also elaborate on building and installing of SQLite.
B	**SQL,XML & MongoDB**
1	Design any database with at least 3 entities and relationships between them. Apply DCL and DDL commands. Draw suitable ER/EER diagram for the system
2	Design and implement a database and apply at least 10 different DML queries for the following task. For a given input string display only those records which match the given pattern or a phrase in the search string. Make use of wild characters and LIKE operator for the same. Make use of Boolean and arithmetic operators wherever necessary.
3	Execute the aggregate functions like count, sum, avg etc. on the suitable database. Make use of built in functions according to the need of the database chosen. Retrieve the data from the database based on time and date functions like now (), date (), day (), time () etc. Use group by and having clauses.
4	Implement nested sub queries. Perform a test for set membership (in, not in), set comparison 1. (<some, >=some, <all etc.) and set cardinality (unique, not unique).
5	Create XML, XML schemas , DTD for any database application and implement min 10 queries using XQuery FLOWR expression and XPath.

6	Execute at least 10 queries on any suitable MongoDB database that demonstrates following querying techniques: find and findOne (specific values) Query criteria (Query conditionals, OR queries, $not, Conditional semantics) Type-specific queries (Null, Regular expression, Querying arrays)
7	Execute at least 10 queries on any suitable MongoDB database that demonstrates following: $ where queries Cursors (Limits, skips, sorts, advanced query options) Database commands
8	Implement Map reduce example with suitable example.
PART-III Theory of Computation laboratory	
1	Write an algorithm to check input end with certain pattern like "aa" or "bb" .Draw mathematical model for same and analyze time complexity
2	Write an algorithm which generate output X if "if it contains 110 substring", output Y "if it contains 111 substring "otherwise generate Z . Draw FA for same and analyze time complexity
3	Write an algorithm to pattern matching using regular expression Input a regular expression: ([a-zA-Z]*), ([a-zA-Z]*) Input a string: Doe, John That string matches Group 0 matched Doe, John Group 1 matched Doe Group 2 matched John Input a string: Bond, 007 That string does not match Input a string: Fortunately, the reactor did not explode That string matches Group 0 matched Fortunately, the Group 1 matched Fortunately Group 2 matched the
4	Write a program to implement Lexical Analyzer for subset of C
5	Write a program to implement calculator using LEX and YACC

6	Implement recursive descent parser
7	A study assignment on conversion of regular Expression to DFA (**using Direct Method**)

Bansilal Ramnath Agarwal Charitable Trust's

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Department of Information Technology

Employability Skills (ITUA31177)

Teaching Scheme
Credits: 3
Lectures / Week: 2 Hrs/week
Practicals / Week: 2 Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: NA

Pre-requisites : Fundamentals of Data Structures, Object Oriented Programming, Data Structures and Files

Course Objectives :

- To adapt the usage of modern tools and recent software.
- To evaluate problems and analyze data using current technologies
- To learn how to employ Integrated Development Environment(IDE) for implementing and testing of software solution
- To acquire contemporary skills to make the students employable in computer engineering domain

Course Outcomes:

1. Evaluate problems and analyze data using current technologies in a wide variety of business and organizational contexts using modern tools.
2. Employ Integrated Development Environment(IDE) for implementing and testing of software solution
3. Incorporate best practices for building applications.
4. Exhibit contemporary skills to make them employable

Instructions:

For this laboratory total four Skill Development Modules are provided as below:

Module-I: Java Programming
Module-II: Python Programming
Module-III: Mobile Application Development
Module- IV: Digital Marketing

Module-I :- Java Programming

Unit I - Data Structures and Collection Framework

Enumeration, BitSet, Vector, Stack, Dictionary, Hash table, Properties. Generic Methods and Generic Classes. Interfaces (Set, List, Queue, and Dequeue) and classes (ArrayList, Vector, Linked List, Priority Queue, HashSet, Linked HashSet, and Tree Set).

Unit II - Serialization and Networking

Serializing an Object and Deserializing an Object, I/O streams, Filtered and Buffered I/O operations, Random Access File, Reader and Writer classes, RMI Architecture, RMI package, RMI application, Socket Programming.

Unit III – Database Connectivity and Multithreading

SQL, JDBC, Thread life cycle, Thread methods, thread states, thread priorities, thread synchronization, wait-notify

Unit IV - GUI in JAVA

AWT, Applet, Swing, Container components, GUI Components, Event Listener, Layout Manager

List of assignments:-

1. Design a system with the help of advance data structures in Java.
2. Enhance the above system with the help of collections and generics in Java.
3. Enhance the above system with the help of socket programming in JAVA. Use Client Server architecture.
4. Enhance the above system with the help JDBC Connectivity.
5. Enhance the above system with the help multithreading, concurrency, synchronous and asynchronous callbacks, Thread Pools using Executor Service.
6. Transform the above system from command line system to GUI based application using Applet /Swing/AWT.

Text Books

1. Java Enterprise Best Practices by The O'Reilly Java Authors
2. Java 2: The Complete Reference by Herbert Schildt, Mcgraw-Hill

Reference Books

1. Java in a Nutshell by David Flanagan, Oreilly
2. Java Cookbook by Ian F. Darwin Oreilly

Module-II: Python Programming

Unit I –Programming Fundamentals using Python

Introduction to programming, Algorithms, Pseudo Code, variables, operators, decision constructs, iteration constructs, data types, operators, implicit/explicit type conversions, functions, control structures, collections, list, array, string, set, dictionary, exception handling, recursion, packages, libraries, file handling, regular expressions, lambda functions, concurrency

Unit II - Object Oriented Programming using Python

OOP basics, class, objects, constructor, class diagram, encapsulation, reference variables, pass by reference, self, collection objects, static attribute, static method, relationships, inheritance, abstract class, abstract method

Unit III – Data Structures & Algorithms using Python

Introduction to data structures, Linked List, Stack, Queue, Trees, Graphs, Hashing & Hash Tables, Linear & binary search algorithm, Sorting Algorithms, Selection Sort, Bubble Sort, Merge Sort, Quick Sort, Greedy Approach, Dynamic Programing

Unit IV – Database Connectivity

Python Database Integration – Pre-requisites and Installation, SELECT Operation, CREATE and INSERT Operation, UPDATE Operation, DELETE Operation

List of assignments:-Create a list of different data fields and use appropriate Python data types to represent each of them. (Case study: - You are required to design the data structure to display the individual player stats for cricket players. A player may have represented more than one team and may have played in more than one format such as Test, ODI and T20)

1. Assume that there are the top 5 performers. Write a Python program to decide the player with the highest points. Develop separate functions to compute batting and bowling points and save them in a module. The performance of each player is stored in a dictionary object. These functions should be imported into the main code. (Case Study: - The 'Man of the Match' award of a 50-over cricket match is decided by computing points earned by players. The points are calculated on the basis of the following rules:

Batting

- 1 point for 2 runs scored
- Additional 5 points for half century
- Additional 10 points for century
- 2 points for strike rate (runs/balls faced) of 80-100
- Additional 4 points for strike rate>100
- 1 point for hitting a boundary (four) and 2 points for over boundary (six)

Bowling

- 10 points for each wicket
- Additional 5 points for three wickets per innings
- Additional 10 points for 5 wickets or more in innings
- 4 points for economy rate (runs given per over) between 3.5 and 4.5
- 7 points for economy rate between 2 and 3.5
- 10 points for economy rate less than 2

Fielding

- 10 points each for catch/stumping/run out

2. Design a 'book' class with title, author, publisher, price and author's royalty as instance variables. Provide getter and setter properties for all variables. Also define a method royalty() to calculate royalty amount author can expect to receive the following royalties:10% of the retail price on the first 500 copies; 12.5% for the next 1,000 copies sold, then 15% for all further copies sold.

Then design a new 'ebook' class inherited from 'book' class. Add ebook format (EPUB, PDF, MOBI etc) as additional instance variable in inherited class. Override royalty() method to deduct GST @12% on ebooks

3. Write a python program to perform operations on stack
4. Write a python program to perform operations on queue.
5. Write a python function which accepts two linked lists containing integer data and an integer, n and merges two linked lists, such that list2 is merged with the list1 after n number of nodes.

6. Write a python function which accepts a stack of integers, sort it in ascending order and return the sorted stack.

7. Assume that you have to create such an application for maintaining a database of book titles and their costs.

Part 1: Write the script to create the required database and add data programmatically by using the Insert query.

Part 2: Write a Python script connecting to the database created that has the following features:

1. A books table having the title, author, and price as fields.
2. Accept input from the user for the title and quantity purchased by the customer.
3. Fetch the price from the table by executing the Select query.
4. Calculate the total amount and display it.

Part 3: Write a python script to update, delete records of the database.

Text Books :

1. Zed A. Shaw, "Learn PYTHON The Hard Way", Pearson, ISBN: 978-93-325-8210-1
2. Kenneth A Lambert and B L Juneja, "Fundamentals of PYTHON", CENGAGE Learning, ISBN:978-81-315-2903-4

Reference Books :

1. Allen B Downey, "Think PYTHON", O'Rielly, ISBN: 13:978-93-5023-863-9, 4th Indian Reprint 2015

Module -III: Mobile Application Development

Unit I – Introduction to Android

Android Platform Architecture, Basic components of android, Features of ART and Delvik Virtual Machine, Activity Life Cycle, Intents and Intent Filters, Resources, System Permissions, Android Application Structure, Device screen size compatibility, Android Emulator

Unit II - User Interface components

Layouts, Recycler View, List View, Grid View and Web view, Input Controls: Buttons, Checkboxes, Radio Buttons, Toggle Buttons, Spinners**,** Input Events, Menus, Toast, Dialogs, Styles and Themes,

Unit III – Multimedia, Animation and Graphics

Playing Audio, Playing Video, Rotate Animation, FadeIn/FadeOut Animation, Zoom Animation, Scale Animation, 2D and 3D Graphics

Unit IV – Advanced Components of Android

Data Storage, Shared Preferences, Internal Storage, External Storage, SQLite Databases, Content provider. and Remote Databases, Web App**,** JSON Parsing, Google Map, GPS, Sensors, Bluetooth/Wi-Fi Connectivity

List of assignments:-

1. Download Install and Configure Android Studio on Linux/windows platform.
2. Design a mobile app for media player using user interface components.
3. Develop Tic-tac-toe mobile game.
4. Design a mobile app to store data using internal or external storage.
5. Design a mobile app using Google Map and GPS to trace the location.
6. Design a mobile app using animation
7. Design and develop a mobile app for novice trekkers by recording the paths from regular trekkers by using, Material Design Pattern for UI, Storage [SQLite database/File/Shared Preference/cloud], Internet connection /Wi-Fi/Bluetooth, GPS and Google Map.

Text Books

1. Neil Smyth, "Android Studio 2 Development Essentials", Payload Media, ISBN: 1532853319
2. John Horton, "Android Programming for Beginners", ISBN 10:1785883267

Reference Books

1. Reto Meier, "Professional Android 4 Application Development", Wrox, ISBN-10: 1118102274; ISBN-13: 978-1118102275
2. Greg Nudelman, "Android Design Patterns :Interaction Design Solutions for Developers", ISBN-10: 1118394151; ISBN-13: 978-1118394151

Module -IV: Digital Marketing

Unit I – Digital Marketing Fundamentals

Introduction to Digital Marketing, Digital Marketing Framework, Marketing Channels, Marketing Objectives & KPIs, Inbound vs Outbound Marketing, Content Marketing, Understanding Traffic, Understanding Leads, Strategic Flow for Marketing Activities

Unit II - Social Media Marketing

Social Media Landscape, Channels, Content, Implement & Monitor Campaigns, Measure Impact, Social Media Advertising, Platforms for Social Ads, Create Ad Sets, Create and Manage Ads

Unit III – Search Engine Optimization

Understanding SEO, SEO Keyword Planning, Meta Tags and Meta Description, Website Content Optimization, Back Link Strategies, Internal and External Links, Optimizing Site Structure, Keywords in Blog and Articles, On Page SEO, Off Page SEO, Local SEO, Mobile SEO, eCommerce SEO, Optimizing with Google Algorithms

Unit IV – Google Analytics and WebMaster Tool

Web Analytics, Integrating with Website, Measurement Metrics, Accounts and Profiles, Analytics Reporting, Sorting, Filter and Time Chart, Audience Segmentation, Traffic and behavior reports, ReMarketing Audiences, Goals and Conversion Reports,Developing Intelligence Report, Google Webmaster Tool, Setting up Tool for SEO, Adding and Managing Assets, Integrating WebMaster Tool, Site Map and Site Links, Search Traffic and Links, Google Indexing, Managing Crawl Errors

List of assignments:-

Assignment 1: (3 weeks Plan)
Design an online marketing campaign strategy for an E-commerce website (fashion for eg. Myntra) which is recently launched and needs to reach max. people within span of 1 year. Location is India.

- Define Campaign Objectives
- Marketing Channels which can be used
- Traffic / User analysis
- Inbound examples, Outbound examples
- 3-5 blog topics which can go on the website
- Overall marketing flow

Assignment 2: (2 weeks plan)
- Create an Ad campaign on Facebook targeting students for Engineering Admissions in XYZ college in Pune
- Create an Ad campaign on Google for Tours and Travels business
- Create an Ad campaign on Linkedin for an recruitment agency

Assignment 3: (3 weeks plan)

- Visit Flipkart.com / Amazon.com or any other ecommerce website and come up with below observations:
  - Keywords used
  - Meta Tags used
  - Backlinks used
  - Check if the website is Mobile optimized
  - Good practices to follow for an SEO friendly website
  - Dos and Don'ts for SEO

Assignment 4: (2 weeks plan)

- Create a website (3 - 5 pages) and link it to Google Analytics or MixPanel for analytics
- Send the website link to about 100 users and derive & present different analytics that are generated (device, location, TTL etc.)

Assignment 5: (3 weeks plan)

- Consider you are running an Digital Marketing Agency, and a customer wants his business to grow online. What all will you recommend him? Please create a short presentation of 10 slides with your recommendations and present. You may pick business (any 1) as mentioned below:
  - Fashion Designing Institute
  - Homemade chocolates
  - Robotics classes
  - GYM
- Note: You can define the geography as required.

Text Books: 1. Brad Geddes,"Advanced Google AdWords", 3rd Edition, Sybex, ISBN-13: 978-1118819562

2. Eric, Stephan, Jessie, "The Art of SEO: Mastering Search Engine Optimization ", 3rd Edition, O'Reilly Media, ISBN-13: 978-1491948965

Bansilal Ramnath Agarwal Charitable Trust's

Vishwakarma Institute of Information Technology, Pune-48

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Department of Information Technology

Mini Project (ITUA31178)

Teaching Scheme :
Credits: 2
Tutorial / Week: 1 Hrs/week
Practical's / Week: 2 Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: NA

Prerequisite: Data Structure and Files, Discrete Structure, Software engineering principles and practices.

Course objectives :

- To learn and understand Database Programming Paradigms.
- To give systematic database design approaches covering conceptual design, logical design and anoverview of physical design.
- To learn and understand various Database Architectures and its use for application development.
- To programme PL/SQL including stored procedures, stored functions, cursors and packages.
- To learn and understand Database Project Life Cycle.

Course Outcomes:

After completion of the course, student will be able to

1. Install and configure a given database system.
2. Distinguish various database models & entity relationship models.
3. Design and implement a database schema for a given problem-domain
4. Understand how analytics and big data affect various functions now and in the future

Guidelines for Instructor's Manual

1. The faculty member should prepare the laboratory manual for all the experiments and it should be made Available to students and laboratory instructor/Assistant.

Guidelines for Student's Lab Journal

1. Student should submit term work in the form of handwritten journal based on specified list of assignments.
2. Practical Examination will be based on the term work.
3. Candidate is expected to know the theory involved in the experiment.
4. The practical examination should be conducted if and only if the journal of the candidate is complete in all respects.

PART I- Mini Project / Database Application Development

A	**Part – I: Introduction to Databases**
1	Draw suitable ER/EER diagram for the Mini project.
2	Write a PL/SQL code to implement all types of cursor (Implicit,Explicit) and display employee number, name and salary of 5highest paid employees using cursor. Employee(employee no, employee name, join_date, designation, salary).
3	PL/SQL Stored Procedure and Stored Function : Write a PL/SQL procedure to find the number of students ranging from 100-80%, 79-70%, 69-60%,59-50 & below 49% in each course from the Student_course table given by the procedure as parameter. Student_course(Roll_no,Course,Couse_code,Semester,Total_Marks,Percentage)
4	Database Trigger (Row level and Statement level triggers, Before and After Triggers):Write a database

	trigger on Employee table. The System should keep track of the records that are being updated or deleted. The old value of updated or deleted records should be added in to a new table when the Employee table is updated. Employee(employee no, employee name, join_date, designation, salary).
5	Student group of size 3 to 4 students should decide the statement and scope of the project which will be refined and validated by the faculty considering number of students in the group. Draw and normalize the design up to at ER Diagram least 3NF in case of back end as RDBMS. Suggested Directions for development of the mini project. • Build a suitable GUI by using forms and placing the controls on it for any application. (E.g Student registration for admission, railway reservation, online ticket booking etc.). Proper data entry validations are expected. • Develop two tier architecture and use ODBC/JDBC connections to store and retrieve data from the database. Make a user friendly interface for system interaction. You may consider any applications like employee management system, library management system etc. • Implement the basic CRUD operations and execute a transaction that ensures ACID properties. Make use of commands like commit, save point, and rollback. You may use examples like transfer of money from one account to another, cancellation of e-tickets etc. •
B	**Part – II:-**
1	Gather the requirements for mini project and Prepare SRS document
2	Draw Use case diagram
3	Prepare use case specification document.

Text books :	1.Ramon A. Mata-Toledo, Pauline Cushman, Database management systems, TMGH, ISBN: IS978-0-07-063456-5, 5th Edition. 2. Ivan Bayross, ―SQL, PL/SQL: The Programming Language of Oracle‖, BPB Publication, ISBN- 10: 8176560723; ISBN-13: 978-8176560726.
Reference Books :	1.Reese G., Yarger R., King T., Williums H, Managing and Using MySQL, Shroff Publishers and Distributors Pvt. Ltd., ISBN: 81 - 7366 - 465 – X, 2nd Edition. 2. Dalton Patrik, SQL Server – Black Book, DreamTech Press. 3. Eric Redmond, Jim Wilson, Seven databases in seven weeks, SPD, ISBN: 978-93-5023-918-6.

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Department of Information Technology

T.Y.B.Tech

2017 Pattern

Syllabus Curriculum

SEMESTER – II

Operating System (ITUA32171)

Teaching Scheme
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites : Computer Organization and Architecture

Course objectives :

- To provide understanding of the concepts like virtualization, concurrency and persistence in operating systems.
- To study the design and implementation of scheduling and memory management policies in Operating systems.
- To demonstrate the working of concurrency and locking mechanism in operating systems
- To provide insights of I/O management in Operating Systems
- To make them aware of advanced topics e.g. data protection, distributed systems in Operating Systems.
- To teach the case studies of xv6 and Linux OS

Course Outcomes
After completion of the course, student will be able to

1. Summarize the concepts of virtualization, concurrency and persistence **(Understanding**).
2. Implement proper scheduling and memory management policies for the OS (**Create**)
3. Analyze concurrency and locking mechanism in OS **(Analyze)**
4. Describe the I/O management in OS **(Remember)**
5. Express the advanced topics in OS **(Understanding)**
6. Compare the working of xv6 and Linux OS (**Compare**)

Unit I - Introduction to Operating Systems and Process

Introduction to operating systems, Virtualizing The CPU, Virtualizing Memory, Concurrency , Persistence, Design Goals, Some History

The Process: Process abstraction, System calls for Process management, Process Creation: A Little More Detail, Process States, Data Structures, Process execution mechanisms Process API, Process Control and Users, Useful Tools.

Unit II - Scheduling

Workload Assumptions, Scheduling Metrics, First In, First Out (FIFO), Shortest Job First (SJF), Shortest Time-to-Completion First (STCF), A New Metric: Response Time, Round Robin, Incorporating I/O, The Multi-Level Feedback Queue, The Priority Boost, Attempt, Better Accounting, Multiprocessor Scheduling, Synchronization, Cache Affinity, Single-Queue Scheduling Multi-Queue Scheduling, Linux Multiprocessor Schedulers.

Unit III – Address Spaces

Early Systems, Multiprogramming and Time Sharing, The Address Space, Memory API**:** Types of Memory, The malloc() Call, The free() Call, Common Errors, Underlying OS Support, Segmentation, Fine-grained vs. Coarse-grained Segmentation, Free-Space Management**,** Paging, A Memory Trace, Faster Translations (TLBs), TLB Basic Algorithm, Example: Accessing An Array, Who Handles The

TLB Miss?, TLB Issue: Context Switches, Replacement Policy, Hybrid Approach: Paging and Segments, Beyond Physical Memory: Mechanisms**,** Swap Space, The Present Bit, The Page Fault, What If Memory Is Full?, Page Fault Control Flow, When Replacements Really Occur, The Linux Virtual Memory System.
Unit IV - Concurrency
Shared Data, Uncontrolled Scheduling, The Wish For Atomicity, Waiting For Another, **Thread API :** Why Use Threads?, Thread Creation, Thread Completion **Locks :** The Basic Idea, Pthread Locks, Building A Lock, Evaluating Locks, Controlling Interrupts, Failed Attempt: Just Using Loads/Stores, Building Working Spin Locks with Test-And-Set, Compare-And-Swap, Load-Linked and Store-Conditional, Fetch-And-Add, Different OS, Different Support, **Semaphores:** A Definition, Binary Semaphores (Locks) Semaphores For Ordering, The Producer/Consumer (Bounded Buffer) Problem, Reader-Writer Locks The Dining Philosophers, How To Implement Semaphores, Common Concurrency Problems
Unit V – I/O Devices
System Architecture, A Canonical Device, The Canonical Protocol, Lowering CPU Overhead With Interrupts, More Efficient Data Movement With DMA, Methods Of Device Interaction, Fitting Into The OS: The Device Driver, Case Study: A Simple IDE Disk Driver, Hard Disk Drives, Redundant Arrays of Inexpensive Disks (RAIDs),Files and Directories, Locality and The Fast File System, File System Implementation, Flash-based SSDs.
Unit VI - Advanced topics in OS
Data Integrity and Protection: Disk Failure Modes, Handling Latent Sector Error, Detecting Corruption: The Checksum, Using Checksums, Performance evaluation of computer systems, load testing, Little's law, Distributed Systems, Sun's Network File System (NFS), The Andrew File System (AFS), Case Studies of: The **xv6** operating system, The **Linux** Operating Systems

Text books :	1. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau "Operating Systems: Three Easy Pieces", Arpaci-Dusseau Books, March , 2015 2. Stallings William., "Operating Systems", Fourth Edition, Prentice Hall of India,2001
Reference Books :	1. Silberschatz, A, Galvin, P.B, and Gagne, G., "Operating System Principles", Eight Edition, John Wiley & Sons, 2008. 2. Bach Maurice J. "The Design of the UNIX Operating System", Second Edition Prentice Hall of India, 2001

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Department of Information Technology

Design and Analysis of Algorithms (ITUA32172)

Teaching Scheme:
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites: Basic mathematics, Discrete structure, Fundamentals of Data structure, Data structures and files

Course objectives :

- To understand the problem solving and problem classification.
- To know the basics of computational complexity analysis and various algorithm design strategies.
- To provide students with solid foundations to deal with a wide variety of computational problems.
- To provide a thorough knowledge of the most common algorithms and data structures.
- To analyze a problem and identify the computing requirements appropriate for its solutions.
- To understand the design of parallel algorithms.

Course Outcomes

After completion of the course, student will be able to

1. To calculate computational complexity using asymptotic notations for various algorithms.
2. To apply Divide & Conquer as well as Greedy approach to design algorithms.
3. Practice principle of optimality.
4. To illustrate different problems using Backtracking.
5. To compare different methods of Branch and Bound strategy.
6. To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms

Unit I - Introduction

Analysis of Algorithm, Efficiency- Analysis framework, asymptotic notations – big O, theta and omega. Analysis of Non-recursive and recursive algorithms, Amortized Analysis. Solving Recurrence Equations (Homogeneous and non-homogeneous) Proof Techniques: Minimum 2 examples of each: Contradiction, Mathematical Induction – Tiling Problem, Direct proofs, Proof by counterexample, Proof by contraposition

Unit II - Divide and Conquer and Greedy

Divide & Conquer: General method, Control abstraction, Merge sort, Quick Sort – Worst, Best and average case. Binary search, Large integer Multiplication, Strassen's Matrix multiplication. (for all above algorithms analysis to be done with recurrence)
Greedy Method: General method and characteristics, Prim's method for MST , Kruskal method for MST (using nlogn complexity), Dijkstra's Algorithm, Huffman Trees (nlogn complexity), Fraction Knapsack problem, Job Sequencing.

Unit III – Dynamic Programming

General strategy, Principle of optimality, Warshal's and Floyd's Algorithm , Optimal Binary Search Trees, 0/1 knapsack Problem, Travelling Salesman Problem.

Unit IV - Backtracking

General method, Recursive backtracking algorithm, iterative backtracking method. 8- queens problem, Sum of subsets, Graph coloring, Hamiltonian Cycle , 0/1 Knapsack Problem

Unit V – Branch and Bound	
The method, Control abstractions for Least Cost Search, Bounding, FIFO branch and bound, LC branch and bound, 0/1 Knapsack problem – LC branch and bound and FIFO branch and bound solution, Traveling sales person problem.	
Unit VI - Computational Complexities and Parallel Algorithms	
Non Deterministic algorithms, The classes P, NP, NP Complete, NP hard Proofs for NP Complete Problems: Clique, Vertex Cover Parallel Algorithms: Introduction, models for parallel computing, computing with complete binary tree, Pointer doubling algorithm	
Text books :	1. Horowitz and Sahani, "Fundamentals of computer Algorithms", Galgotia. ISBN 81-7371-612-9
Reference Books :	1. Thomas H Cormen and Charles E.L Leiserson, "Introduction to Algorithm" PHI, ISBN:81-203-2141-3. 2. Anany Levitin,"Introduction to the Design & Analysis of Algorithm ",Pearson ISBN 81- 7758-835-4 3. Gilles Brassard, Paul Bratle "Fundamentals of Algorithms ", Pearson ISBN 978-81-317-1244-3 4. George T. Heineman, Gary Pollice, Stanley Selkow "Algorithms in a Nutshell, A Desktop Quick Reference", O'Reilly, ISBN 13:978-81-8404-608-3

Bansilal Ramnath Agarwal Charitable Trust's

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Department of Information Technology

Elective II- Advanced Computer Networks (CSUA32173A)

Teaching Scheme :
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites : Fundamentals of Data Communication, Computer Network

Course Objectives:

- To study the fundamentals of LAN design.
- To understand spanning tree protocols.
- To understand the EtherChannel, HSRP and Dynamic Routing
- To study EIGRP.
- To learn different techniques for routing and routing configuration.
- To learn and demonstrate Tuning and Troubleshooting of given network.

Course Outcomes :

After completion of the course, student will be able to

1. Explore LAN design.
2. Understand the functions of spanning tree protocols.
3. Understand the functionality of network layer
4. Understand the functionality of EtherChannel, HSRP and Dynamic Routing
5. Analyze the routing for a given network/LAN using EIGRP.
6. Design networks and demonstrate the Tuning and Troubleshooting of it.

Unit I :LAN Design

Campus Wired LAN design, Selecting Network devices, Scaling VLANs: VTP, Extended VLAs and DTP, Multi LAN issues, Layer 3 Switching

Unit II : STP: Spanning Tree Protocols

Introduction, STP Operations, Types of Spanning Tree Protocols, Spanning Tree Configuration, Issues in STP.

Unit III : Ether Channel, HSRP and Dynamic Routing

Link Aggregation Concepts, Link Aggregation Configuration, First Hop Redundancy Protocols. Introduction to Dynamic Routing, Dynamic Routing Protocols: Distance Vector, RIP, Link state, e-IGRP, Configuration, Operation, Link-State Routing Protocols.

Unit IV : EIGRP

EIGRP: Introduction, Characteristics, Reliable transport protocol, Packet types, EIGRP messages, EIGRP for IPv4, EIGRP Operation, Topology table, EIGRP for IPv6. IPv6 link local address, configuration.

EIGRP Tuning and Troubleshooting: Tune EIGRP, Troubleshoot EIGRP

Unit V : OSPF	
Single-Area OSPF: Introduction, OSPF Characteristics, messages, operation, Single-Area OSPFv2: Router ID, configuring OSPFv2, OSPF cost, Single-Area OSPFv3. Difference between OSPFv2 and OSPFv3. Multiarea OSPF: Introduction, Multiarea OSPF Operation, Configuring Multiarea OSPF	
Unit VI :Tuning and Troubleshooting	
Advanced Single-Area OSPF: operation, Configurations, Troubleshooting Single-Area OSPF Implementations. Tune and troubleshoot networks and network protocols.	
Text Books :	1.Andrew S. Tanenbaum, ―Computer Networks‖, PHI, ISBN 81-203-2175-8. 2.Fourauzan B., "Data Communications and Networking", 5th Edition, Tata McGraw- Hill, Publications, ISBN: 0 – 07 – 058408 – 7 3.Kurose, Ross ―Computer Networking a Top Down Approach Featuring the Internet‖, Pearson, ISBN-10: 0132856204
Reference Books :	1.Routers and Routing Basics CCNA 2 Companion Guide- Webdell Odom, Rick McDonald 2.CCNA Routing and Switching 200-125 Official Cert. Guide Library 3.Cisco CCNA Command Guide- An introductory Guide for complete beginners

Elective II- Artificial Intelligence (CSUA32173B)

Teaching Scheme :
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites : Data Structures, Probability and Statistics

Course Objectives:

- To understand the various characteristics of Intelligent agents.
- To learn the different search strategies in AI.
- To understand the EtherChannel, HSRP and Dynamic Routing
- To learn how to represent knowledge in solving AI problems.
- To introduce the concepts of Expert Systems and Machine Learning.
- To know about the various applications of AI.

Course Outcomes :

After completion of the course, student will be able to

1. Understand different types of AI Agents and environment
2. Implement various AI search algorithms.
3. Understand fundamentals of knowledge representation and planning.
4. Study working knowledge of reasoning in presence of incomplete and or uncertain information.
5. Apply knowledge representation, reasoning and machine learning techniques to real world problems. Study the architecture and design of Expert Systems

   Understand application of AI in Natural language Processing and Image Processing
6. Understand different types of AI Agents and environment.

Unit I :Introduction

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Environment, Environment Types, Problem Solving Approach to Typical AI problems.

Unit II : Problem Solving Methods

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing - Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games

Unit III : Representation of Knowledge

Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

Unit IV : Knowledge Inference

Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster – Shafer theory.	
Unit V : Expert Systems	
Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.	
Unit VI :Applications	
AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving	
Text Books :	1. Kevin Night and Elaine Rich, Nair B., —Artificial Intelligence (SIE), McGrawHill-2008. 2. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill Education(India), 2013, ISBN : 978-1-25-902998-1 3. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2009.
Reference Books :	1. Peter Jackson, —Introduction to Expert Systems, 3rd Edition, Pearson Education, 2007. 2. Deepak Khemani —Artificial Intelligence, Tata Mc Graw Hill Education 2013 3. Dan W. Patterson, —Introduction to AI and ES‖, Pearson Education, 2007

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Elective II- Software Design & Architecture (CSUA32173C)

Teaching Scheme:
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites : Software Engineering

Course Objectives:

- To understand software design methods and UML notations.
- To learn architectural design for real time software architecture.
- To select and use appropriate design pattern applicable to software system.
- To understand various middleware technologies and their usage.
- To provide intensive into client side and server side knowledge for given architecture.
- To select and use appropriate archetype pattern for architectural system.

Course Outcomes :

After completion of the course, student will be able to

1. **Remember** various software design methods and UML notatons
2. **Understand** importance of different views in architectural views.
3. **Apply** appropriate design pattern in software design.
4. **Analyze** need of middleware technology in three tier architecture
5. **Develop** application with server side components in three-tier architecture
6. **Understand** three-tier architecture with model driven architecture with Archetype

Unit I : Introduction to Software Design

Design Methods: Procedural and Structural Design methods, Object Oriented design method, Unified modeling Language overview, Static and Dynamic Modeling Advance Use case, Class, State, Sequence Diagrams

Unit II : Architectural Design

Need of Architectural Design, importance and architecture views, client-server, service oriented, component based concurrent and real time software architecture with case studies.

Unit III : Design Patterns

Introduction, creational, Structural and behavioral patterns, singleton,proxy, adapter, actory, iterator, observer pattern with application

Unit IV : Middleware Technologies

Introduction to Middleware, Types of Middleware, Web/Application servers, Introduction to Java EE, Introduction to Java EE technologies like JMS, JDBC, JMX, SOCKET. EJB 3.0 Architecture, Entity, Session, Message beans, XML, XSLT.

Unit V : Client and Server Side Technologies

Introduction to MVC, Need of Client side technology in N-tier architectures and N-tier architectures, client side technologies: HTML, CSS, Java script. Need of server side technology in N-tier architectures, Server side technologies: Java Servlets, JSP, JSF, Framework: struts.	
Unit VI : Archetype Patterns	
Archetypes and Archetype Patterns, Model Driven Architecture with Archetype Patterns. Literate Modeling, Customer Relationship Management (CRM) Archetype Pattern, Product Archetype Pattern, Quantity Archetype Pattern, Rules for Archetype pattern.	
Text Books :	1. David Budgen, "Software Design", 2nd edition, Pearson Education 2. Software Architecture in Practice, 3rd Edition By Len Bass, Paul Clements, Rick Kazman Published Sep 25, 2012 by Addison-Wesley Professional
Reference Books :	1 Grady Booch,James Rumbaugh,Ivar Jacobson, The UML Users Guide, Pearson Publication 2. Software Design: From Programming to Architecture Eric J. 3. Applied Software Architecture ,Christine Hofmeister, Robert Nord, Deli Soni, Addison-Wesley Professional Enterprise Patterns and MDA: Building Better Software with Archetype Patterns and UML Jim Arlow, Ila Neustadt ,Addison-Wesley Professional

Elective II- Information Storage And Retrieval (ITUA32173)

Teaching Scheme :
Credits: 3
Lectures / Week: 3Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Prerequisites : **1.** Data Structures and Files
2. Database management systems

Course objectives :

1. To understand information retrieval process.
2. To understand concepts of clustering and how it is related to Information retrieval.
3. To deal Storage, Organization & Access to Information Items.
4. To evaluate the performance of IR system and understand user interfaces for searching.
5. To understand information sharing on semantic web.
6. To understand the various applications of Information Retrieval giving emphasis to multimedia and distributed IR, web Search.

Course Outcomes :

After completion of the course, student will be able to

1. Understand the concept of Information retrieval.
2. Deal with storage and retrieval process of text and multimedia data.
3. Evaluate performance of any information retrieval system.
4. Design user interfaces.
5. Understand importance of recommender system.
6. Understand concept of multimedia and distributed information retrieval.

Unit I – Introduction

Basic Concepts of IR, Data Retrieval & Information Retrieval, text mining and IR relation, IR system block diagram. Automatic Text Analysis: Luhn's ideas, Conflation Algorithm, Indexing and Index Term Weighing, Probabilistic Indexing Inverted file, Suffix trees & suffix arrays, Signature Files, Scatter storage or hash addressing, Clustered files, Hypertext and XML data structures.

Unit II - Classification and Retrieval search strategies

Retrieval strategies: Vector Space model, Probabilistic retrieval strategies, Language models, Inference networks, Extended Boolean retrieval, Latent semantic indexing, neural networks, Fuzzy set retrieval. Retrieval utilities: Relevance feedback, Cluster Hypothesis, Clustering Algorithms: Single Pass Algorithm, Single Link Algorithm.

Unit III – Retrieval Performance Evaluation And Visualization

Performance evaluation: Precision and recall, MRR, F-Score, NDCG, user oriented measures, cross fold evaluation. Visualization in Information System: Starting points, document context, User relevance judgment, Interface support for search process.

Unit IV - Distributed And Multimedia IR

Distributed IR: Introduction, Collection Partitioning, Source Selection, Query Processing, web issues. MULTIMEDIA IR: Introduction, Data Modeling, Query languages, Generic multimedia indexing approach, One dimensional time series, two dimensional color images, Automatic feature extraction

Unit V – Web Searching

Searching the Web: Challenges, Characterizing the Web, Search Engines, Browsing, Matasearchers, Web crawlers, Meta-crawler, Web data mining, Finding needle in the Haystack, Searching using Hyperlinks, Page

ranking algorithms: Pagerank, Rank SVM.	
Unit VI – Advanced Information Retrieval	
Semantic Search systems: G Semantic Web Google knowledge graphs, Ontology, Searching across ontologies, semantic web search. Recommendation system: Collaborative Filtering and Content Based Recommendation of Documents and Products. Information Extraction and Integration: Extracting Data from Text. Collecting and Integrating Specialized Information on the web.	
Text books :	1. Yates & Neto, Modern Information Retrieval, Pearson Education, ISBN:81-297-0274-6 2. C.J. Rijsbergen, Information Retrieval, (www.dcs.gla.ac.uk)., 2ndISBN:978-408709293. 3. David Grossman, Ophir Frieder, Information Retrieval - Algorithms and Heuristics, Springer International Edition, ISBN: 978-1-4020-3004-8. 4. Grigoris Antoniou and Frank van Harmelen, A semantic Web Primer, Massachusetts Institute of Technology, ISBN: 978-0-262-01242-3. 5. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies, Chapman & Hall/CRC, ISBN: 9781420090505. 6. Hang Li, Learning to Rank forInformation Retrievaland Natural Language. 7. Processing, Morgan & Claypool, ISBN: 9781608457076.
Reference Books :	1. Christopher D. Manning, Prabhakar Raghavan and HinrichSchutzen, Introduction to Information Retrieval, Cambridge University Press, Online book, ISBN:978-0-521-86571-5 2. Robert Korfhage, Information Storage and Retrieval, John Wiley & Sons,1 Edition, ISBN:9788126507702. 3. Kowalski, Gerald, Maybury, Mark, Information Storage and Retrieval Systems :Theory and Implementation, Springer US, 2nd Edition,ISBN:978-0-7923-7924-9. 4. Zhang, Jin, Visualization for Information Retrieval, Springer-Verlag Berlin Heidelberg,1st Edition,ISBN:978-3-642-09442-2Mark leven, Introduction to search engines and web navigation, John Wiley and sons Inc, 2nd Edition,ISBN 9780-170-52684-2. 5. V. S. Subrahamanian, Satish K. Tripathi , Multimedia information System,Kulwer Academic Publisher. 6. ChabaneDjeraba, Multimedia mining A highway to intelligent multimedia documents, Kulwer Academic Publisher, ISBN:1-4020-7247-3. 7. Ricci, F, Rokach, L. Shapira, B.Kantor, Recommender Systems Handbook. 8. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval Implementing and Evaluating Search Engines, The MIT Press, Cambridge.

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Department of Information Technology

Lab Practice –IV (ITUA32174)

Teaching Scheme :
Credits: 3
Practical's / Week: 6Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Pre-requisites: C and C++ Programming ,Fundamentals of data Structures, OOP

Course objectives:

To Study the operating systems functioning and internals.

- To define the different strategies and applications of Artificial Intelligence
- To differentiate artificial intelligence problems.
- To specify architectural design for real time software architecture.
- To select and use appropriate design pattern applicable to software system.
- To demonstrate the building of computer network.
- To design, configure and troubleshoot the network.
- To learn the various algorithmic design paradigms
- To find the space and running time requirements of the algorithms.
-

Course Outcomes:

After completion of the course, student will be able to

1. Apply algorithmic strategies for solving various problems such as travelling salesman problem, Hamiltonian circuit etc.
2. Demonstrate the working of Linux OS.
3. Design and implement various memory management and scheduling policies.
4. Describe the Data Science Process and explore components interaction .Develop regression model for data forecasting.
5. Implement Artificial Intelligence algorithms.
6. Differentiate artificial intelligence problems.
7. Design and demonstrate the networks.
8. Configure and troubleshoot the network.
9. Understand the concept of Information retrieval
10. Deal with storage and retrieval process of text and multimedia data

PART-I Operating System Laboratory

1	Shell programming Write a program to implement an address book with options given below: a) Create address book. b) View address book. c) Insert a record. d) Delete a record. e) Modify a record. f) Exit.
2	Process control system calls: The demonstration of *FORK*, EXECVE and *WAIT* system calls along with zombie and orphan states. Implement the C program in which main program accepts an integer array. Main program uses the *FORK* system call to create a new process called a child process. Parent process sorts an integer array and passes the sorted array to child process through the command line arguments of *EXECVE* system call. The child process uses *EXECVE* system call to load new program that uses

	this sorted array for performing the binary search to search the particular item in the array.
3	Thread management using pthread library. Implement matrix multiplication using multithreading. Application should have pthread_create, pthread_join, pthread_exit. In the program, every thread must return the value and must be collected in pthread_join in the main function. Final sum of rowcolumn multiplication must be done by main thread (main function).
4	Thread synchronization using counting semaphores and mutual exclusion using mutex.Application to demonstrate: producer-consumer problem with counting semaphores and mutex.
5	Thread synchronization and mutual exclusion using mutex. Application to demonstrate: Reader-Writer problem with reader priority
6	Deadlock Avoidance Using Semaphores: Implement the deadlock-free solution to Dining Philosophers problem to illustrate the problem of deadlock and/or starvation that can occur when many synchronized threads are competing for limited resources.
7	Inter process communication in Linux using following. a. **Pipes :** Full duplex communication between parent and child processes. Parent process writes a pathname of a file (the contents of the file are desired) on one pipe to be read by child process and child process writes the contents of the file on second pipe to be read by parent process and displays on standard output.
8	Inter-process Communication using Shared Memory using System V. Application to demonstrate: Client and Server Programs in which server process creates a shared memory segment and writes the message to the shared memory segment. Client process reads the message from the shared memory segment and displays it to the screen.
	***All assignments to be implemented using C++ on Linux platform.**
PART II-Design and Analysis Algorithm Laboratory	
1	Write a program to implement matrix multiplication using Strassen's method. (Divide and Conquer)
2	Implement program to find minimum and maximum element from given list using Divide and Conquer
3	Write a program to implement optimal storage tape using greedy approach
4	Write a program to print shortest path and cost for the directed graph using Floyd and Warshal Method. (Dynamic Programming) and verify the complexity
5	Write a program to print shortest path and cost for the directed graph using Bellman Ford algorithm (Dynamic Programming) and verify the complexity
6	Write a recursive program to find the solution of placing n queens on chess board so that no queen takes each other (backtracking).
7	Write a non-recursive program to check whether Hamiltonian path exists in undirected graph or not. If exists print it. (backtracking)
8	Write a program to solve the travelling salesman problem. Print the path and the cost. (Branch and Bound)

	***All assignments to be implemented using C++/C on Linux Platform in OPENGL.**
PART-III Elective II- Advanced Computer Networks Laboratory	
1	Set Up Devices in the Network as Shown in the Topology.
2	To Configure Extended VLANs, VTP, and DTP.
3	Troubleshooting Inter-VLAN Routing
4	To Building a Switched Network with Redundant Links.
5	To Configure Rapid PVST+, PortFast, and BPDU Guard.
6	To Configure and Troubleshoot Ether Channel
7	To Configure HSRP.
8	To Configure and Troubleshoot Basic EIGRP for IPv4 and IPv6.
9	To Configure and Troubleshoot Advanced EIGRP for IPv4.
10	To Configure and Troubleshoot Basic Single-Area OSPFv2 and OSPFv3.
PART-III Elective II- Artificial Intelligence Laboratory	
1	Assignment on Heuristic Search Techniques: Implement Best first search (Best-Solution but not always optimal) and A* algorithm (Always gives optimal solution).
2	Assignment on Constraint Satisfaction Problem: Implement graph coloring problem.
3	Write a program to implement Unification algorithm.
4	Write a program to develop book recommender Expert system.
5	Write a program to predict WORK_TYPE for query tuple from given dataset using naïve bays approach to predict the work type for a person with following parameters: age: 30, Qualification: MTech, Experience: 8
6	Write a program to correct the spelling of English paragraph.(NLP Based).

Work Type	Age	Qualification	Experience
Consultancy	30	Ph.D.	9
Service	21	MTech.	1
Research	26	MTech.	2
Service	28	BTech.	10
Consultancy	40	MTech.	14
Research	35	Ph.D.	10
Research	27	BTech.	6
Service	32	MTech.	9
Consultancy	45	Btech.	17
Research	36	Ph.D.	7

PART-III Elective II- Software Design and Architecture Laboratory	
1	Design and draw various UML diagrams (Use case, state, activity, sequence, deployment) in open source tool(any) for software system of your choice.
2	Install and configure Jboss application server as open source application as well as web server and deploy sample JSP pages on It.
3	Design and implement 3 tier web application using JSP/Servlet/JDBC/JMS for reuirements in assignment 1 and deploy it on server configure in assigmnet no.3.
4	Write java script code for assignment no 4 for validation of various fields of display pages as part of client side validation.
5	Write program in EJB 3.0 in assignment no. 4 as part of middleware business login and deploy it on application server installed in assignment no. 3.
PART-III Elective II-Information Storage Retrieval Lab	
1	To implement Conflation Algorithm using File Handling
2	To implement single pass algorithm for clustering.
3	To implement a program Retrieval of documents using inverted files.
4	To implement a program for feature extraction in 2D colour images (any features like colour, texture etc
5	To implement a simple Web Crawler in Java.
6	Extract features from input image and plot histogram for the features.
7	Write a program to recommend a product / learning course based on person preferences / education details.
8	Consider set of 25 to 30 documents on 5 to 7 distinct topics. Define 5 queries and map the document that will be retrieved for every query. Write a program using any algorithm to retrieve documents. Evaluate the algorithm using all evaluation methods.
9	Case study on Image retrieval for ADAS (Advanced Driver Assistance System) (Here students are expected to research the topics like Lane Change Assist (LCA), Driver Drowsiness and inattentiveness, Lane Change Assist, Automatic Parking, ACC etc.)

Internship (ITA32175A)

Teaching Scheme
Credits : 8
Lectures /Week: -Hrs /week
Practical's/week : 16 Hrs /week

Examination Scheme
Formative Assessment : 50 Marks
Summative Assessment :50 Marks

Course Objective:

1. Apply existing knowledge in similar or new situations
2. Acquire new engineering knowledge and skill
3. Understand importance of life learning processes through internship experiences.

Course Outcomes:

After completion of the course, student will be able to

1. Apply the existing engineering knowledge in similar or new situations
2. Have ability to identify when new engineering knowledge is required, and apply it
3. Understand the lifelong learning processes through critical reflection of internship experiences.

The preferred duration of an Engineering internship is 3 months, full-time placement with an related industry/organization/consultancy work etc.

Continuous Assessment of Performance During Internship:

During the internship semester, the organization with whom the student is undertaking the internship programme conducts periodic assessments of the intern's progress, performance and achievements.
Students are required to submit progress report of internship as per schedule and being in constant touch with the respective Guide. At least two presentations and report should be submitted to VIIT, Pune.

In order to ensure that the internship remains meaningful, Guide of the respective student from VIIT, Pune will maintains close contact with organizations/ Industry/Consultancy etc.

Summative Assessment:

After completion of the program, the student submits a detailed report of his internship experience and makes a presentation of the same at VIIT, Pune.

Value added Course (ITUA32175B)

Teaching Scheme :
Credits: 8
Lectures's / Week: 4Hrs/week
Practical's / Week: 12Hrs/week

Examination Scheme
Formative Assessment: 50
Summative Assessment: 50

Course Objectives:

- Study of new technology in the field of course

Course Outcomes:

After completion of the course, student will be able to

1. Exposure to state of art technology in the respective field of course
2. Have an in-depth knowledge about the subject chosen as value added course.

1.	CSUA32175B1	User Interface Technology
2.	CSUA32175B2	Software Testing
3.	CSUA32175B3	Cyber Security
4.	CSUA32175B4	CCNA
5.	ITUA32175B	Oracle
6.	IE32175B1	General Studies for Indian Services and National Service Scheme
7.	IE32175B2	National Service Scheme and Social Entrepreneurship
8.	IE32175B3	Social Enterprise and Entrepreneurship

Department has to select at least one module out of four modules provided. Department can select more than one module also. Set of suggested assignments is provided. Each student must perform 5 to 10 assignments and at least one mini-project provided in each module. Instructor should frame set of mini projects or guide students to frame the problem statement of mini-project by sticking to technologies in respected module.

Term Work will be based on assignments be carried out by students and Oral Examination will be based on Mini-Project demonstration and related skill learned ONLY.

User Interface Technology (CSUA32175B1)

Unit I – UI Design
HTML5: What is HTML5 - Features of HTML5 – Semantic Tags – New Input Elements and tags - Media tags (audio and video tags) – Designing Graphics using Canvas API - Drag and Drop features – Geolocation API - Web storage (Session and local storage). CSS3: What is CSS3 –Features of CSS3 – Implementation of border radius, box shadow, image border, custom web font, backgrounds - Advanced text effects(shadow) - 2D and 3D Transformations - Transitions to elements - Animations to text and elements
Unit II - Responsive Web Design (RWD)
Responsive Design: What is RWD – Introduction to RWD Techniques – Fluid Layout, Fluid Images and Media queries- Introduction to RWD Framework Twitter Bootstrap – Bootstrap Background and Features - Getting Started with Bootstrap - Demystifying Grids – OffCanvas - Bootstrap Components - JS Plugins - Customization
Unit III – Introduction to JavaScript
Introduction - Core features - Data types and Variables - Operators, Expressions and Statements - Functions & Scope - Objects - Array, Date and Math related Objects - Document Object Model - Event Handling –Browser Object Model - Windows and Documents - Form handling and validations. Object-Oriented Techniques in JavaScript - Classes – Constructors and Prototyping (Sub classes and Super classes) – JSON –Introduction to AJAX.
Unit IV - Introduction to jQuery
Introduction – jQuery Selectors – jQuery HTML - Animations – Effects – Event Handling – DOM – jQuery DOM Traversing, DOM Manipulation – jQuery AJAX
Unit V – Introduction to Server-side JS Framework
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 VI - Introduction to TypeScript
TypeScript : Introduction to TypeScript – Features of TypeScript – Installation setup – Variables – Datatypes – Enum – Array – Tuples – Functions – OOP concepts – Interfaces – Generics – Modules – Namespaces – Decorators – Compiler options – Project Configuration
UNIT VII: Introduction to Client-side JS Framework – Basics of Angular
UNIT VII: Introduction to Client-side JS Framework – Basics of Angular
Introduction to Angular 4.0 - Needs & Evolution – Features – Setup and Configuration – Components and Modules – Templates – Change Detection – Directives – Data Binding - Pipes – Nested Components Template Driven Forms - Model Driven Forms or Reactive Forms - Custom Validators - Dependency Injection - Services - RxJS Observables - HTTP - Routing

Software Testing (CSUA32175B2)

Unit I – Software Testing Introduction
In this, you learn about Importance of testing. Why Testers need industry, software program/application/product: meets the business and technical requirements that guided its design and development works as expected. What is testing? Importance of testing , Roles and Responsibilities ,Principles of software testing ,What is Quality? , How much testing is enough? ,Differences between Manual and Automation Testing
Unit II - Software Testing Methodologies
In this, you learn about deferent types of software testing. Software Testing Methodology is defined as strategies and testing types used to certify that the application under test meets client expectations. White Box Testing, Black Box Testing, And Grey Box Testing.
Unit III – Test Case Design Techniques
In this, you learn design test cases in such a way that we get the maximum coverage using an optimal set of Test cases. Focus on highlighting the various Methods and Techniques in designing test cases for both Black Box Testing and White Box testing. **Static Techniques:** Informal Reviews ,Walkthroughs .Technical Reviews ,Inspection **Dynamic Techniques:** **Structural Techniques :**Statement Coverage Testing ,Branch Coverage Testing ,Path Coverage Testing ,Conditional Coverage Testing ,Loop Coverage Testing **Black Box Techniques :**Boundary Value Analysis ,Equivalence Class Partition ,State Transition Technique ,Cause Effective Graph ,Decision Table ,Use Case Testing ,E **Experienced Based Techniques**: Error guessing ,Exploratory testing
Unit IV - Levels of Testing
In this, you learn about levels of testing are frequently grouped by where they are added in the software development process, or by the level of specificity of the test. **Functional Testing :** Unit Testing ,Integration Testing ,System Testing ,User Acceptance Testing , Sanity/Smoke Testing , Regression Test ,Retest. **Non Functional Testing :** Performance Testing, Memory Test ,Scalability Testing ,Compatibility Testing, Security Testing ,Cookies Testing , Session Testing ,Recovery Testing, Installation Testing , Adhoc Testing, Risk Based Testing,I18N Testing. ,L1ON Testing.,Compliance Testing.
Unit V : Software Testing Life Cycle
In this , learn about in detail description of Test Life Cycle, importance of Test Plan roles and responsibilities of Test Manager, Test Lead, Test Engineer, **Requirements Analysis/Design :**Understand the requirements ,Prepare Traceability Matrix **Test Planning :**Object, Scope of Testing , Schedule, Approach ,Roles & Responsibilities,

Assumptions, Risks & Mitigations ,Entry & Exit Criteria ,Test Automation, Deliverables.

Test Cases Design : Write Test cases , Review Test cases ,Test Cases Template , Types of Test Cases ,Difference between Test Scenarios and Test Cases.

Test Environment setup : Understand the SRS ,Hardware and software requirements ,Test Data

Test Execution: Execute test cases, Defect Tracking and Reporting, Types of Bugs, Identifying the Bugs, Bug/Defect Life Cycle. ,Reporting the Bugs, Severity and priority ,Tools: TFS, JIRA and TFS/MTM

Test Closure : Criteria for test closure , Test summary report

Test Metrics What is Test Measurements?, Why Test Metrics? , Metric Life Cycle. , Types of Manual Test Metrics.

Unit VI - Software Automation Testing Tools

Various tools can be used for automation testing −PERL/Unix,HP Quick Test Professional ,Selenium, IBM Rational Functional Tester, SilkTest, TestComplete, Testing Anywhere, WinRunner , LoadRunner ,Visual Studio Test Professional, WATIR

- CA- ARD and TDM

Cyber Security (CSUA32175B3)

Unit I – Introduction to Cyber Security
Basics of Computer Networks Security: Essential Terminology, Elements of Information Security, Types of Hackers, Steps for Ethical hacking, Types of Attacks, Steganography, Cryptography, Nice 2.0 Framework to be used as the guiding principle for Cyber Security
Unit II - Information Gathering Techniques
Active information gathering, passive information gathering, Trace route, Interacting with DNS Servers, SNMP and SMTP attacks. Port Scanning, Target Enumeration and Port Scanning Techniques: Scanning for Open Ports and Services, Types of Port Scanning, Firewall/IDS Evading Techniques
Unit III – Vulnerability Assessment
Vulnerability Assessment: Vulnerability Scanners and How Do They Work, Pros and Cons of a Vulnerability Scanner, Vulnerability Assessment with Nmap, Nessus.
Unit IV - Network Sniffing and Remote Exploitation
Introduction, Types of Sniffing, ARP Protocol Basics, ARP Attacks, Denial of Service Attacks, Man in the Middle Attacks. Remote Exploitation **:** Understanding Network Protocols: TCP,UDP,ICMP, Server Protocols: FTP,HTTP,SMTP using Wireshark
Unit V – Wireless Hacking and Web Hacking
Cracking a WEP Wireless Network, Attacking the Target, SQL Injection attack
Unit VI - Advance topic
Information Security (IS) within Lifecycle Management **:** Lifecycle management landscape, Security architecture processes, Security architecture tools, Intermediate lifecycle management concepts. Mobile and IOT Hacking Concepts
Text Books : 1. Rafay baloch, "Ethical hacking and Penetration Testing guide", CRC press, 2015, ISBN: 13: 978-1-4822-3162-5 (eBook - PDF) 2. Nina Godbole, SunitBelapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY Publications, 2015, ISBN:978-81-265-2179-1.
Reference Books : Matt Walker, "CEH Certified Ethical Hacker", Mc Graw Hill Publications, 2014, ISBN: p/n 978-0-07-183645-6

CCNA(CSUA32175B4)

Unit I – Introduction to Network
Explore the network, Configure a Network Operating System, Network Protocols and Communication, Network Access, Ethernet, Network Layer, IP Addressing, Sub netting IP Networks, Transport Layer, Application Layer, Building a Small Network
Unit II - Routing and Switching Essentials
Routing Concepts, Static Routing, Dynamic Routing, Switched Networks, Switch Configuration, VLAN, Access Controlled Lists, DHCP, NAT for IPv4
Unit III – Scaling Networks
LAN Design, Scaling VLANs, STP, EtherChannel and HSRP, Dynamic Routing, EIGRP, EIGRP Tuning and Troubleshooting, Single area OSPF, Multi area OSPF, OSPF Tuning and Troubleshooting.
Unit IV - Connecting Networks
WAN Concepts, Point to Point connections, Branch connection, ACL, Network Security and Monitoring, Quality of Service, Network Evolution, Network Troubleshooting
List of assignments (Project Based Learning (PBL) approach):- 1. Configuration of initial Switch setting using using secure Passwords and SSH. 2. Implementation of basic connectivity in a small network. 3. Identify MAC and IP addresses. 4. To examine the ARP table 5. Implementation of wireless LAN 6. Study of Basic router configuration and introduction of iOS. 7. To design subnets as per given requirement 8. To investigate Unicast, Multicast and Broadcast Traffic. 9. To configure VLANs and implement TRUNKs for a given LAN. 10. To implement static NAT for a given networking topology. 11. To configure SSH and implement switch port security for all the switches given in LAN. 12. Configuration and testing of IPv4 and IPv6 interfaces on the routed network 13. Configuration and Testing of static and dynamic routing. (IPv4 and IPv6) 14. Configuration of routed network using RIP and OSPF. 15. Configuration of DHCP on routed network. 16. Configuration of Wireless network with wireless security techniques. 17. To map a network using CDP protocol. 18. Network analysis as well as packet header study with the help of any protocol analyzer/ packet sniffer.(eg: wireshark) 19. Installation and Configuration of Remote Login Service Telnet/SSH and access it through

Telnet/SSH client

20. Installation and Configuration of FTP server and access it through FTP Client

Text Books :

1. Andrew S. Tanenbaum, ―Computer Networks‖, PHI, ISBN 81-203-2175-8.

2. Routers and Routing Basics CCNA 2 Companion Guide- Webdell Odom, Rick McDonald

3. Behrouz A. Forouzan,"TCP-IP protocol suite ", Tata McGraw Hill Edition, 2nd edition, 2003, ISBN: 978007060004

Reference Books :

1. CCNA Routing and Switching 200-125 Official Cert. Guide Library

2. Cisco CCNA Command Guide- An introductory Guide for complete beginners

Oracle (ITUA32175B)

Prerequisites : NIL

Course objectives :

- Understand the basics of Relational Databases
- Update database content with SQL and transaction handling
- Retrieve data from single or multiple tables
- Process data with row and aggregate functions
- Manipulate data with correlated and no correlated sub queries
- Apply views to break down problems and enhance security

Course Outcomes :

After completion of the course, student will be able to :

1. To design and implement a database schema for a given problem-domain
2. To understand the relational and document type database systems.
3. To populate and query a database using SQL DML/DDL commands
4. Learn programming, management, and security issues of working with PL/SQL program units, Programming topics will include the built-in packages that come with Oracle, the creation of triggers, and stored procedure features

Unit I – Introduction

Limiting Rows Using a Selection, Using the WHERE Clause, Character Strings and Dates, Comparison Conditions , Using Comparison Conditions, Other Comparison Conditions , BETWEEN Condition, IN Condition, LIKE Condition, NULL Conditions, Sorting by Multiple Columns

Unit II - Single Row Functions

SQL Function: Case Manipulation Functions, Using Case Manipulation Functions, Character-
Function with Numbers, Using the TO_NUMBER and TO_DATE Functions Manipulation Functions , Using the Character-Manipulation Functions, Number Functions, Using the ROUND Function, Using the TRUNC Function, Using the MOD Function, Working with Dates, Arithmetic with Dates, Using Arithmetic Operators with Dates, Date Functions, Using Date Functions.

Conversion Functions: Implicit Data Type Conversion ,Explicit Data Type Conversion
Using the TO_CHAR Function with Dates ,Elements of the Date Format Model, Using the TO_CHAR Function with Dates, Using the TO_CHAR, RR Date Format, Example of RR Date Format, Nesting Functions,

General Functions : NVL Function, Using the NVL Function, Using the NVL2 Function, Using the NULLIF Function, Using the COALESCE Function, Conditional Expressions, The CASE Expression:
Using the CASE Expression, The DECODE Function, Using the DECODE Function

Aggregating Data Using Group Functions: Group by and Having clause.

Unit III – Advanced Sub queries

What Is a Sub query? Sub queries, Using a Sub query, Multiple-Column Sub queries, Column Comparisons, Pairwise Comparison Sub query, No pairwise Comparison Sub query, Using a Sub query in the FROM Clause, Scalar Sub query Expressions,
Scalar Sub queries: Examples Correlated Sub queries , Using Correlated Sub queries, Using the EXISTS Operator, Using the NOT EXISTS Operator, Correlated UPDATE, Correlated DELETE, The WITH Clause, WITH Clause: Example
Hierarchical Retrieval, Sample Data from the EMPLOYEES Table, Natural Tree Structure

Unit IV - Part I: Programming in PL/SQL

PL/SQL Program Structure: Conditional and Sequential Control, IF Statements CASE Statements and Expressions, The GOTO Statement , The NULL Statement ,Iterative Processing with Loops :The Simple Loop, The WHILE Loop, The Numeric FOR Loop, The Cursor FOR Loop, Loop Labels, Tips for Iterative Processing
PL/SQL Program Data: Working with Program Data, Naming Your Program Data ,Overview of PL/SQL Data types , Declaring Program Data, Programmer-Defined subtypes, Conversion Between Data types, Strings, Numbers, Records, Collections, Miscellaneous data types
Exception Handlers- Exception-Handling Concepts and Terminology, Defining Exceptions
Raising Exceptions , Handling Exceptions, Building an Effective Error Management Architecture
Making the Most of PL/SQL Error Management
SQL in PL/SQL: Data Retrieval -Cursor Basics, Working with Implicit Cursors, Working with Explicit Cursors, BULK COLLECT, SELECT ... FOR UPDATE, Cursor Variables and REF CURSORs, Cursor Expressions

Unit V – Procedures, Functions, and Parameters

Procedures, Functions, Parameters, Local Modules, Module Overloading, Forward Declarations
Advanced Topics
Triggers: DML Triggers, DDL Triggers, Database Event Triggers, INSTEAD OF Triggers
AFTER SUSPEND Triggers, Maintaining Triggers

Unit VI - Packages

Why Packages? Rules for Building Packages, Rules for Calling Packaged Elements, Working with Package Data, When to Use Packages, Packages and Object Types.

Lab assignments :
SQL **Assignments**
EMPLOYEES(EMPLOYEE_ID,FIRST_NAME,LAST_NAME,EMAIL,PHONE_NUMBER,HIRE_DATE,JOB_ID,SALARY)

DEPARTMENTS(DEPARTMENT_ID,DEPARTMENT_NAME,MANAGER_ID,LOCATION_ID)

JOB_GRADES(GRA,LOWEST_SAL,HIGHEST_SAL)

1)Create a query to display all the data from the EMPLOYEES table.Separate each column by a comma.Name the column THE_OUTPUT.

2)a) Display the last names of all employees where the third letter of the name is an a.

b) Display the last name,job and salary for all employees whose job is sales representative or stock clerk and whose salary is not equal to $2,500,$3,500, or $7,000.

3)Write a script to display the employee last name,job and hire date for all employees who started between a given range.Concatenate the name and job together,separated by a space and comma, and label the column Employees.In a separate SQL script file,use the DEFINE command to provide the two ranges.Use the format MM/DD/YYYY.Save the script files as lab7_3a_sql and lab7_3b.sql.

DEFINE low_date = 01/01/1998

DEFINE high_date = 01/01/1999

4) Populate the MY_EMPLOYEE table with the second row of sample data from the preceding list.This time,list the columns explicitly in the INSERT clause.

5) Write a query that displays the employee's last names with the first letter capitalized and all

other letters lowercase, and the length of the names, for all employees whose name starts with J, A, or M. Give each column an appropriate label. Sort the results by the employees' last names.

6) For each employee, display the employee's last name, and calculate the number of months

between today and the date the employee was hired. Label the column MONTHS_WORKED.

Order your results by the number of months employed. Round the number of months up to the

closest whole number.

7) Write a query that produces the following for each employee: <employee last name> earns <salary> monthly but wants <3 times salary>. Label the column Dream Salaries.

8) Create a query to display the last name and salary for all employees. Format the salary to be 15

characters long, left-padded with $. Label the column SALARY.

9) Display each employee's last name, hire date, and salary review date, which is the first Monday

after six months of service. Label the column REVIEW. Format the dates to appear in the format similar to "Monday, the Thirty-First of July, 2000."

10) Display the last name, hire date, and day of the week on which the employee started. Label

the column DAY. Order the results by the day of the week starting with Monday.

11) Create a query that displays the employees' last names and commission amounts. If an

Employee does not earn commission; put "No Commission." Label the column COMM.

12) 12. Create a query that displays the employees' last names and indicates the amounts of their

Annual salaries with asterisks. Each asterisk signifies a thousand dollars. Sort the data in descending order of salary. Label the column EMPLOYEES_AND_THEIR_SALARIES.

13) Using the DECODE function, write a query that displays the grade of all employees based on the

value of the column JOB_ID, as per the following data:

Job Grade

AD_PRES A

ST_MAN B

IT_PROG C

SA_REP D

ST_CLERK E

None of the above 0

Revision of Joins

1)Display the employee last name and department name for all employees who have an *a* (lowercase) in their last names. Place your SQL statement in a text file

2)Write a query to display the last name, job, department number, and department name for all employees who work in Toronto.

3)Display the employee last name and employee number along with their manager's last name and manager number. Label the columns Employee, Emp#, Manager, and Mgr#, respectively.

4) To display all employees including King, who has no manager. Order the results by the employee number

5) Create a query that displays employee last names, department numbers, and all the employees who work in the same department as a given employee. Give each column an appropriate label.

6) Show the structure of the JOB_GRADES table. Create a query that displays the name, job,

department name, salary, and grade for all employees.

7) Create a query to display the name and hire date of any employee hired after employee Davies.

8) Display the names and hire dates for all employees who were hired before their managers, along with their manager's names and hire dates. Label the columns Employee, Emp Hired, Manager, and Mgr Hired, respectively.

Aggregate Functions

1) Display the highest, lowest, sum, and average salary of all employees. Label the columns

Maximum, Minimum, Sum, and Average, respectively. Round your results to the nearest whole

number.

2) Modify above query Modify the query to display the minimum, maximum, sum, and average salary for each job type.

3) Write a query to display the number of people with the same job.

4) Determine the number of managers without listing them. Label the column Number of

Managers

5) Write a query that displays the difference between the highest and lowest salaries. Label the

column DIFFERENCE.

6) Display the manager number and the salary of the lowest paid employee for that manager.

Exclude anyone whose manager is not known. Exclude any groups where the minimum salary is $6,000 or less. Sort the output in descending order of salary.

7) Write a query to display each department's name, location, number of employees, and the

average salary for all employees in that department. Label the columns Name, Location, Number of People, and Salary, respectively. Round the average salary to two decimal places.

If you want an extra challenge, complete the following exercises:

8) Create a query that will display the total number of employees and, of that total, the number of

employees hired in 1995, 1996, 1997, and 1998. Create appropriate column headings.

9) Create a matrix query to display the job, the salary for that job based on department number,

and the total salary for that job, for departments 20, 50, 80, and 90, giving each column an

appropriate heading.

Sub Queries

1) Write a query to display the last name and hire date of any employee in the same department as Zlotkey. Exclude Zlotkey.

2) Create a query to display the employee numbers and last names of all employees who earn more

than the average salary. Sort the results in ascending order of salary.

3) Write a query that displays the employee numbers and last names of all employees who work in

a department with any employee whose last name contains a *u*.

4) Display the last name, department number, and job ID of all employees whose department location ID is 1700.

5) Display the last name and salary of every employee who reports to King.

6) Display the department number, last name, and job ID for every employee in the Executive

department. If you have time, complete the following exercises:

7) Write a query that displays the emplomyee numbers and last names of all employees who work in

a department with any employee whose last name contains a *u*.Modify it to display the employee numbers, last names, and salaries of all employees who earn more than the average salary and who work in a department with any employee with a *u* in their name.

PL/SQL Assignments

1) Create an anonyms block to output the phrase "My PL/SQL Block Works" on the screen.

2) Create a PL/SQL block that selects the maximum department number in the DEPARTMENTS table and stores it in an *iSQL*Plus* variable.Print the results to the screen.Save your PL/SQL block in a file named p3ql.sql by clicking the Save Script button.Save the script with a .sql extension.

3) Create a PL/SQL block that updates the location ID for the new department.Save your PL/SQL block in a file named p3ql.sql by clicking the Save Script button.Save the script with a .sql extension.

a) Use an *iSQL*Plus* variable for the department ID number that you added in the previous assignment.

b) Use the DEFINE command to provide the location ID.Name the new location ID 1700.

DEFINE p_deptno =280

DEFINE p_loc = 1700

c) Pass the value to the PL/SQL block through a *iSQL*Plus* substitution variable.Test the PL/SQL block.

d) Display the department that you updated.

4) Create a PL/SQL block that rewards an employee by appending an asterisk in the STARS column for every

$ 1000 of the employee's salary.

a) Use the DEFINE command to provide the employee ID.Pass the value to the PL/SQL block through a *iSQL*Plus* substitution variable.

DEFINE p_empno = 104

b) Initialize a v_asterisk variable that contains a NULL.

c) Append an asterisk to the string for every $1000 of the salary amount.For example,if the employee has a salary amount of $8000,the string of astrisks should contain eight astrisks.If the employee has a salary amount of $12500,the string of astrisks should contain 13 asterisks.

d) Update the STARS column for the employee with the string of asterisks.

e) Test the block for the following values :

DEFINE p_empno = 174 DEFINE p_empno = 176

5) Create a PL/SQL block that does the following:

a) Use the DEFINE command to provide the department ID.Pass the value to the PL/SQL block through a *iSQL*Plus* substitution variable.

b) In a loop use the *iSQL*Plus* substitution parameter and gather the salaries of the salaries of the top *n* people from the EMPLOYEES table.There should be no duplicationin the salaries.If two employees earn the same salary,the salary should be picked up only once.

c) Store the salary in the TOP_DOGS table.

6) Create a PL/SQL block that does the following:

a) Use the DEFINE command to provide the department ID.Pass the value to the PL/SQL block through a *iSQL*Plus* substitution variable.

b) If the salary of the employee is less than 5000 and if the manager ID is either 101 or 124,display the message <<last_name>> Due for a raise.Otherwise,display the message <<last_name>> Not due for a raise.

6) In a loop,use a cursor to retrive the department number and the department name from the DEPARTMENTS table for those departments whose DEPARTMENT_ID is less than 100.Pass the department number to another cursor to retrive from the EMPLOYEES table the details of employee last name.,job,hire date and salary of those employees whose EMPLOYEE_ID is less than 120 and who work in that department.

7) Write a PL/SQL block to select the name of the employee with a given salary value.

a) Use the DEFINE command to provide the salary.

b) Pass the value to the PL/SQL block through a *iSQL*Plus* substitution variable. If the salary entered returns more than one row, handle the exception with an appropriate exception handler and insert into the MESSAGES table the message "More than one employee with a salary of < salary>".

c) If the salary entered returns only one row, insert into the MESSAGES table the employee's name and the salary amount.

d) Handle any other exception with an appropriate exception handler and insert into the MESSAGES table the message "some other error occurred."

8) Create a procedure called QUERY_EMP to query the EMPLOYEES table, retrieving the salary and job ID for an employee when provided with the employee ID.

a) Create a procedure that returns a value from the SALARY and JOB_ID column for a specified employee ID.

Use host variables for the two OUT parameters salary and job ID.

b) Compile the code, invoke the procedure to display the salary and job ID for employee ID 120.

c) Invoke the procedure again,passing an EMPLOYEE_ID of 300.What happens and why?

9) Create a function called ANNUAL_COMP to return the annual salary by accepting two parameters:an employee's monthly salary and commision.The function should address NULL values.

a)Create and invoke the function ANNUAL_COMP,passing in values for montly salary and commision.Either or both values passed can be NULL,but the function should still return an annual salary,which is not NULL.The annual salary is defined by the basic formula:

(salary * 12) + (commission_pct * salary * 12)

b) Use the function in a SELECT statement against the EMPLOYEES against the EMPLOYEES table for department 80.

10) Suppose you have lost the code for the NEW_EMP procedure and the VALID_DEPTID function that you created in lesson 10.

Create an *iSQL*Plus* spool file to query the appropriate data dictionary view to regenerate the code.

To spool the output of the file to a .sql file from *iSQL*Plus*,select the Save option for the Output and execute the code.

11)Create a package with suitable example

Bansilal Ramnath Agarwal Charitable Trust's

Vishwakarma Institute of Information Technology, Pune-48

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Department of Information Technology

General Studies for Indian Services and National Service Scheme

(IE32175B1)

Course objectives

This course will lead to the learning of

- To inculcate & improve the understanding about general studies knowledge and analytical qualities which required for various technical & non-technical competitive exams.
- To foster the student's social work identity including professional use of supervision and consultation, self-awareness.
- To prepare students with critical thinking skills in various areas of practice, research, and aware them about various social work programs.

Course Outcomes

On completion of the course, student will be able to :

1. Able to develop better understanding about importance of ongoing Current events and general studies knowledge required for various competitive exams.
2. Comprehensive understanding of various concepts of economy, history, our country's constitutional system & its significance.
3. Understand for environmental issues relevant to engineering industry and its impact on society through engineering prospect as future technocrat.
4. Understand the community in which they live & work to gain skills in mobilizing community participation for the purpose of finding practical solutions to individual and community problems.
5. Understanding and awareness about various health habits and importance of fitness for successful life style through yoga technique.

Unit I – Indian History & Geography

History of India (with special reference to Maharashtra) and Indian National Movement.
Maharashtra, India and World Geography- Physical, Social, Economic Geography of Maharashtra, India and the World.

Unit II - Indian Political System & Governance

Constitution, Political System, Panchayati Raj Institutions, Urban Governance, Public Policy, Rights issues, various constitutional and non-constitutional agencies etc

Unit III – Indian Economy

Economic and Social Development - Sustainable Development, Poverty, Inclusion, Demographics, Social Sector initiatives, etc., Banking system and financial transaction techniques.(Including Digital)

Unit IV - Environmental Studies & Current Affairs

Current events of state, national and international importance. General issues on Environmental Ecology, Bio-diversity and Climate Change

Unit V – Introduction To NSS & Village Adoption Program

Orientation and structure of NSS: The history of NSS, Objectives, Symbol and meaning, NSS hierarchy from national to college level, Roles and responsibility of various NSS functionaries.

Definition and importance of Life Competencies: Four aspects of development – Physical, Mental, Social, and Moral, Qualities of constructive leadership, Rapport building with community and role of leadership.

Degeneration of value system, family system, Gender issues ,Regional imbalance, Problems of Rural areas,

Approaches and strategies in adopting a village with special reference to involving people participation in N.S.S. Activities, Govt. and Non-Government agencies (NGO), political and village leadership for effective implementation of N.S.S. program and activities in adopted villages.

Unit VI – Health, Hygiene, Sanitation & Yoga

Definition, need and scope of health education, Food and nutrition, Safe Drinking water ,water Borne Diseases and sanitation (**Swachh Bharat Abhiyan**),National health program, Reproductive Health, HIV Different Yoga Traditions and Their impact, Yoga as a tool for healthy Lifestyle

Text Books :

1. Modern Indian History by Rjiv Ahir, Spectrum Publication
2. Indian Polity by M. Laxmikant
3. Indian Geogrphy Majjid Husain
4. Rural Housing: Policies and Practices by Bhaskar Majumder
5. TISS : Training Programme on National Programme Scheme.

Reference Books

1. Imagining India : Nandan Nilkani
2. I do What I do : Dr. Raghuram Rajan
3. An Uncertain Glory: India and its contradictions: Dr. Amratya Sen.
4. Indian Economy by D.D.Basu
5. Rural Sociology: Dr. Desai A.R. , Ellis Horowitz,
6. Fundamentals of Data Structures: Sartaj Sahni ,Computer Science Press.

Introduction to Social work: Chowdhry Paul

Social Enterprise and Entrepreneurship (IE32175B2)

Course objectives

This course will lead to the learning of

1. Acquiring Entrepreneurial spirit and resourcefulness
2. Familiarization with various uses of human resource for earning dignified means of living
3. Understanding the concept and process of entrepreneurship -its contribution in and role in the growth and development of individual and the nation
4. Acquiring entrepreneurial quality, competency and motivation
5. Learning the process and skills of creation and management of entrepreneurial venture

Course Outcomes

On completion of the course, student will be able to :

1. Understand the concept of Entrepreneurship
2. Assess how entrepreneurship can help shape one's career
3. Differentiate between various types of entrepreneurs
4. Identify different and your own personality type to become an entrepreneur
5. Appreciate the role of global and Indian innovations in entrepreneurial ventures

Unit I – Entrepreneurship -What, Why and How

Entrepreneurship –Concept, Functions, Need and Importance, Why Entrepreneurship For You, Myths about Entrepreneurship, Pros and Cons of Entrepreneurship, Process of Entrepreneurship, Startup and its stages, Entrepreneurship –The Indian Why be an Entrepreneur, Types of Entrepreneurs ,Competencies and characteristics: Ethical Entrepreneurship ,Entrepreneurial Values, Attitudes and Motivation ,Mindset of an employee and an entrepreneur difference , Intrapreneur: Importance in any organization Scenario

Unit II - Entrepreneurship Journey

Self-Assessment of Qualities, Skills, Resources and Dreams., Generation of Ideas., Business Ideas vs. Business Opportunities, Opportunity Assessment –Factors, Micro and Macro Market Environment, Feasibility Study , Business Plan Preparation, Execution of Business Plan ,Role of networking in entrepreneurship

Unit III – Entrepreneurship as Innovation and Problem Solving

Entrepreneurs -as problem solvers., Innovations and Entrepreneurial Ventures –Global and Indian, New Industries of New Age Economy, Role of Technology –E-commerce and Social Media, Social Entrepreneurship as Problem Solving-Concept and Importance, Risk Taking-Concept; types of business risks

Unit IV - Understanding the Market

Business Idea and Concept, Types of Business: Manufacturing, Trading and Services,Stakeholders: sellers, vendors and consumers and Competitors. Market Research -Concept, Importance and Process, Market Sensing and Testing, Business Model, Proof of Concept, Pricing and Factors affecting pricing. , Launch Strategies after pricing and proof of concept

Unit V – Introduction to Social Entrepreneurship

Profile of social entrepreneurs, Create your own profile of a social entrepreneur, Grounding in social entrepreneurship, Typology of ventures, Definitional disputes.Creating social change: The social value proposition and identifying a social business opportunity, Seizing social business opportunities, Social entrepreneurship profiles, Community asset mapping, Profile of a social entrepreneur: Dr.

Venkataswamy, Aravind Eye Institute, India. Understanding poverty: The Sustainable Development Goals, The critical need to alleviate poverty, Ecosystem approach, The role of cooperatives in addressing poverty, Profile of a social organization: Grameen Bank. Profile of a social organization: IDEO, The role of mind mapping in creating solutions, Empowerment model: Partnering with targeted community.

Unit VI – The Business model: Creating a social business model

The role of the business model in starting a social venture, Equitable distribution of value, The role of the business model: The business model canvas, Social business model framework, Profile of a social entrepreneur: Husk Power Systems, Business model canvas exercise, Business model execution failure. Sustainable funding sources: Earned income, Profile of a social entrepreneur: Furniture Resource Centre, Traditional funding sources, Social investment funding sources, Investing in a social venture, Relationship building with donors and investors

Text Books :

1. Udyamita (in Hindi) by Dr. MMP. Akhouri and S.P Mishra, pub. By National Institute for Entrepreneurship and Small Business Development (NIESBUD), NSIC-PATC Campus, Okhla
2. Everyday Entrepreneurs - The harbingers of Prosperity and creators of Jobs - Dr. Aruna Bhargava.

Reference books:

1. Udyamita Samachar Patra (Monthly, Hindi), Pub. By centre for Entrepreneurship Development, M.P. (CEDMAP), 60 Jail Road, Jhangerbad, Bhopal-462008.
2. Science Tec. Entrepreneur (A Bi Monthly Publication), centre for Enterprenurship Development, M.P (CEDMAP), 60 Jail Road, Jhangerbad, Bhopal - 462008

Project Work (Any Three): 1)Visit and report of Industry 2)Case Study 3)Field Visit 4)Learn to earn 5) Business Plan design

National Service Scheme and Social Entrepreneurship(IE32175B3)

Course objectives

This course will lead to the learning of

- To equip social workers with generalist knowledge, values, and skills and to prepare competent professionals for entry level social work practice.
- To prepare social workers who understand and values social and economic justice while also respecting and appreciating diversity.
- To foster the student's social work identity including professional use of supervision and consultation, self-awareness.
- To prepare students with critical thinking skills in areas of practice, research, and ethics to help ensure success in graduate social work programs.
- Developing creative solutions to address social problems.
- Learning the process and skills of creation and management of social entrepreneurial venture.

Course Outcomes

On completion of the course, student will be able to :

1. understand the community in which they work to gain skills in mobilising community participation
2. identify the needs and problems of the community and involve them in problem-solving
3. develop among themselves a sense of social and civic responsibility
4. utilise their knowledge in finding practical solutions to individual and community problems
5. Identify innovative solution for identified problems
6. Appreciate the role of global and Indian innovations in social entrepreneurial ventures.

Unit I – Introduction to NSS and development of Life competencies

Orientation and structure of NSS, The history of NSS, Objectives, Symbol and meaning, NSS hierarchy from national to college level, Roles and responsibility of various NSS functionaries. Definition and importance of Life Competencies, Four aspects of development – Physical, Mental, Social, and Moral, Qualities of constructive leadership, Rapport building with community and role of leadership

Unit II - Basic social issues in India and Benefits of Village adoption programme

Degeneration of value system, family system, Gender issues ,Regional imbalance, Problems of Rural areas, Approaches and strategies in adopting a village with special reference to involving people participation in N.S.S. Activities, Govt. and Non Government agencies, political and village leadership for effective implementation of N.S.S. programme and activities in adopted villages

Unit III – Health, Hygiene and Sanitation

Definition, need and scope of health education, Food and nutrition, Safe Drinking water ,water Borne Diseases and sanitation(Swachh Bharat Abhiyan),national health programme, Reproductive Health

Unit IV - Youth Health and Yoga

Healthy Lifestyles, Aids, HIV, Drugs, Substance abuse, Home Nursing, First aid, Different Yoga Traditions and Their impact, Yoga as a tool for healthy Lifestyle

Unit V – The Business model: Creating a social business model

Profile of social entrepreneurs, Create your own profile of a social entrepreneur, The role of the business model in starting a social venture, Equitable distribution of value, The role of the business model: The business model canvas, Social business model framework, Profile of a social entrepreneur: Husk Power Systems, Business model canvas exercise, Business model execution failure.

Unit VI – Funding social ventures: Strategies for success

Sustainable funding sources: Earned income, Profile of a social entrepreneur: Furniture Resource Centre, Traditional funding sources, Social investment funding sources, Investing in a social venture, Relationship building with donors and investors.

Text Books :

1.Rural Housing: Policies and Practices by Bhaskar Majumder | 1 December 2007
2. Singh Surendra and Srivastava S. P. (ed) 2005), Social Work Education in India, Challenge and opportunities, New Royal Book Publications, Lucknow.
3. Bornstein, D. and Davis, S., *Social Entrepreneurship: What Everyone Needs to Know* (Oxford, Oxford University Press, 2010)

Reference Books :

1. Dr. Desai A.R. : Rural Sociology in India
2. Siddiqui, H.Y.2015, Social Work and Human Relations,Rawat Publications, Jaipur.
3. Raising the Bar : Integrity and Passion in Life and Business: The Story of Clif Bar, Inc., By Gary Erickson

Students will work on a particular problem at the respective area.

i) Plantation of trees, their preservation and upkeep

(ii) Creation of NSS parks/gardens.
(iii) Construction & maintenance of village streets, drains, etc. so as to keep the environment clean;
(iv) Construction of sanitary latrines etc.
(v) Cleaning of village ponds and wells;
(vi) Popularization and construction of Gobar Gas Plants, use of non-conventional energy;
(vii) Environmental sanitation and disposal of garbage & composting;
(viii) Prevention of soil erosion, and work for soil conservation,
(ix) Watershed management and wasteland development

(x) Organic farming

SOCIAL ENTREPRENEURSHIP

(i) Visit and report of Industry or Case Study of the startup associated with the problem identify

(ii) Identifying possible solutions and analyzing them

(iii) Design a business Plan