



Bansilal Ramnath Agarwal Charitable Trust's

Vishwakarma Institute of Technology

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Structure & Syllabus of

Master In Computer Applications

Pattern 'B20/C20'

Effective from Academic Year 2020-21

Prepared by: - Board of Studies in Information Technology

Approved by: - Academic Board, Vishwakarma Institute of Technology, Pune

Signed by

Chairman – BOS

Chairman – Academic Board

Master in Computer Applications Structure (applicable w.e.f. AY 20-21)**Index**

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Master in Computer Applications Structure (applicable w.e.f. AY 20-21)**SY MCA Module -III (B20 Pattern)**

Subject head	Course code	Course name	Contact hours per week			Credits
			Theory	Lab	Tut	
S1	IT8001	Optimization Techniques	3	-	-	3
S2	IT8002	C++ And Core Java Programming	3	2	-	4
S3	IT8003	Computer Networks	3	2	-	4
S4	IT8004	Software Engineering	3	2	-	4
S5	IT8005	Python Programming	1	4	-	2
	IT8106	Design And Innovation -3	2	2	-	3
		Total	15	12	0	20

SY MCA Module -IV (B20 Pattern)

Subject head	Course code	Course name	Contact hours per week			Credits
			Theory	Lab	Tut	
S1	IT8008	Advanced Java Programming	3	4	-	5
S2	IT8009	Design And Analysis Of Algorithms	3	2	-	4
S3	IT8012	Software Project Management	2	2	-	3
S4(Elective)	IT8215	Cloud Computing	3	-	-	3
	IT8014	Organizational Behavior	3	-	-	
S5	IT8107	Quantitative Techniques	2	2		3
	IT8111	Design And Innovation -4	-	-		3
		Total	16	10		21

Syllabus Template
IT8001::Optimization Techniques

Credits: 3**Teaching Scheme Theory: 3 Hours/Week****Course Prerequisites: Basic Mathematics****Course Objectives:**

- To formulate mathematical models of business problems.
- To learn effective project management and planning of resources.
- To make optimal utilization of resources.
- To reduce logistic costs of the supply chain.
- To understand formulation of optimal strategies in a conflict and competitive environment.
- To understand the significance and methods of inventory management.

Course Relevance:

This course is widely applicable in software and manufacturing industries to improve productivity and quality.

Course Relevance:

SECTION-1
<p>Topics and Contents</p> <p>Linear Programming :Essentials of Linear Programming Model, Properties of Linear Programming Model, Formulation of Linear Programming, General Linear Programming Model, Maximization & Minimization Models, Graphical Method for Solving Linear Programming problems, Unbounded LP Problem, Additional Variables Used In Solving LPP, Maximization Case, Minimization Problems, Big M Method, Degeneracy in LP Problems, Unbounded Solutions in LPP, Multiple Solutions in LPP.</p> <p>CPM/PERT:PERT/CPM Network Components, Rules in Constructing a Network, Scheduling of Activities: Earliest Time and Latest Time, Determination of Float and Slack Times, Critical Path method for project management, Project Evaluation Review Technique – PERT, Gantt chart(time chart). Terminology.</p> <p>Sequencing and Queuing: Types of Sequencing Problems, Algorithm for Solving Sequencing Problems, Processing n jobs through 2, 3, m machines. Processing 2 jobs through m machines, Characteristics of Queuing Systems, Poisson and Exponential Distributions, Symbols and Notations, Single server Queuing Model, Two servers Queuing Model.</p>

SECTION-I

Topics and Contents

Transportation: General Mathematical model of transportation problem, The transportation algorithm, Method of finding initial solution: North west corner method, Least cost method, Vogel's Approximation method, Test for optimality: MODI method, Variation in transportation problems.

Game Theory: Terminologies of game theory, Two-person-zero-sum-game, Game with pure strategy, Methods of solving game with mixed strategy, Dominance Property, Graphical method for $2 \times n$ and $m \times 2$ games. Linear Programming approach for games theory,

Inventory Management: Inventory Control Models: Purchase model with instantaneous replenishment with and without shortages, calculate EOQ, classification of inventory like ABC-Always, Better, Control, FSN –Fast, Slow and non-Moving, VED -Vital, Essential, Desirable etc

List of Course Seminar Topics:(any 6)

1. Formulation of Linear Programming
2. Simplex Method of solving LPP problem.
3. Primal To dual with example and solution of problem
4. Degeneracy in LP Problems
5. Big M method
6. CPM/PERT
7. Sequencing-Processing n jobs through 2, 3 machines
8. Processing 2 jobs through m machines
9. Queuing

List of Course Group Discussion Topics:(any 6)

1. Comparison of Transportation -N-W Corner method and Least cost cell method.
2. Transportation-MODI method
3. Transportation-VAM method.
4. Two-person-zero-sum-game, Game with pure strategy.
5. Methods of solving game with mixed strategy.
6. Inventory-Purchase model with instantaneous replenishment with shortages and without s shortages.
7. Discuss inventory classification techniques
8. Comparative analyses of purchase models

List of Home Assignments:**Design:**

1. Design network activity diagram using CPM for construction work of building.
2. Design network activity diagram using CPM for a research work.
3. Design a transportation model using VAM –Vogel's Approximation method.
4. Design optimal strategies for two players-Zero sum game.
5. Design mathematical model for a business problem.

Case Study:

1. Write a case study on goal programming for an It start up company.
2. Case study on project crashing of a software development company.
3. Write a case study on special cases in linear programming.
4. Write a case study on project management.
5. Write a case study to improve a sales of a manufacturing company.
6. Write a case study on classification of inventory.

Blog

1. Optimization Techniques-A quantitative perspective to decision making.
2. The methodology to solve optimization problems.
3. Write a blog on non-linear programming
4. Write a blog on applications of Optimization Techniques.
5. Write a blog on Linear Programming approach for games theory.

Surveys:

1. Take the survey of applications of linear programming.
2. Take the survey of different transportation models transportation.
3. Take survey inventory classification models.

Suggest an assessment Scheme:

1. *Home Assignment*
2. *MCQ*
3. *Quiz*
4. *Seminar*
5. *Group Discussion*
6. *Viva*

Text Books: (As per IEEE format)

1. Kanti Swarup, Gupta P.K., Man Mohan, "Operations Research", 12th Edition; Sultan Chand & Sons, New Dehli.
2. R. Panneerselvam, "Operations Research", 2nd Edition, PHI Learning Private Ltd New Dehli.
3. Taha H A Operation Research and Introduction 9th Edition Pearson Education 2014
4. Gupta & Hira Operations Research Revised Edition Chand & Co. 2007

Reference Books: (As per IEEE format)

Reference Books: (As per IEEE format)

1. Billy E. Gillett, "A Computer – Oriented Algorithmic Approach", 1979 Edition, Tata McGraw - Hill Publications Company Ltd., New Dehli.
2. Hiller Lieberman, "Introduction to Operations Research", 7th Edition; Tata McGraw-hill publishing Company Ltd., New Dehli
3. S.D. Sharma Operations Research 15th Edition Kedarnath, Ramnath & Co
- J K Sharma Operations Research 3rd edition Laxmi Publications 2009

Moocs Links and additional reading material:

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1. www.nptelvideos.in
2. <https://www.youtube.com/watch?v=Q2dewZweAtU>
3. <https://www.youtube.com/watch?v=8IRgDoV8Eo>
4. <https://www.youtube.com/watch?v=h0bdo06qNVw>

Course Outcomes:

The student will be able to –

1. Develop linear programming models to solve real life business problems.
2. Analyze Critical path using CPM and PERT.
3. Use sequencing and queuing techniques for effective scheduling of jobs.
4. Solve transportation problems using various methods.
5. Compute the value of the game using pure / mixed strategies and accordingly device optimal strategies to win the game.
6. Learn various models and techniques of inventory management.

CO PO Map

CO attainment levels CO1-3, CO2- 3, CO3-4, CO4-4, CO5-5, CO6-5
Future Courses Mapping: Operation Research, Operations management, Supply Chain management
Job Mapping: Operation Research Analyst, Inventory manager, Project manager, Operation research engineer.

Syllabus Template**IT8002:: C++ and Core Java programming****Course Prerequisites: C (Any programming language)****Course Objectives:**

1. The Students are expected to learn the basics of C++ programming and Core java programming
2. The course is designed to let students learn object oriented concepts like polymorphism, inheritance, exception handling
3. The Student will learn C++ concepts of Generic functions and generic classes.
4. The Student will learn C++ concepts of STL and RTTI.
5. The Student will learn the Implementation of Java Applet

Credits: 4**Teaching Scheme Theory: 3 Hours/Week****Lab: 2 Hours/Week****Course Relevance:**

This is an important and basic course for in the field of Information Technology. It gives knowledge of object oriented programming. C++ and core java course is taught in practical GOAL oriented way. C++ plays quite an integral role in modern times as many contemporary systems such as operating systems, web browsers, databases, etc. have C++ code in at least some part of their codebase. This course engages students and introduces to object-oriented programming concepts, terminology, and syntax, and the steps required to create c++ and basic Java programs.

SECTION-1**C++ Polymorphism, inheritance and exception handling**

Introduction to Object Oriented Programming: Procedural Vs Object Oriented Programming, Basics and Application of C++, Functions: Inline Function, Default Arguments , Const Arguments, Function Overloading, Friend Function. Classes: C++ Program with class, Arrays of Objects, Object as Function Arguments, Friendly Functions, Returning Objects, Constructor: Parameterized Constructor, Multiple Constructor in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, types of Constructor. Operator Overloading, Overloading Unary and Binary Operator. Static Data Members and static member Functions, Manipulating of String Using Operators, overloading operator using friend.

Inheritance in C++: Single Inheritance, Hierarchical Inheritance, Multiple Inheritance ,

Virtual Base Classes, Abstract Classes, Constructor in Derived Classes, Nesting of Classes. Multilevel Inheritance, Hybrid Inheritance., Nested Namespaces, Unnamed Namespaces, Namespace Aliases.. **Namespace:** *Introducing Namespaces, Referring to Members of a Namespace, The using namespace Statement, Defining A Namespaces.*

Exception handling, STL in C++: *The try Block, the catch Exception Handler, The throw Statements, The try/throw/catch sequence, Exception Specification, Unexpected Exception, Catch – All Exception Handlers, Throwing an exception from handler, Uncaught Exception .Introduction to Standard Template Library, STL Programming Model, Sequence, Container Adapter, Integrator, Algorithms, Predicates, Allocators.*

SECTION-II

Advance C++ and core java programming

Topics and Contents

Advance concepts of C++: *Template: Generic Function, A function with Two Generic Data Types, Explicitly Overloading a Generic Function, Overloading a Function Template, Using Standard Parameter with Template, Functions, Generic Function Restriction, Generic Sort, Generic Classes, An Example with Two Generic Data Types, Using Non-Type Arguments with Generic, Class, Using Default Arguments With Template New-Style Casts, Runtime Type Information(RTTI). Dynamic_cast , Static_cast ,Reinterpret_cast, Const_cast.*

Introduction to core java : *Difference between Java and C language, difference between Java and C++.Object Oriented concepts with respect to Java-Data abstraction, encapsulation, Class and Object, inheritance, polymorphism, Java Programming – Data types, variables, operators, control statements, Arrays, Programs based on class, methods, constructor, Inheritance, Interfaces, Packages. Exception Handling – Exception types, try, catch, throw, throws, finally, creating own exceptions.*

JAVA I/O, APPLET & AWT: *Java I/O classes and interfaces, File, Byte Streams, Character Streams, File handling exercise, Applets specific methods & Related HTML references, Creating an Applet, Displaying it using Web Browser and with appletviewer.exe, Advantages and Disadvantages of Applet Vs Application, Abstract Windows Toolkit- Components and Graphics, Containers, Frames and Panels, Layout.*

List of Practicals: (Any Six)

1. .Program for calculate area of square & other function to calculate area of circle overload these two function. Function parameter accept from user (Use function Overloading concepts).
2. Operator overloading-I Write a class Complex containing members as m_real and m_imag. Overload binary +, binary -, unary -, ++ and – operators
Operator overloading-II Write a class cString and overload assignment ,insertion

and extraction operators for it. Design a C ++ class string to overload < and > operator

3. Inheritance

- Single Inheritance Derive class cWageEmployee from cEmployee. Multiple Inheritance Derive class cWageEmployee , cManager from cEmployee .Create two derived classes called test-containing marks of two subjects & other derived class called result calculates result of the student. Use multilevel Inheritance.
- Virtual base class concept Write a c++ program for display the result of the student as a class student accept roll no of the student, class test accept marks of the two subjects, in class sports accept student's sports marks. All the information of the above classes display in the result class. Use virtual base class concept. Pure virtual base class Write a c++ program for calculate area of circle & rectangle. Create class shape & two other classes circle & rect. Use pure virtual class function concept

4. Program for unstructured Exception:

- divide by zero
- Array index out of bounds exception
- Null pointer Exception
- Using structured exception handlings catch these exceptions.

5. Template function & Namespace Write program for bubble sort using template and namespace. Template class Write program for linked stack using template.

6. Java basic programmes

Display area and volume of different shapes(Use class, object, constructor, overloading)using java

Display bank account information(Use interface and inheritance using java)

Read content of one file and write it into other file.

Display student mark sheet (Use package in java)

Write a program to illustrate following exceptions

- a) ArithmeticException b) ArrayIndexOutOfBoundsException
- c) NullPointerException d) IllegalAccessException

6. Create one form to read student information(Use applet, layout managers and all possible controls)

Write a program to illustrate card layout manager.

List of Projects:

- Hangman Game Project
- Tower of Hanoi
- Personal Diary Management System
- Casino Number Guessing Game
- Snake and Ladder Game Project
- Phonebook Application
- Quiz Game
- School Billing System

- Snake Game
- Tic-Tac-Toe Game
- Scientific calculator
- Income tax calculation
- Quiz software
- Data structures using c++
- Online voting system
- Tetris game
- Kon Banega Crorepati (KBC) Quiz
-

List of Course Seminar Topics:

- C++ Polymorphism
- STL In c++
- Generic classes and generic functions
- C++ vs Java features
- C vs c++ features
- Types of constructors

List of Home Assignments:**Design:**

- Design system for Supermarket Billing
- Design system for Student Record System
- Design system for Telecom Billing System
- Design system for Banking System
- Design system for Telephone Billing System
- Design system for Telephone Directory System
- Design system for Library
- Design system for Railway Reservation System
- Design system for Salary Management
- Design system for Student Management

Suggest an assessment Scheme:***1.Home Assignment******2.MCQ******3.LAB-Course Assignment******4. Course Project******5. CVV.***

Text Books: (As per IEEE format)
1.Herbert Schildt, C++: The Complete Reference, Fourth Edition, Tata McGraw-Hill, 2003. ISBN 0-07-053246-X. 2.“Java 2 Complete Reference”, Patric Naughton, Herbert Schildt ISBN-0070495432.
Reference Books: (As per IEEE format)
1.Robert Lafore, Object Oriented Programming in C++, Fourth Edition, Tech Media, 2002. ISBN 0-672-32308-7. 2.Core Java 2 Volume – I, Cay S Horstmann, Fary Cornell ,ISBN-0130894680. 3.E.Balguruswami , Programming with Java, A Primer, ISBN-0070617139. 4.Dustine R Callway , Inside Servlets, ISBN-9788131715451. 5.Core Java 2 Volume – II, Cay S Horstmann, Fary Cornell ,ISBN-0131118269 .
Moocs Links and additional reading material: www.nptelvideos.in
Course Outcomes: 1.To implement polymorphism using c++. 2.To Apply the concepts of data encapsulation , inheritance, and polymorphism using c++. 3.To incorporate exception handling in object-oriented programs. 4.Understand advanced concepts like template classes and RTTI . 5.To design a computer program to solve real world problems using java based on object-oriented principles. 6.Develop Java based solution for real world problem.
CO PO Map CO1 – PO1 CO2 - PO3 CO3 – PO5 CO4 – PO8 CO5 – PO9 CO6 – PSO1
CO attainment levels CO1 - 3 CO2 - 3 CO3 - 2 CO4 - 4 CO5 - 4 CO6 - 3

Future Courses Mapping: <i>Advance java programming</i>
Job Mapping: <i>C++ and java programming languages are base for most of programming related jobs.</i>

Syllabus Template**IT8003::Computer Networks**

Course Prerequisites: Computer Fundamentals and C/C++ or Python Programming Language

Course Objectives:

1. The Students are expected to learn the basics of Computer network Technologies which will help them to build Network fundamentals.
2. The course is designed to let students demonstrate an understanding of the fundamentals of types of transmission mediums and interfacing standards along with the current edge of the data communication techniques.
3. The Student will learn flow control and error control techniques and Computer Network protocols at Conceptual level.
4. The Students will learn to implement the client Server Architecture as the current Internet needs.
5. The Student will learn the Implementation of application levels protocols.

Credits: 4

Teaching Scheme Theory: 3 Hours/Week

Lab: 3 Hours/Week

Course Relevance:

The curriculum of the program is divided into the theoretical and practical study. The Students will understand and explore the basics of Computer Networks and Various Protocols. After completion of this course the students will be in a position to understand the World Wide Web concepts. The Students will learn to administrate a network and flow of information further students can understand easily the concepts of Socket Programming.

SECTION-1

Topics and Contents

Modulation techniques: Principle of amplitude modulation, modulation index and percentage of modulation, Single sideband communication, ISB modulation, frequency modulation principle, phase modulation, AM vs FM, pulse code modulation, delta modulation, **Multiplexing:** Introduction, FDM, TDM, WDM, **Transmission media:** guided, unguided **Reference Models:** OSI and TCP/IP, Mathematical derivation for amplitude and frequency modulation **Design Issues: Error Detection and correction**, CRC, Examples on Checksum, Stop-and- Wait protocol, Sliding Window protocols, **HDLC**, **Point-to-Point-Access (PPP):** Frame format, Transition states, PPP Stack: LCP, NCP, **Channel allocation:** Static and Dynamic allocation, Multiple Access Protocols: ALOHA, CSMA, Collision-free and limited-contention protocols, **WDM**, **Ethernet:** Cabling, MAC sublayer protocol, Logical link control, Wireless LAN, Broadband wireless, Bluetooth, . SLIP, SONET, MPLS, Switched, fast

and Gigabit Ethernet, network devices

SECTION-II

Topics and Contents

Design Issues of Network layer: Packet switching, Connectionless and Connection-oriented Services, Virtual Circuit and Datagram Subnets, **IP addressing:** Class-full, CIDR, Subnetting, super-netting, **IP protocols:** ARP, RARP protocol, **Shortest path and widest path Routing algorithms:** Bellman-Ford algorithm, Dijkstra's algorithm, Distance vector routing, link state routing, routing loops, Counting to infinity problem, split horizon, routing protocols, RIP, OSPF, BGP, IPv4, IPv6, ICMP, IGMP, Mobile IP, DHCP, Router architecture, IP packet format, Multicast and broadcast routing, Congestion Control and QOS: General Principles, Congestion prevention policies, Load shading, Jitter Control, Quality of Service, Services and service primitives, **Elements of Transport protocol:** Addressing, Connection establishment and release, flow control and buffering, Multiplexing, Crash recovery, **UDP: Introduction, TCP: Introduction, Model, protocol, header, connection establishment and release, connection management Transmission policy, congestion control, timer management, RPC, Introduction to wireless TCP and UDP, Socket programming, Domain Name System (DNS) and DNS servers, Electronic Mail:** Architecture and services, MIME, SMTP, **Mail Gateways, Remote login, File Transfer Protocol, World Wide Web:** Introduction, Architectural overview, static and dynamic web pages, HTTP, LDAP, Browser Architecture, SNMP, wireless web

List of Practicals: (Any Six)

1. Setup a wired LAN using Layer 2 Switch and then IP switch of minimum four computers.
2. Write a Program with following options to transfer 1.Character separated by space 2.One Strings at a time 3.One Sentence at a time
3. Write a program for error detection and correction for 7/8 bits ASCII codes using CRC.
4. Write a program for error detection and correction for 7/8 bits ASCII codes using Hamming Codes
5. Write a program to simulate Go back N Mode of Sliding Window Protocol in peer to peer mode
6. Write a program to simulate Selective Repeat Mode of Sliding Window Protocol in peer to peer mode
7. Write a program using TCP socket for wired network to Say Hello to Each other
8. Write a program using TCP socket for wired network to Transfer a file.

9. Write a program using TCP socket for wired network to Implement Arithmetic and Trigonometry Calculator.
10. Write a program using UDP Sockets to enable file transfer (Script, Text, Audio and Video one file each) between two machines.

List of Projects:

1. Prepare and analyze following packet formats captured through Wireshark for wired networks. 1. Ethernet 2. IP 3. TCP 4. UDP
2. Prepare TCP and UDP packets using header files and send the packets to destination machine in peer to peer mode
3. Configure RIP/OSPF/BGP using Packet Tracer.
4. Use network simulator NS2/Cisco Packet Tracer to implement: Monitoring traffic for the given topology.
5. Use network simulator NS2/Cisco Packet Tracer to implement: Analysis of CSMA and Ethernet protocols
6. Use network simulator NS2/Cisco Packet Tracer to implement: Network Routing: Shortest path routing, AODV.
7. Use network simulator NS2/Cisco Packet Tracer to implement: Analysis of congestion control (TCP and UDP).
8. Create a client server network using TCP sockets for wired network to implement Peer to Peer Chat
9. Create a client server network using TCP sockets for wired network to implement Multi User Chat
10. Write a program using UDP sockets for wired network to implement Peer to Peer Chat
11. Write a program using UDP sockets for wired network to implement Multi User Chat

Note for all the Projects: Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.)

List of Course Seminar Topics:

1. Modulation techniques
2. Multiplexing
3. Transmission media:
4. Reference Models
5. Design Issues of Data Link Layer
6. Error Detection and correction Techniques
7. Flow Control Protocols
8. HDLC, Point-to-Point-Access (PPP):
9. Channel allocation
10. Ethernet

List of Course Group Discussion Topics:

1. Mobile IP
2. TCP/IP Model
3. Mobile IP
4. Congestion Control and QoS
5. Wireless Technology for Short range and long range
6. Application Protocols and its security
7. IP Protocols
8. Data Communication Issues in IP Networks and Solutions to it
9. Congestion control in hybrid networks
10. Issues in Real time Audio and video transmission protocol.
11. IPV6

List of Home Assignments:**Design:**

1. Design the procedure to configure TCP/IP network layer services.
2. Simulation of Routing Protocols using NS2.
3. Simulation of FTP based Protocols using CISCO packet Tracer/ NS2
4. Simulation of Congestion Control Protocols Using NS2/Cisco Packet Tracer.
5. Simulation of Application layer Protocols(Any two)

Case Study:

1. Study of Various VPNs
2. Iot Solutions to Current Network Requirement
3. Solutions for Broadcast System
4. Study of short term and long term wireless Technology
5. Issues in real time transmission of audio and video data.

Blog

1. Communication Protocol
2. Emerging Trends in Computer Networks
3. Use of IOT in Networks
4. Cloud based Network Solutions for real world problems
5. Recent Trends in Computer Security

Surveys

1. Survey of wireless Technologies
2. Survey of Congestion control methodologies
3. Survey of Bluetooth Technology
4. Survey of Virtual Private Networks
5. Survey of ADHOC Networks

Suggest an assessment Scheme:

Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

Home Assignment

MCQ

Quiz

Seminar

Group Discussion

LAB-Course Assignment and Project Evaluation

Text Books: (As per IEEE format)

1. James F. Kurose, and Keith W. Ross," A Top-Down Approach," 4th edition ,Publisher: Addison-Wesley ISBN: 0-321-49770-8
2. Behrouz A. Forouzan (Fourth Edition), "Data Communication and Networking", Tata McGraw Hill
3. Andrew S. Tanenbaum, "Computer Networks" (Fifth Edition), Pearson Education

Reference Books: (As per IEEE format)

1. Kurose, Ross —Computer Networking a Top Down Approach Featuring the Internet, Pearson; 6th edition (March 5, 2012), ISBN-10: 0132856204
2. Holger Karl and Andreas Willig, —Protocols and Architectures for Wireless Sensor Network, Wiley, ISBN: 0-470-09510-5
3. C. Siva Ram Murthy and B. S. Manoj, —Ad Hoc Wireless Networks: Architectures and Protocols, Prentice Hall, 2004

Moocs Links and additional reading material:

1. www.nptelvideos.in
2. <https://www.my-mooc.com/en/categorie/computer-networking>
3. www.udemy.com

Course Outcomes: <ol style="list-style-type: none">1. Understand various modulation techniques, network architecture, topology and essential components to design computer networks.2. Implement reliability issues based on error control, flow control and pipelining by using bandwidth, latency, throughput and efficiency.3. Design mechanisms to demonstrate communication server channel allocation in wired and wireless computer networks4. Analyze data flow between peer to peer in an IP network using Application, Transport and Network Layer Protocols5. Demonstrate sustainable engineering practice indicating the scientific purpose and utility of communication frameworks and standards.6. Implement Client-Server System and prototypes by the means of correct standards, protocols and technology.
CO PO Map
CO attainment levels CO1 - 2 CO2 - 3 CO3 - 3 CO4 - 4 CO5 - 5 CO6 - 5
Future Courses Mapping: <ul style="list-style-type: none">● Network Security And Information System● Internet Of Things● Cloud Computing And Security
Job Mapping: <ul style="list-style-type: none">● Network Engineer● System Engineer (IT and Computer Networking)● Software Engineer● Technical Support Engineer● Network Administrator● Information Technology Manager

IT8004: Software Engineering**Course Prerequisites: Nil****Course Objectives:**

1. To learn fundamental knowledge of Software Engineering, to be successful professional in the IT/ITES Sector
2. To understand and exhibit professional and ethical principles of Software Engineering while functioning as members, leaders of multi-disciplinary teams
3. To analyze project knowledge area activities to determine a basis of successful project execution
4. To interpret and diagnose impact of changing project requirements using an appropriate principle, processes and produce specific sections of the project plan used to manage change requests
5. To design and document Project Management practices with international standards

Credits: 4**Teaching Scheme Theory: 3 Hours/Week****Lab : 2 Hours/Week****Course Relevance:**

Software Engineering is a field that is vitally important to Computer Technology as a whole; rather, it is a backbone of any software product development. This scientific and technically-driven field has always focus on implementation of the best processes and methodologies in the production of high-quality software. It develops problem understanding and designing ability, as well as analytical and problem solving ability amongst learner. The purpose of this course is to present Software Engineering as a body of knowledge. The course is designed to learn and experience Software Engineering concepts, principles in parallel with umbrella activities and demonstrate knowledge with real life problem statements.

<p style="text-align: center;">SECTION-1 Software Engineering Foundations</p>
<p>Topics and Contents</p> <p>Professional software development: Software engineering ethics, Software process : Software process models, Process activities, Coping with change, The rational unified process, Requirement Engineering: Functional and non-functional requirements, The software requirements document, Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management, Architectural design, Architectural design decisions, Architectural views, Architectural patterns, Application architectures, Software reuse, The reuse landscape, Application frameworks, Software product lines, Commercial-Off-the-Shelf (COTS) product, Component-based software engineering, Distributed software engineering, Aspect-oriented software engineering, Agile Development Process: Agile Development: Agile manifesto, agility and cost of change, agility principles, myth of planned development, toolset for the agile process. Extreme Programming: XP values, process, industrial XP, SCRUM -process flow, scrum roles, 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.</p>
<p style="text-align: center;">SECTION-II Fundamentals of Project Management</p>

Topics and Contents

Introduction to Project Management: Project overview, Project Attributes, The Triple Constraint, Concept of Project Management, Project Stakeholders, **Project Life Cycle:** Project Pre-Initiation and Initiation, Project Planning, Project Execution, Project Monitoring and Controlling, Project Closing. Project Management Knowledge Areas, Project Management Tools and Techniques, The Role of the Project Manager, Project Manager Job Description, Suggested Skills for Project Managers, The Project Management Process Groups, **Project Knowledge Areas:** Integration Management, **Scope Management :** Creating the Work Breakdown Structure, Approaches of developing Work Breakdown Structures, Time Management, **Cost Management :** Basic Principles of Cost Management, Estimating Costs, Types of Cost Estimates, Cost Estimation Tools and Techniques, Parameters of Quality Management, **Quality Standards :** ISO/IEC, IEEE related to Project Management activities, Project Human Resource Management, Essentials of Project Communications Management, **Risk Management :** Identifying risks, Qualitative Risk Analysis , Quantitative Risk Analysis, RMMM Plan, Procurement Management

Guidelines for Lab Work:

- A. Form the group of 3 students (strictly) from the concerned laboratory batch.
- B. Identify client in any domain you are comfortable e.g. Healthcare, Education, Retail, Automobile...
- C. The group shall retain the evidence of requirement collection in form of video, survey forms, questionnaire etc.
- D. The group shall combine all the requirements to finalize the boundary of the system.
- E. The group may select any project from given project list or identify any other project with consent of faculty conducting this lab course.

List of Practical's: (Any Six)

1. Prepare a problem statement on the basis of strategies adopted for requirement collection. For collection of requirements, the group shall personally or virtually interact with identified users / client and prepare draft of requirement document.
2. Perform Problem Analysis with thorough study of the problem: define objectives, scope. Analyze deliverables. Identify functional and non-functional requirements.
3. Capture requirements in an unambiguous manner in order to facilitate communication between stakeholders using IEEE Std.830-1998.
4. Specify the detailed project plan using prescribed format of IEEE Std 1058-1998
5. Draw Work Breakdown Structure (WBS) and Gantt Chart for identified problem statement using JIRA
6. Perform estimation of effort using Function Point Analysis (FPA)
7. Visit www.github.com. Register yourself. Identify new problem statement and develop a prototype for the same.
8. With reference to practical no. 7, perform cost estimation using estimation technique.
9. Create Proof of Concept (POC) for an idea using following steps :
 10. a. Step 1: Prove the Need
 11. b. Step 2: Map Pain Points to Solutions and Get Feedback
 12. c. Step 3: Prototype Your Solution and Test
 13. d. Step 4: Create a Minimum Viable Product
 14. e. Step 5: Design a Roadmap
15. Study of Continuous Integration, Continuous Deployment - CICD Pipeline

List of Projects:

1. Educational Networking Tool for College Students
2. Canteen Automation System
3. Automated College Timetable Generator
4. Academic feedback system
5. Institute Administration System
6. Automated Question Paper generation
7. Resume/ Profile Builder
8. Campus Recruitment and Analysis
9. Aptitude and Technical Test (MCQ) Management & Analysis
10. Result Processing and Transcript Generation
11. Household Inventory
12. Quality Assurance Monitoring in a small-scale industry
13. Computerized Personnel Appraisal
14. Information System in a Grocery Business
15. Information System for Small Business Enterprise
16. Purchase Processing
17. Elderly Care and Monitoring
18. Personality Test and Domain Analyzer
19. Event Management
20. Housing Society Management

List of Course Seminar Topics:

1. Analysis and Selection of Process Model to be adopted
2. Requirement Engineering: An Art & Science
3. Selection of appropriate methodologies for Requirement Collection
4. Understanding requirements via notations and diagrams
5. Importance of Functional, Non-Functional, Domain Requirements from Testing Perspective
6. Deciding parameters for finalization of boundary of requirements
7. Commercial-Off-the-Shelf (COTS) product
8. Methods adopted for user analysis
9. Identification of essential Non Functional Requirements
10. Analysis of Domain Requirements to finalize requirements boundary

Guidelines for Group Discussion:

Forming a group of 5 students shall be strictly based on students with different course project of Software Engineering laboratory. Each student must be well aware about the course projects of group members. Various topics listed below will be available in form of chits in a box at the time of group discussion. One of the group members will pick up the topic chit from shuffled chit box. Participation of each group member in group discussion is mandatory since assessment is individual.

List of Course Group Discussion Topics:

1. Stakeholder Analysis and Role of Stakeholders
2. Relevance of implementation of Triple Constraints
3. WBS and Work Assignment in team
4. Ways to handle Change Management Issues
5. Identification of minimum five possible potential risks when system is under construction and steps to reduce these risks
6. Issues to be addressed during Change Management
7. Analysis of project failures
8. Importance of Project Management documents from Quality Assurance perspective
9. Project Risk Identification and Risk Assessment with Startups - Challenges & Solutions
10. Styles of Agile Software development

List of Home Assignments:**Design:**

1. You want to monitor the efforts spent and the time spent on different activities of the project. Can it be possible by using MS Excel? The design should be such that automated processing is possible.
2. During the semester you are developing your course project. Assume that, you are supposed to handover this system to the client at the end of the semester. Design a document comprising instructions and guidelines.
3. After an application is installed (course project) at client side, it is necessary to provide training to the users. Design stage wise training program for the users along with stage wise feedback forms at various stages of training
4. During the semester you are developing your course project. Perform cost estimation techniques of identified course project.
5. While using your application, clients/users may give you some changes. Document this change and predict its effect on existing application.

Case Study: (The detailed case will be provided to the groups on email) Analyze:

1. What went wrong?
2. Risks associated with identified problem(s)
3. Effect of identified risks on existing work completed
4. Estimate time required to solve the issue
5. Change in documents created

Blog:

1. Agile Development
2. SCRUM
3. Extreme Programming (XP)
4. Importance of documentation in total development process
5. Professional certifications in domain of Software Engineering

Surveys:

1. Recent trends in Software Engineering
2. Recent trends in Project Management
3. Quality standards required essential for software product
4. Software Development Process Audits
5. Software Design Engineering

Suggest an assessment Scheme: (Scheme 5)

	MSE	ESE	GD	Seminar	HA
Actual Marks	30	30	100	100	100
Weightage (%)	25	25	10	20	20

Text Books: (As per IEEE format)

1. Somerville, Ian, "Software Engineering", 9th Edition., Addison Wesley
2. Pressman Roger, "Software Engineering: A Practitioner's Approach", 7th Edition, McGraw Hill
3. Bob Hughes, Mike Cotterell ,Rajib Mall, " Software Project Management",6th Edition, McGraw Hill
4. Joseph Phillips, "IT Project Management –On Track From Start to Finish", Tata Mc Graw-Hill

Reference Books:

1. Pankaj Jalote; Software Engineering A Precise Approach; 2010; Wiley India
2. Rajib Mall; Fundamentals of Software Engineering; Third Edition; PHI
3. Robert K. Wysocki; "Effective Software Project Management"; O'Reilly

Moocs Links and additional reading material:

1. www.nptelvideos.in
2. www.coursera.com
3. www.udemy.com
4. swayam.gov.in

Course Outcomes: After successful completion of course, the learner will be able to:

1. Understand processes of professional software development
2. Apply appropriate lifecycle model of software development
3. Analyze software requirements by applying various modeling techniques
4. Understand IT project management through project life cycle and knowledge areas
5. Apply time and cost estimations to predict project activities
6. Analyze risk assessment activities towards development of quality product

CO PO Map:**CO1:****CO2: PO2****CO3: PO3****CO4: PO10****CO5: PO6****CO6: PO6****CO attainment levels:**

Programme Outcomes												Program Specific Outcomes			
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
	2	3		3	3				2					3	

Future Courses Mapping:

1. Software Project Management
2. Software Quality Assurance

Job Mapping:

Business Analyst , Application Developer, Web Developer, Information Systems Engineer, Software Engineering Associate, System Administrator, Project Management Professional, Data Scientist, Full Stack Developer, Python Developer, Java Developer, Cloud Engineer, Scrum Master, Technical Writer

IT8005: Python Programming

Course Prerequisites: Fundamental knowledge about basic Programming, Object oriented programming

Course Objectives:

1. Better understanding of different datatypes used in python.
2. Get better understanding of different types of control structures.
3. Use different data structures for different problem domains.
4. Apply different object oriented features for solving real world problems.
5. Develop different web based applications.

Credits: 2**Teaching Scheme Theory: 1 Hours/Week****Lab: 4 Hours/Week****Course Relevance: Object oriented Programming, Web Programming****SECTION-1****Topics and Contents**

Introduction to Python Installation and Working with Python Understanding Python variables Python basic Operators Understanding python blocks Python Data Types Declaring and using Numeric data types: int, float, complex Using string data type and string operations Defining list and list slicing Use of Tuple data type Python Program Flow Control Conditional blocks using if, else and elif Simple for loops in python For loop using ranges, string, list and dictionaries Use of while loops in python Loop manipulation using pass, continue, break and else Programming using Python conditional and loops block, Functions in Python

SECTION-II**Topics and Contents**

Python Functions, Modules And Packages Organizing python codes using functions Organizing python projects into modules Importing own module as well as external modules Understanding Packages Powerful Lambda function in python Programming using functions, modules and external packages, Python File Operation Reading config files in python Writing log files in python Understanding read functions, read(), readline() and readlines() Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming using file operations, Class in Python, Exception handling in Python, Sql lite database connectivity, Django Framework, Sample application.

List of Practicals: (Any Six)

1. Python Program for factorial of a number.
2. Python Program to find largest element in an array
3. Python program to find second largest number in a list
4. Generating random strings until a given string is generated
5. Program to create grade calculator in Python
6. Reverse each tuple in a list of tuples
7. Develop programs to learn concept of functions scoping, recursion and list mutability.
8. Develop programs to understand working of exception handling and assertions.
9. Develop programs for Bank customers having attributes like name, accno, balance. Each customer can perform operations like deposit, display details, withdraw, update.
10. Create a database for students having attributes like Rollno, Name, Class, Marks of 3 subjects. Perform different operations.
11. Develop chat room application using multithreading.
12. Develop a web based application using Django framework.

List of Projects:

1. Password Generator
2. Stop Watch
3. Shop Billing System
4. Notepad
5. Contact Management
6. Hotel Management
7. Web Scrapping of any website like BookMyShow
8. Game (Rock, Paper, Ceaser)
9. Tik Tak Toi Game
10. Music Player
11. Dice Rolling Simulator
12. Currency converter app using python

Suggest an assessment Scheme:

Assessment Component	Continuous Assessment	Course Project	Viva Voce
Marks	30	40	30

Text Books: (As per IEEE format)

1. Mark Lutz ,”Learning Python”, O Reily, 4thEdition, 2009, ISBN: 978-0-596-15806-4
2. Mark Lutz ,”Programming Python “, O Reily, 4thEdition, 2010, ISBN 9780596158118
3. Tim Hall and J-P Stacey ,”Python 3 for Absolute Beginners” , 2009, ISBN:9781430216322
4. Magnus Lie Hetland , “Beginning Python: From Novice to Professional”, 2nd Edition, 2009, ISBN:9781590599822

Reference Books: (As per IEEE format)

1. Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.
3. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.

Moocs Links and additional reading material:

1. Python Tutorial for Beginners by **Telusko** Learning- <https://www.youtube.com/watch?v=QXeEoD0pB3E&list=PLsyebzWxl7poL9JTVyndKe62ieoN-MZ3>
2. Python for beginners by Mosh- https://www.youtube.com/watch?v=_uQrJ0TkZlc

Course Outcomes:

The student will be able to-

- 1) To be able understand the different data types of python.
- 2) Perform various operations upon different data structures of Python.
- 3) Apply different conditional and loop structure to solve complex problems.
- 4) Solve real world problems using Python class, packages and exception handling.
- 5) Create better storage and retrieval of data using sqlite database and file.
- 6) Develop different web based applications using Django framework.

CO PO Map

Co1-1, Co2- Pso3, Co3-10, Co5-7, Co6-5

CO attainment levels

Co1-2

Co2- 3

Co3- 3

Co4-4

Co5-5

Co6-5

Future Courses Mapping:

1. Machine learning using python

2. Deep learning using python

Job Mapping:

1. Python Developer
2. Web designer

IT8008::Advanced Java Programming**Course Prerequisites:**

Basic Knowledge about C++ and Core-Java

Course Objectives:

1. Design different types of GUI.
2. Develop effective applications for Multi-user environment.
3. Implement different backend technologies for effective storage and retrieval of data.
4. Apply different advanced features of Java for security of users.
5. Apply suitable alternate frameworks for better application development.

Credits: 5**Teaching Scheme Theory: 3 Hours/Week****Tut: 1 Hours/Week****Lab: 2 Hours/Week**

Course Relevance: Web Based applications, Real-time applications using object oriented principle

SECTION-1**Topics and Contents**

Swing controls, JPanel, JButton, JCheckbox, JCombobox, Jlist, JMenu, JRadioButton, Slider, JPasswordField, JFileChooser, JTable, JTextArea, JTree, JLabel, JApplet, JDialog, JFrame, JScrollPane, JTabbedPane, Event Handling: Mouse event, Window event, Java database connectivity, Types of JDBC drivers, Writing first JDBC applications, Types of statement objects(Statement, PreparedStatement and CallableStatement), Types of resultset , Result Set Metadata, Inserting and updating records, JDBC and Swing, Multithreading - Multithreading concepts, Thread Life cycle, creating multithreaded application, Thread priorities, Thread synchronization, Inter thread Communication, Deadlock , Java Collection: Sequence based collection, Map based collection

SECTION-II***Topics and Contents***

Introduction to servlets, Servlet API, Structure of web application, Creating web application, Servlet interface, Servlet life cycle, Generic Servlet, javax.servlet.http package, HTTPServlet, HTTPServletRequest, HTTPServletResponse, Include and Forward Request, Init Parameters, Session Management, Session tracking mechanism, Cookies, Web security,, Introduction to JSP, JSP API, JSP life cycle, JSP scopes, JSP Tags, Custom Tags, JSP directives, JSP implicit objects, JSP action elements, MVC in JSP , Introduction to groovy: Installation, Keywords, Types of Comments, Defining Methods, Different types of Strings, Hibernate, NoSQL

List of Practicals: (Any Six)

1. Design a java application to demonstrate file handling in Java.
2. Design a java application to demonstrate GUI using Swing.
3. Design a java application to demonstrate event handling using Java IDE.
4. Create an Application to display the table of different numbers using multithreading.
5. Create an Application to display even and odd numbers till number X input by user, Using multithreading.
7. Implement Producer Consumer Problem using multithreading.
8. Design a java application to demonstrate use of ArrayList Collections.
9. Design a java application to demonstrate use of Hash map Collections.
10. Design a client-server application demonstrating the use of Java I/O using sockets with GUI for configurations.
13. Design a java application to demonstrate use of JSP/Servlet using database.

List of Projects:

1. eLibrary
2. Mall Guiding System
3. Educational Portal based System
4. Retail Shop Stock Management
5. Online Mobile Shop Management System
6. Online Student Performance Monitoring System
7. Online Movie Ticket Booking System
8. Online Student Feedback System
9. Online vegetable shopping system
10. Online faculty record keeping system
11. Online Food Shopping System
12. Online Property Enquiry System

List of Course Seminar Topics: NA**List of Course Group Discussion Topics: NA****Suggest an assessment Scheme: Programming Subjects**

1. MSE-15 Marks
2. ESE-15 Marks
3. Lab-40 Marks

4. HA-10 Marks
5. Viva-20 Marks
Text Books: (As per IEEE format)
<i>1. "Advanced Java2: Development for Enterprise Applications", Clifford J. Berg, Sun ISBN: 0130848751, MicroSytem Press, 2000.</i> <i>2. "Advanced Java networking", Dick Steflik, PrashantSridharan, ISBN: 0130844667, Prentice Hall PTR, 2000.</i>
Reference Books: (As per IEEE format)
<i>1. "Java: The Complete Reference", , Herbert Schildt, McGraw Hill Publication, Seventh Edition, ISBN: 007063677X, 2006.</i> <i>2. "Java generics and collections", Thomas Powell, O'Reilly Media, ISBN: 0596527756, 2006</i> <i>3. "Java EE 7" for Beginners, Sharanam shah, Vaishali shah, SPD, ISBN: 13:978-93-5110-349</i>
Moocs Links and additional reading material: 1. Introduction to servlet by Naresh Technology https://www.youtube.com/watch?v=dGvVPdpeP4U&list=PLVIQHNRLfIP_kHVsiJVau2s1HFpTRXIa4 2. JSP Introduction by Naresh Technology: https://www.youtube.com/watch?v=3RfYgt-9Y5Y&list=PLLE7ESHTAzoq584kukbjmLfL3wrGUynaT

Course Outcomes:

The student will be able to –

1. Analyze and create different GUI using Swing and AWT.
2. Develop different Java applications using Multi-threading.
3. Apply different collections and databases for backend storage of suitable data.
4. Work in well-formed teams with proper skill sets to achieve effective solutions using JSP and Servlet.
5. Extend their knowledge in utilizing the appropriate advanced features for Security like Session management and Cookies
6. Construct software solutions by evaluating alternate architectural patterns.

CO PO Map

Co1- Po3

Co2-Po2

Co3-Po8

Co4-Po4

Co5-Po10

Co6-Po5

CO attainment levels

Co1- 2

Co2-3

Co3-4

Co4-5

Co5-4

Co6-5

Future Courses Mapping:

1. Spring Frame Work
2. Grails Frame Work

Job Mapping:

1. Java Application Developer
2. Database Engineer
3. Design Engineer

Syllabus Template**IT8009: DESIGN AND ANALYSIS OF ALGORITHM****Course Prerequisites: C (Any programming language), Data structures****Course Objectives:**

1. To understand and apply the algorithm analysis techniques.
2. To critically analyze the efficiency of alternative algorithmic solutions for the same problem
3. To understand different algorithm design techniques.
4. To understand the limitations of Algorithmic power.

Credits: 4**Teaching Scheme Theory: 3 Hours/Week****Lab: 2 Hours/Week****Course Relevance:**

This is an important course for in the field of Information Technology . one can analyse algorithm from time complexity point of view and enables to write efficient algorithms. Designing algorithms using suitable paradigms and analysing the algorithms for computational problems has a high relevance in all domains of IT . This course is also relevant for students who want to pursue research careers in theory of computing, computational complexity theory, advanced algorithmic research.

SECTION-1**Analysis of algorithm and Greedy ,D&C techniques**

Introduction To Analysis of Algorithm: Algorithm, analysis, Characteristics of an Algorithm, time complexity and space complexity, Well Known Asymptotic Functions & Notations, Big O-notation, Omega notation and theta notation, Sets and disjoint set, union and find algorithms, Heaps. Sorting in linear time.

Divide and Conquer: General Strategy, Exponentiation. ,Strassen's matrix multiplication. Convex hull, closest pair finding. Divide and conquer binary search, heap sort, quick sort and merge sort, finding the median.

Greedy Method: General Strategy, Formalization of Greedy Technique, Knapsack problem, Job sequencing with Deadlines, Optimal merge patterns, Minimal Spanning Trees Prim's and Kruskal Algorithm and Dijkstra's algorithm.

SECTION-II

Design techniques and NP complete problems

Dynamic Programming: General Strategy, The Principle of Optimality, Multistage graphs, OBST, 0/1 Knapsack, Traveling Salesperson Problem, Make change Problem. Dynamic Programming: Flow Shop Scheduling, Chained Matrix Multiplication.

Backtracking And Branch And Bound: Backtracking: General Strategy, 8 Queen's problem, Graph Coloring, Hamiltonian Cycles, 0/1 Knapsack, sum of subset. Branch and Bound: General Strategy, 0/1 Knapsack, Traveling Salesperson Problem, recourse allocation problem, Tile Problem, Maze Problem.

NP hard and NP-Complete Problems : Basic concepts, non-deterministic algorithms: sorting, NP-HARD and NP-COMPLETE classes, COOKS theorem.

Introduction to parallel algorithms, Parallel sorting

List of Practicals: (Any Six)

1. Quick Sort/ Merge Sort implementations using divide and conquer approach. Time complexity measure is to be obtained.

2. Minimal spanning Trees/ Job scheduling as an example of Greedy approach

3. Finding shortest path for multistage graph problem. (single source shortest path and all pairs shortest path.)

4. 0/1 knapsack's problem using Greedy approach.

5. 0/1 knapsack's problem using Dynamic Programming/Branch & Bound Strategies.

6. n-Queen problem using general backtracking method.

7. Algorithm implementation for 'Traveling salesman' problem using Dynamic programming approach.

8. Find a subset of a given set $S = \{s_1, s_2, \dots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d . For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$ there are two solutions $\{1, 2, 6\}$ and $\{1, 8\}$. A suitable message is to be displayed if the given problem instance doesn't have a solution.

List of Projects:

- Tower of Hanoi
- Knight tour
- Hamilton graph
- Finding closest pair
- Pac-Man game
- Rat in maze
- Minesweeper game

List of Course Seminar Topics:

1. Paradigms for algorithm design

2. Different Searching techniques and its analysis
3. Different Sorting techniques and its analysis
4. Asymptotic notations
5. Divide and conquer strategy and its applications

List of Course Group Discussion Topics:

1. Greedy Algorithms Vs. Dynamic Programming strategy
2. Greedy vs Divide and conquer
3. Backtracking vs Branch and bound
4. NP-completeness
5. Comparison of P Vs NP problems
6. Relevance of Cook-Levin theorem
7. Application of Recursion

List of Home Assignments:**Design:**

1. Greedy strategy for real world problem solving
2. Divide and Conquer strategy for real world problem solving
3. Dynamic Programming strategy for real world problem solving
4. Backtracking strategy for real world problem solving
5. Branch and bound strategy for real world problem solving
6. Problems on NP completeness

Case Study:

1. Encoding techniques
2. Network flow optimization algorithms
3. Algorithms for TSP
4. Sorting techniques
5. Branch and bound algorithm applications

Blog

1. How to decide which design strategy to be applied to given problem.
2. Importance of disjoint set and its applications
3. Role of greedy approach in solving graph based problems
4. Performance analysis of Graph Theoretic Algorithms
5. P and NP problems.

Surveys

1. Integer Factoring Algorithms
2. Shortest Path Algorithms
3. Matrix multiplication algorithms

4. Knapsack problem and different design strategies 5. TSP problem and different design strategies
<p>Suggest an assessment Scheme: <i>Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.</i></p> <p>1.Home Assignment</p> <p>2.MCQ</p> <p>3.Group discussion</p> <p>4. seminar</p> <p>3.LAB-Course Assignment</p> <p>4. Course Project</p> <p>5. CVV.</p>
<p>Text Books: (As per IEEE format)</p> <p>Horowitz/Sahani, "Fundamentals of Computer Algorithms", Galgotia Publication. 2006</p> <p>2. Sanjay Dasgupta,Chirostos Padadimitriou, Umesh Vazirani "Algorithms" ,Tata Mcgraw Hill, 2006</p>
<p>Reference Books: (As per IEEE format)</p> <p>Bressard, "Fundamental of Algorithm." PHI</p> <p>2. Thomas H Cormen and Charles E.L Leiserson, "Introduction to Algorithm" PHI .</p> <p>3. Aho And J.D. Ullman, "Design and Analysis of Algorithms", Addison Wesley .</p>
<p>Moocs Links and additional reading material: www.nptelvideos.in</p>
<p>Course outcome: Upon completion of the course, post graduates will be able to -</p> <ol style="list-style-type: none"> 1. Analyze asymptotic time and space complexity of an algorithm for worst, average and best cases using suitable mathematical tools. 2. Derive and solve recurrences describing the performance of divide and conquer

<p>algorithms.</p> <p>3. Synthesize and analyze greedy algorithms.</p> <p>4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.</p> <p>5. Use backtracking and branch and bound technique for solving problems.</p> <p>6. Differentiate polynomial and nonpolynomial problems.</p>
<p>CO PO Map</p> <p>CO1 – PO1</p> <p>CO2 – PO2</p> <p>CO3 – PO3</p> <p>CO4 – PO7</p> <p>CO5 – PO11</p> <p>CO6 – PSO2</p>
<p>CO attainment levels</p> <p>CO1 - 2</p> <p>CO2 - 3</p> <p>CO3 - 2</p> <p>CO4 - 3</p> <p>CO5 - 4</p> <p>CO6 - 4</p>
<p>Future Courses Mapping:</p> <p>Advanced Algorithms, advance data structures, Computational Geometry, Algorithmic Number Theory, Algorithmic Graph Theory, Motion planning and Robotics</p>
<p>Job Mapping:</p> <p>Algorithm design is very important for any job based on programming. All Industries in IT Engineering always look for a strong knowledge in Algorithm design and Data structures . all the IT sector designations like programmer, Developer, Architect, Backend lead engineer, Full stack developers, Technical lead etc needs good knowledge of design and analysis of algorithm</p>

IT8012 :: Software Project Management

Course Prerequisites: Software Engineering

Course Objectives:

1. To learn the concepts of Project Management with process groups and knowledge areas
2. To apply skills to manage triple constraints of the project
3. To perform feasibility analysis in Project Management, Network Analysis for cost, time estimation
4. To develop skills to analyze, apply and appreciate contemporary project management tools and methodologies
5. To understand importance of quality standards, communication management and analyze the role of stakeholders

Credits: 3

Teaching Scheme Theory: 3 Hours/Week

Course Relevance:

Software Project Management, a professional practice focuses on process, problem and people. It is an art and science leading towards successful projects with an experience of how projects are planned, budgeted, prioritized, and executed. It helps the learner to develop himself, to create actionable steps of achieving project goals with predicting challenges or risks and prioritizing them. It is a skill which is in high demand with competitive salaries. The purpose of this course is to learn Software Project Management Body of Knowledge.

SECTION-1

Basics of Project Management

Topics and Contents

Project, Project Attributes, Project Constraints, Project Management, Project Stakeholders., Project Management Knowledge Areas, The Role of the Project Manager, Project Manager Job Description, Skills for Project Managers, Ethics in Project Management, Project Management Process Groups, Mapping the Process Groups to the Knowledge Areas, Project Life cycle, Project Integration Management: Concept, Strategic Planning and Project Selection, developing a Project Charter, Developing a Project Management Plan. Project Scope Management: Planning Scope Management, Collecting Requirements, Defining Scope, Creating the Work Breakdown Structure, Approaches to Developing Work Breakdown Structures Guidelines for Creating a WBS and WBS Dictionary. Project Time Management: Project Schedules, Planning Schedule Management, Defining Activities, Sequencing Activities, Network Diagrams, Gantt Charts, CPM & PERT, Project Cost Management : Importance and Principles of Cost Management, Planning, Estimating Costs, Types of Cost Estimates, How to Develop a Cost Estimate, Determining the Budget, Project Risk Management: The Importance of Project Risk Management, Planning Risk Management, Common Sources of Risk, Identifying Risks, The Risk Register, Performing Qualitative Risk Analysis and Quantitative Risk Analysis, Planning Risk Responses, Controlling Risks

SECTION-II**Project Management Knowledge Areas****Topics and Contents**

Project Quality Management: Importance of Project Quality Management, Planning Quality Management , Performing Quality Assurance , Controlling Quality , Six Sigma , Modern Quality Management : Deming, Juran, Crosby, Ishikawa, Taguchi , ISO Standards, IEEE Standards, Project Human Resource Management: Developing the Human Resource Plan, Acquiring the Project Team, Developing the Project Team, Managing the Project Team, Project Communications Management: Keys to Good Communications , Formal and Informal Methods for Communicating , Determining the Number of Communication Channels, Planning Communications Management, Selecting the Appropriate Communication Methods and Media, Reporting Performance, Controlling Communications, Project Procurement Management: Importance of Project Procurement Management, Planning Procurement Management, Types of Contracts, Procurement Management Plan, Statement of Work, Procurement Documents, Source Selection Criteria, Conducting Procurements, Controlling Procurements, Closing Procurements, Project Stakeholder Management : Identifying Stakeholders, Planning Stakeholder Management, Managing Stakeholder Engagement, Controlling Stakeholder Engagement

List of Practicals: NA
List of Projects: NA
List of Course Seminar Topics: <ol style="list-style-type: none">1. Causes of Project Failure2. Ethics in Project Management3. Project Management for 21st Century4. Connecting project planning to scheduling5. Work Breakdown Structure6. Risk Mitigation Plan7. Tools for Project Planning8. Project Estimations9. Prioritizing Risks10. Stakeholder's Analysis

Guidelines for Group Discussion:

Forming a group of 5 students shall be strictly based on students with different course projects of current semester. Each student must be well aware about the course projects of group members. Various topics listed below will be available in the form of chits in a box at the time of group discussion. One of the group members will pick up the topic chit from a shuffled chit box. Participation of each group member in group discussion is mandatory since assessment is individual.

List of Course Group Discussion Topics:

1. Quality parameters applicable
2. Issues addressed under Quality Assurance
3. Issues addressed under Quality Control
4. Selection of Formal and Informal Communication methods and media
5. Methods adopted for reporting progress of project
6. Issues to be taken care while closing the project
7. Contents of maintenance contract
8. Contents of user manual
9. IEEE standards essential for project
10. Stakeholder Management
11. Contents of Stakeholder register

List of Home Assignments:

Forming a group of 5 students shall be strictly based on students with different course projects of current semester. Each student must be well aware about the course projects of group members.

Design:

1. Project Plan
2. Time and Cost Management Activities
3. Human Resource Management Plan
4. Risk Mitigation, Monitoring and Management Plan
5. Communication Management Plan

Case Study:

(The detailed case will be provided to the groups on email)

Analyze:

1. What went wrong?
2. Risks associated with identified problem(s)
3. Effect of identified risks on existing work completed
4. Estimate time required to solve the issue
5. Change in documents created

Blog

1. Issues which are most important to the project success and why?
2. Role of Project Manager for project success
3. Recent trends in Project Quality Management
4. Importance of documentation in making projects successful
5. Professional Certifications to develop career in Project Management

Surveys

1. The Perceived Value and Potential Contribution of Project Management Practices to Project Success
2. A Study of Critical Success Factor of Information System Projects in India
3. Effective Project Leadership: A Combination of Project Manager Skills and Competencies in Context
4. Matching Software Development Life Cycles to the Project Environment
5. Tools for Facilitating Project Communication in an Onshore-Offshore Engagement Model

Suggest an assessment Scheme: (Scheme 5)

	MSE	ESE	GD	Seminar	HA
Actual Marks	30	30	100	100	100
Weightage (%)	25	25	10	20	20

Text Books: (As per IEEE format)

1. Bob Hughes, Mike Cotterell, Rajib Mall; Software Project Management; Sixth Edition, McGraw Hill
2. Joseph Phillips, IT Project Management –On Track From Start to Finish, Tata Mc Graw-Hill

Reference Books:

1. Robert K. Wysocki; “Effective Software Project Management”; O’Reilly
2. Richard Bechtold; “Essentials of Software Project Management”; Second Edition Management Concepts
3. Kathy Schwalbe; Information Technology Project Management; Eighth Edition; Cengage Learning

Moocs Links and additional reading material:

1. www.nptelvideos.in
2. www.coursera.com
3. www.udemy.com
4. swayam.gov.in

Course Outcomes:

On completion of this course, the students will be able to:

1. Understand project characteristics and various stages of a project.
2. Analyze scope management and Work Breakdown Structure
3. Analyze techniques for Project planning, scheduling and Execution Control.
4. Evaluate potential risks associated with identified project and apply risk mitigation plan
5. Understand and analyze the role of stakeholders.
6. Understand implementation of quality standards in the Industry.

CO PO Map**CO attainment levels**

Future Courses Mapping:

1. Project Management Professional (PMP)
2. Associate in Project Management
3. Certified Associate in Project Management (CAPM)
4. Certified Project Director
5. Certified Project Management Practitioner (CPMP)
6. Certified Project Manager (CPM)
7. Certified Scrum Master (CSM)
8. CompTIA Project
9. Master Project Manager (MPM)
10. Professional in Project Management (PPM)
11. Project Management in IT Security (PMITS)

Job Mapping:

Business Analyst , Team Leader, Project Coordinator, Consultant, Project Management Professional, Entrepreneur

Syllabus Template

IT8215::Cloud Computing

Course Prerequisites: Nil

Course Objectives:

1. Understand the architecture and infrastructure of cloud.
2. Learn the resource virtualization technique.
3. Build the appropriate file system and database.
4. Design a algorithm for a given business case using Map-Reduce model
5. Develop a SaaS solution for a real world problem with collaborative efforts

Course Relevance:

This course is widely applicable in software and manufacturing industries for storage purpose.

SECTION-1
<p>Topics and Contents</p> <p><i>Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud Service Models: SaaS, PaaS, IaaS, Cloud provider, benefits and limitations, Deploy application over cloud, Cloud computing vs. Cluster computing vs. Grid computing. Open Stack vs Cloud Stack, Role of Open Standards, Infrastructure as a Service (IaaS): Virtualization Technology: Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine (VM). Virtualization: Server, Storage, Network. Virtual Machine (resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service), Multitenant software: Multi-entity support, Multi-schema approach, Multitenance using cloud data stores, Data access control for enterprise applications, Cloud file-systems: GFS and HDFS, BigTable, Features and comparisons among GFS, HDFS etc., Databases on Cloud: NoSQL, MongoDB, HBase, Hive, Dynamo, Graph databases</i></p>
SECTION-II

Topics and Contents

Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Example/Application of Map-reduce, **PaaS:** Introduction to PaaS - What is PaaS, Service Oriented Architecture (SOA). Cloud Platform and Management - computation, storage

SaaS: Introduction to SaaS, Web services, Web 2.0, Web OS, Case Study on SaaS **Service Management in Cloud Computing:** Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data - Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing

Cloud Security: Infrastructure Security - Network level security, Host level security, Application level security. Data security and Storage - Data privacy and security Issues, Jurisdictional issues raised by Data location: Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.

List of Course Seminar Topics:(any 6)

1. IaaS model for cloud
2. PaaS for cloud
3. SaaS application and host it on Cloud Platform
4. Repository in Cloud
5. Amazon Virtual Private Cloud (Amazon VPC)
6. ML task in cloud
7. AI task in Cloud
8. Deploy and manage cloud environment
9. Authentication in cloud
10. Service Oriented Architecture (SOA)

List of Course Group Discussion Topics:(any 6)

1. Cloud Service Models
2. Cloud computing vs. Cluster computing vs. Grid computing
3. Virtualization
4. Cloud file-systems
5. Cloud data stores
6. Databases on Cloud
7. Map-Reduce model for Cloud
8. Data security and Storage for Cloud
9. Application security for Cloud
10. Commercial and business risk and opportunities in Cloud

List of Home Assignments:**Design:**

1. Design Local Train ticketing system using Cloud
2. Design online Book-store system using Cloud
3. Cloud based Attendance system
4. University campus online automation using Cloud
5. Cloud based student information chatbot

Case Study:

1. Secure file storage in Cloud
2. Android offline computations over Cloud
3. Data leak detection in E-commerce cloud applications.
4. e-Bug tracking in Cloud
5. Rural Banking using Cloud

Blog

1. Private Vs Public Cloud
2. Storage and Energy efficient Cloud computing
3. CIO-Cloud
4. Cloud computing Intelligence
5. High scalability in Cloud

Surveys:

1. Public cloud security
2. Cloud based Improved file handling
3. E-learning platform using cloud computing
4. DevOps and Cloud
5. Cloud service providers(CSP)

Suggest an assessment Scheme:

1. *Home Assignment*
2. *MCQ*
3. *Quiz*
4. *Seminar*
5. *Group Discussion*
6. *Viva*

Text Books: (As per IEEE format)
<ol style="list-style-type: none"> 1. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, “Cloud Computing for Dummies”, Wiley India. 2. Ronald Krutz and Russell Dean Vines, “Cloud Security”, Wiley-India
Reference Books: (As per IEEE format)
Reference Books: (As per IEEE format) <ol style="list-style-type: none"> 1. Barrie Sosinsky, “Cloud Computing Bible”, Wiley India 2. Antohy T Velte, et.al, “Cloud Computing : A Practical Approach”, McGraw Hill. 3. McGraw Hill, “Cloud Computing”, Que Publishing.
Moocs Links and additional reading material: www.nptelvideos.in
Course Outcomes: The student will be able to – <ol style="list-style-type: none"> 1. Illustrate the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc. 2. Investigate the resource virtualization technique for a given business case 3. Choose the appropriate file system and database for a given business case 4. Develop a algorithm for a given business case using Map-Reduce model 5. Build a SaaS solution for a real world problem with collaborative efforts 6. Identify the challenges in Cloud Management and Cloud Security
CO PO Map
CO attainment levels CO1-3, CO2- 3, CO3-4, CO4-4, CO5-5, CO6-5
Future Courses Mapping: Mobile application development, <i>Advance web technology</i>

Job Mapping:

Cloud Architect, *cloud developer, web developer*

IT8014::ORGANIZATION BEHAVIOR**Credits:3****Teaching Scheme Theory: 3 Hours/Week****Course Prerequisites: Fundamentals of Management****Course Objectives:**

- To make the students understand the concepts of Organization Behavior.
- To make students adoptive and responsive to the changes in the business environment.
- To enlighten the students about the theories of motivation.
- To create able leaders and good team members.
- To create symbiotic relationships between organization and professionals by aligning personal objectives with organizational objectives.
- To create competent and ethical professionals.

Course Relevance:

This course will help the students in displaying progressive, competent and ethical behavior in the corporate business environment.

SECTION-1**Topics and Contents**

Introduction to Organizational Behavior: A review of the Manager's Job Management Functions, Management Roles, Management Skills, Effective versus Successful Managerial Activities. Definition, Importance, Scope, Fundamental Concepts of OB, Challenges and Opportunities of OB Different models of OB - autocratic, custodial, supportive, collegial and SOBC. Disciplines That Contribute to the OB Field - Psychology, Social Psychology, Sociology, Anthropology. Responding to Economic Pressures, Responding to Globalization, Managing Workforce Diversity, Improving Customer Service.

Organizational Change and Stress Management: Types of changes: Dilemma of change, Pressure of change, Resistance to change Force field analysis, Change process, Overcoming the resistance to change, Approaches to Managing Organizational Change: Lewin's Three-Step Model, Creating a Culture for Change: Stimulating a Culture of Innovation, Creating a Learning Organization, Work Stress and Its Management: What Is Stress? Potential Sources of Stress, Individual Differences, Cultural Differences, Temporariness, Consequences of Stress, Managing Stress, Balance Work-Life Conflicts.

Motivation: Definition, Importance, Motives – Characteristics, Classification of motives - Primary & Secondary motives. Theories of Motivation - Maslow's Theory of need hierarchy - Herzberg's theory, Goal-Setting, Self-Efficacy Theory, Reinforcement Theory, Equity Theory, Expectancy Theory, Motivating by Job Design: How Can Jobs Be Redesigned? Alternative Work Arrangements, Employee Involvement Programs, Using Rewards to Motivate Employees.

SECTION-II

Topics and Contents

Group Dynamics and Team building: Concept of Group & Team, Differences Between Groups and Team, Theories of Group Formation - Formal and Informal Groups. Importance of Team building, Stages of Group Development - The Five-Stage Model, Group Decision Making, Groups versus the Individual, Problem-Solving Teams, Self-Managed Work Teams, Creating Effective Teams, Leadership, Quality Circle.

MBO Techniques: Concept of MBO technique and details, phases, Concept of personality: Development of personality – Attributes of personality, perception, values, and attitudes. Learning Behavior - Emotional Intelligence in organization. Johari window - Nature and dimensions of attitude – Developing the right attitude.

Organization Culture: Concept of Organizational Culture, Culture's Functions, Creating an Ethical Organizational Culture, Creating a Positive Organizational Culture, What Is Spirituality? Spirituality and Organizational Culture, Why Spirituality Now? Characteristics of a Spiritual Organization, Achieving a Spiritual Organization, Criticisms of Spirituality, How a Culture Begins, Creating and Sustaining Culture, Keeping a Culture Alive.

List of Course Seminar Topics:

1. Fundamental Concepts of OB, Challenges and Opportunities of OB.
2. Models in Organization behavior:
3. Globalization :What it is,its effects Responding to Economic Pressures, Managing Workforce Diversity, Improving Customer Service
4. Change: Types of changes , Dilemma of change, Pressure of change, Resistance to change , Force field analysis, Change process, Overcoming the resistance to change,
5. Approaches to Managing Organizational Change: Lewin's Three-Step Model, Creating a Culture for Change:, Creating a Learning Organization.
6. Work Stress and Its Management: What Is Stress? Potential Sources of Stress, Individual Differences, Cultural Differences, temporariness, Consequences of Stress, Managing Stress, balance Work–Life Conflicts.
7. Motivation: Definition, Importance, Motives – Characteristics, Classification of motives - Primary & Secondary motives. Motivating by Job Design: How Can Jobs Be Redesigned?
8. Comparison of Theories of Motivation :- Maslow's Theory of need hierarchy - Herzberg's theory, Goal-Setting.

List of Course Group Discussion Topics:

1. Quality Circle.
2. Leadership in corporate world.
3. Sense of ownership in an organization.
4. Talent management in an organization
5. Change management.
6. Role of IQ and EQ in organization.
7. Role culture in an organization.
8. Nurturing ethical corporate governance.
9. Aligning personal objectives with organizational objectives.
10. Multiculturalism and team building.

List of Home Assignments:**Design:**

1. Design a plan for Stimulating a Culture of Innovation in your college.
2. You are the manager of a software company design a plan to increase job satisfaction of female employees in your company.
3. You have your own start up Design and Develop an Innovative Solution To A Non-traditional Problem? in an organization you know.

4. You have your software company having more than 500 employees design a plant to release the stress of employees.
5. If you are a project manager and there are 15 people working under you who are doing a variety of work. Design a plan to implement MBO in their career?

Case Study:**Blog:**

1. Role of motivation in the performance of employees in an organization.
2. Effective versus Successful Managerial Activities.
3. Stress A Stimulus Or A Response?
4. Criticisms of Spirituality in an organization.
5. Globalization and Temporariness

Surveys:

1. Carry out a work culture survey of an organization you are concerned with.
2. Carry out the satisfaction index of students of your college.
3. Carry out happiness index of faculties of your college.
4. Carry out survey of issues of Low- Skilled Service Workers and skilled Service workers.
5. Carry out survey of non-localities students in VIT

Suggest an assessment Scheme:

MSE	PPT Presentation	ESE	GD	HA	Viva
20	10	20	10	20	20

Text Books: (As per IEEE format)

1. Fundamentals of Organizational Behavior by Nancy Langton , Stephen P.Robbins
2. Organizational Behavior : Stephen Robbins, Timothy Judge : Pearson Publications : 13th Edition
3. Organizational Behavior: Concepts, Controversies and Applications : Stephen Robbins
4. The Fundamentals of Organizational Behavior : Henry Tosi And Neal P. Mero : Black Well Publishing

Reference Books: (As per IEEE format)

1. Essentials of Organizational Behavior : Laurie J. Mullins : Pearson Education : 2nd Edition
2. Organizational Behavior : Individuals, Groups and Organisation, 3rd Edition : Ian Brooks : Pearson Publication
3. Organizations: Structures, Processes, and Outcomes : Richard H. Hall.

Moocs Links and additional reading material:

1. <https://www.youtube.com/watch?v=sLHfYnxh8s&list=PLbMVogVj5nJQYXoO3foSZ6CrU7aCCwTsb>
2. https://www.youtube.com/watch?v=pjgdvp2f_cs

Course Outcomes:

The student will be able to –

1. To describe the concept of Organizational Behavior and management practices.
2. Summarize the problems occurring due to organizational change and analyze how the theory can help to in solving contemporary organizational issues.
3. Apply theories of motivation in problem solving.
4. Be a good team leader and good team member..
5. Apply the MBO techniques to achieve organizational objectives.
6. Develop the skills that are necessary for making ethical decisions in professional life.

CO PO Map**CO attainment levels**

CO1-2, CO2- 3, CO3-3, CO4-2, CO5-2, CO6-4

Future Courses Mapping:

Human Resource Management, Marketing Manager,

Job Mapping:

Human Resource Manager, Staff Trainer, Trainer and Counselor, Project Manager.

FF No. : 654

Syllabus Template**IT8007 : :Quantitative Techniques**

Credits: 3

Teaching

Scheme:-Theory: 2 Hours / Week

Lab: 2

Hours / Week

Course Prerequisites: Basic Maths**Course Objectives:**

Course Relevance: This course widely applicable in all types of aptitude tests conducted by software companies, for post graduate entrance exams like MS, MTech , MBA etc and other jobs.

SECTION-1**Topics and Contents:**

Section 1: Numbers, Average, Problem on ages, Problems on numbers, Logarithms, Surds and Indices, HCF and LCM of Numbers. Time and distance, Problems on trains, Boats and Streams, Time and Work, Pipes and Cisterns, Allegation or mixture. Percentage, Profit and loss, Ratio and Proportion, Simple interest, Compound interest, Partnership, Chain Rule.

SECTION-1I**Topics and Contents**

Race and Games , Odd Man Out and Series, Number Series, Analogies, Logical Problems, Letter and Symbol Series, Statement and Conclusion, Artificial Language. Area, Volume and Surface Areas, Calendar, Clocks, Permutations and Combinations, Probability, Heights and Distances. Tabulations: Tabulations of Imports and Exports of Data, Analysis of Tabulated Data, Bar Graphs: Vertical or Horizontal Bars, Pie Charts: Pie Graphs, Central angle, Line Graphs.

List of Practical: (Any Six)

Students will solve mock tests on the following topics

1. Geometry
2. Percentages/Profit & Loss
3. Time and Work
4. Simple and Compound Interest
5. Series and Progression
6. Time and Distance
7. Ratios
8. Bar Graph and Line Graph
9. Probability
10. Averages

List of Course Seminar Topics:

1. Short cut methods of solving following types of problems
2. Average,
3. Problem on ages,
4. Problems on numbers,
5. HCF and LCM of Numbers.
6. Time and distance,
7. Time and Work.
8. Percentage,
9. Profit and loss,
10. Ratio and Proportion,
11. Simple interest, Compound interest.
12. Tabulations of Imports and Exports of Data,.
13. Analysis of Tabulated Data, Bar Graphs: Vertical or Horizontal Bars,
14. Pie Charts: Pie Graphs, Line Graphs.

List of Course Group Discussion Topics:

1. Race and Games ,
2. Odd Man Out and Series,
3. Number Series,
4. Analogies,
5. Logical Problems,
6. Letter and Symbol Series,
7. Statement and Conclusion,
8. Artificial Language. Area,
9. Volume and Surface Areas,
10. Calendar, Clocks,
11. Permutations and Combinations,
12. Probability, Heights and Distances

List of Home Assignments:**Design:**

1. Develop overall action plan to pass GRE and GMAT aptitude test.
2. Design action pan to qualify banking exam for Probationary Officer.
3. Design a study note which is useful for revision before any aptitude test.

Case Study:

1. How to prepare for banking aptitude test.
2. How to prepare for railways, public services, etc.
3. Qualify the exam for higher study like GRE, GMAT.
4. Qualify the exam for higher study like NDA, CDS.

Blog:

1. Significance of aptitude tests and its preparation.
2. Common mistakes students make while solving attitude test
3. Not just the speed but the other factors which are important to pass any entry level aptitude test.test.
4. How the mental state should be maintained before and during aptitude test of any competitive exam.
5. General guidelines for the preparation of any entry level aptitude test.

Surveys

1. Write a survey of the topics which should be focused for any banking exam
2. Write a survey of the topics which should be focused for UPSE/MPSE aptitude tests. GRE exma
3. Write a survey of the topics which should be focused for entrance test of
4. Write a survey of the topics which should be focused for entrance test of any software company

Suggest an assessment Scheme:

Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

MSE	PPT Presentation	ESE	GD	Viva	Lab assignments +Course Project(test)
10	10	10	10	20	40

Text Books: (As per IEEE format)

1. Dr. R. S. Aggarwal, "Quantitative Aptitude For Competitive Examinations", twelfth edition, S. Chand. 2. Arun Sharma, "How to Prepare for Quantitative Aptitude"; fifth edition; Tata McGraw-Hill.

Reference Books: (As per IEEE format)

1. Abhijit Guha, "Quantitative Aptitude for Competitive Examinations", Fourth Quarter.
2. K. Sarvesh Verma; "Quantitative Aptitude Quantum Cat Common Admission Test", Third Edition; Arihant.

Moocs Links and additional reading material:

1. <https://www.youtube.com/watch?v=CFhds94-KCU&list=PLXVjll7-2kRm0oyWnk4CbLpwaPXhjJb-u>
2. <https://www.youtube.com/watch?v=rHzggZDdtc4>

Course Outcomes:

The student will be able to –

1. Qualify all the company aptitude Test for placement.
2. Clear Most of the Banking test based on Quantitative aptitude and Reasoning.
3. Qualify most of the exam based on Quantitative aptitude and Reasoning like railways, public services, etc.
4. Qualify the exam for higher study like GRE, GMAT.
5. Qualify the exam for higher study like NDA, CDS.

6. Develop overall aptitude ability.

CO PO Map

Code	Course Name	Programme Outcomes												Program Specific Outcomes			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
IT8007	Quantitative Techniques																

CO attainment levels

CO1-, CO2- , CO3-, CO4-, CO5-, CO5-, CO6-

Future Courses Mapping:

After completion of this course students can take exams like GRE, GATE, GMAT and go for higher education like MTech, MS, MBA or can do research.

Job Mapping:

For all the organizations may be government or private they keep aptitude test at the entry level. Once the student gets through the test he can have opportunities in Banking sector, Central Government, State government and software companies.

Master in Computer Applications Structure (applicable w.e.f. AY 20-21)**TY MCA Module -V (C20 Pattern)**

Subject head	Course code	Course name	Contact hours per week			Credits
			Theory	Lab	Tut	
S1	IT9001	Network and Information Security	3	2		4
S2	IT9102	Data Science	3	2		4
S3	IT9013	Advanced Web Technology	3	2		4
	IT9012	Artificial Intelligence	3	2		
S4	IT9004	Internet of Things	3	2		4
	IT9018	Image Processing	3	2		
S5	IT9005	Mobile Application Development	1	2		2
S5	IT9106	Design and Innovation-5I	-	-		3
		Total	12	10		21

IT9001::Network and Information Security**Course Prerequisites: Computer Networks, C/C++ or Python Programming Language****Course Objectives:**

1. To introduce the concepts of Information Security
2. To understand the concepts of cryptography
3. To understand the various encryption algorithms
4. To understand various authentication algorithms

Credits: 4**Teaching Scheme Theory: 3 Hours/Week****Lab: 2 Hours/Week****Course Relevance:**

The curriculum of the program is divided into the theoretical and practical study. The Students are made proficient in carrying out operations in relation to networking and information security. Students are provided with the skills to design, plan, construct, and manage data networks. The course mainly deals with the nuances of cryptography. The course is covered through a combination of seminar, assignments and project work. Students after the successful completion of this course will be able to imbibe the required qualities for beginning their career in the field of IT and networking.

SECTION-1**Topics and Contents**

Worms, viruses, Trojans, Bots, Types of Attacks: DoS, IP spoofing, replay, DNS poisoning, Phishing, Need of security, attributes of security: authentication, confidentiality, integrity and cryptography, Vulnerabilities in OSI model, layers, Bioinformatics security, Mathematical background for security, Substitution Techniques: Ceaser cipher, Playfair cipher, Hill cipher, Vigenere cipher, One time pad, Transposition Techniques, Product Cipher, Steganography, Block Cipher Principle, S-DES, DES, Double DES, Triple DES, Man in the middle attack, RC4, AES, S-AES, RSA Algorithm, Elliptic Curve Arithmetic, Elliptic curve Cryptography, El Gamal Cryptosystem, Knapsack public key algorithm

SECTION-II

Topics and Contents

Diffie-Hellman Key Exchange Technique, ECC Diffie-Hellman Key Exchange Technique, Symmetric Key Distribution using symmetric encryption, Symmetric Key Distribution using asymmetric encryption, Distribution of public keys, X.509 Certificates, Public key infrastructure, Remote user authentication principles, Remote user authentication principles using symmetric encryption, Kerberos, Remote user authentication principles using asymmetric encryption, Applications of cryptography, Hash Functions, SHA, Whirlpool, Message Authentication, MAC, HMAC, CMAC, Digital Signature, EL Gamal Digital Signature Scheme, Digital Signature Standard, Transport Layer Security, Secure Socket Layer, HTTPS, Secure Shell(SSH), Wireless network security, Wireless transport layer security, Wireless application layer protocol(WAP) end to end security, E-mail Security, PGP, S/MIME, IP security, Firewall security

List of Practicals: (Any Six)

1. Write a C/JAVA program to perform encryption and decryption using the following algorithms Caesar cipher
2. Write a C/JAVA program to perform encryption and decryption using the following algorithms Substitution cipher
3. Write a C/JAVA program to perform encryption and decryption using the following algorithms Hill Cipher
4. Write a C/JAVA program to perform Playfair cipher.
5. Write a C/JAVA program to perform Vigenere Cipher
6. Write a C/JAVA program to perform RC4 algorithm
7. Write a C/JAVA program to implement the S-DES algorithm logic.
8. Write a C/JAVA program to implement the S-AES algorithm logic
9. Write a C/Java program that contains functions, which accept a key and input text to be encrypted/decrypted. This program should use the key to encrypt/decrypt the input by using the triple Des algorithm
10. Write a C/JAVA program to implement RSA algorithm

List of Projects:

1. Write a C program that contains a string(char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result
2. Write a C program that contains a string(char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Implementation of ECC.
4. Implement Hash algorithm.
5. Implementation of packet sniffer.
6. Implementation Kerberos simulation
7. Implement the Diffie-Hellman Key Exchange mechanism
8. Calculate the message digest of a text using the SHA-1 algorithm in C/JAVA
9. Calculate the message digest of a text using the MD5 algorithm in C/JAVA.
10. Write a program to perform a Key generation(public and private key pair).

List of Course Seminar Topics:

1. Types of Attacks:
2. attributes of security
3. Vulnerabilities in OSI model, layers
4. Bioinformatics security
5. Mathematical background for security
6. Substitution Techniques
7. Steganography
8. Block Cipher
9. Man in the middle attack,
10. RC4,
11. AES, S-AES,
12. RSA Algorithm,
13. Elliptic Curve Arithmetic, Elliptic curve Cryptography,
14. El Gamal Cryptosystem,
15. Knapsack public key algorithm

List of Course Group Discussion Topics:

1. Diffie-Hellman Key Exchange Technique & ECC Diffie-Hellman Key Exchange Technique
2. X.509 Certificates
3. Kerberos
4. Applications of cryptography
5. Hash Functions,SHA
6. MAC, HMAC, CMAC
7. Digital Signature, EL Gamal Digital Signature Scheme, Digital Signature Standard
8. Transport Layer Security, Secure Socket Layer, HTTPS
9. Secure Shell(SSH)
10. Wireless network security
11. Wireless transport layer security
12. Wireless application layer protocol(WAP) end to end security

13. Email Security
14. PGP, S/MIME
15. IP security
16. Firewall security

List of Home Assignments:**Design:**

1. Implementation of handwritten character recognition
2. Implementation of face recognition model
3. Implement Privacy enhancement (using biometrics)
4. Implementation of cryptography model
5. Implement Hash/MD5 algorithm

Case Study:

1. Single Sign On(SSO)
2. Secure Inter-branch Payment Transactions
3. Secret Splitting
4. Secure Multiparty Calculation
5. Secure File Transfer

Blog

1. Securing Routing Protocols for Ad Hoc Wireless Networks
2. Transport Layer Security for Ad Hoc Wireless Networks
3. Security protocols for Ad hoc Wireless Networks
4. Basics Security measures in Wireless, Sensors and Applications
5. Security measures in Sensor Network Hardware

Surveys

1. Information Security
2. Symmetric Key Algorithms and AES
3. Message Authentication and Hash Functions
4. Security at layers(Network, Transport, Application)
5. Intruders, Virus

Suggest an assessment Scheme:

Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

Home Assignment

MCQ

Quiz

Seminar

Group Discussion**LAB-Course Assignment and Project Evaluation****Text Books: (As per IEEE format)**

1. Michael E. Whitman, Herbert J. Mattord, “*Principles of Information Security*”, CENGAGE Learning, 5th Edition.
2. Atul Kahate, McGraw Hill, “*Cryptography and Network Security*”, 2nd Edition
3. William Stallings, “*Cryptography and Network Security*”, Pearson Education, 4th Edition

Reference Books: (As per IEEE format)

1. C K Shyamala, N Harini, Dr T R Padmanabhan, “*Cryptography and Network Security*”, Wiley India, 1st Edition.
2. Bernard Menezes, “*Network Security and Cryptography*”, CENGAGE Learning
3. Forouzan Mukhopadhyay, “*Cryptography and Network Security*”, McGraw Hill, 2nd Edition
4. WM.Arthur Conklin, “*Principles of Computer Security*”, Greg White, TMH.

Moocs Links and additional reading material:

1. www.nptelvideos.in
2. www.udemy.com

Course Outcomes:

1. Identify the various types of attacks by analyzing the behavior of data in the networks.(2)
2. Design a secure system for protection from the various attacks for 7 layer model by determining the need of security from various departments of an organization.(3)
3. Investigate the vulnerabilities in the existing system for the development of new system by following laws of security.(4)
4. Perform authentication of individuals or groups with cost effective Engineering solutions.(4)
5. Examine the importance of network security applications for current and future needs of organizations.(5)
6. Estimate future needs of security for a system by researching current environment on a continuous basis for the benefit of society.(5)

CO PO Map
CO attainment levels CO1-2 CO2-3 CO3-4 CO4-4 CO5-5 CO6-5
Future Courses Mapping: <ul style="list-style-type: none">• Database Security• Cyber Security
Job Mapping: <ul style="list-style-type: none">• Safeguarding the organization's computer networks and systems• Planning security measures,• Monitoring and protecting data from infiltration and cyber-attacks.• Conducting audits• Providing customer service and information assurance to the organization and companies.

Syllabus Template

IT9102::Data Science

Course Prerequisites: Discrete Mathematics, Python/Java Programming knowledge

Course Objectives:

- The course is designed to let students demonstrate an understanding of data science and the key steps involved well enough to lead/manage a real-life data science project
- The Students will understand classification, clustering, frequent pattern analysis and regression.
- The Students are expected To understand and exhibit the basics of data warehousing and multi-dimensional modelling.
- Students will learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration, exploratory data analysis
- Students will learn predictive modelling, descriptive modelling, data product creation and evaluation.

Credits:4

Teaching Scheme Theory: 3 Hours/Week

Lab: 2 Hours/Week

Course Relevance:

The principal purpose of Data Science is to find patterns within data. It uses **various statistical techniques** to analyse and draw insights from the data. Data Science is the study of the generalizable extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases and other branches of computer science along with a good understanding of the craft of problem formulation to engineer effective solutions. To make the learning contextual, real datasets from a variety of disciplines will be used. This course is designed to introduce you to a range of topics and concepts related to the data science process.

SECTION-1

Classification, clustering, frequent item set mining

Topics and Contents

Introduction : Introduction to data science, role of data scientist ,Data mining Techniques, Data pre processing: Data cleaning, Data summarization, Data integration, Data transformation ,Data reduction.

Classification: classification and prediction ,Decision tree classifier, bayesian classification, rule based classification, classifier accuracy, introduction to other classification methods like neural network classification, back propagation, KNN classifier, Support Vector Machines.

Clustering: What is cluster analysis, types of cluster analysis ,a categorization of major clustering method ,partition ,hierarchical ,density based, grid based method,
Mining Frequent Pattern: Basic concept, market basket analysis ,frequent pattern mining, Mining frequent itemset using candidate generation and without candidate generation methods, mining various kind of association rules.
Tree: Tree Terminology, Binary Tree, Binary Tree Representation, and Binary Search Tree (BST): creation of binary Search tree, Deletion of a node from a binary search tree, printing a tree level wise and depth wise.

SECTION-II

Predictive analytics, data mining

Topics and Contents

Predictive analytics: linear and multiple regression.
Outlier analysis: Global outlier, Local outlier, Outlier detection various methods.
Data cube and OLAP, Concept hierarchies, OLAP operations. Multi dimensional modeling: star, snowflake ,fact constellation. MDM case studies. ETL Overview.
Data Mining Application: Mining various databases, multimedia databases, spatial database, text databases.
Text Mining: Text preprocessing, text mining operations, Categorization, Text mining Applications.

List of Practicals: (For THL, TLP courses)

1. Perform following practical on given dataset.
2. Implementing Data cleansing method for a given problem.
3. Generating different types of classification Trees using WEKA:Decision Trees
4. Applying various classification methods on a given data set.
5. Implementing K-means clustering algorithm using a data set, Using clustering algorithm build a partitioned model, Hierarchical Model, probabilistic Model.
6. Multi-dimensional modelling.
7. Concept hierarchy, OLAP operations and KPI.
8. ETL operations using kettle software. Implementing data transformation for a given problem domain.

List of Projects:

1. Sentiment analysis of movie /restaurant dataset
2. Possibility of heart attack based on text data.
3. Market basket analysis
4. Credit Card Fraud Detection
5. Designing Multi-dimensional modeling for a real world scenario and design , identify Concept hierarchy, apply OLAP operations and KPI for a real world scenario.
6. Handwritten Digit Recognition
7. Image Caption Generator
8. Movie Recommendation System
9. Cancer Classification
10. Traffic Signs Recognition

List of Course Seminar Topics:

1. Web mining
2. spatial data mining
3. SVM/ nural network
4. Decision tree classification
5. Clustering methods
6. Outlier detection methods
7. Baysian classifiers naive bayes and bayes net
8. Regression
9. Different data preprocessing techniques
10. spatial data mining
11. Lazy learner methods

List of Course Group Discussion Topics:

1. Machine learning, Data mining, Business intelligence
2. Machine learning vs Deep learning
3. Classification vs Clustering
4. Market Basket Analysis
5. Data preprocessing
6. outlier analysis applications
7. Text mining
8. eager vs lazy learners
9. OLAP vs OLTP
10. Density based clustering vs Distance based clustering

List of Home Assignments:**Design:**

1. Design of Multi-dimensional model for insurance/Mutual fund/bank database
2. Design of model for Color Detection
3. Design of model for Speech Emotion Recognition
4. Design of model for Gender and Age Detection
5. Design of model for Chatbot

Case Study:

1. Uber Data Analysis
2. Driver Drowsiness detection
3. Bharat natyam dataset gesture classification.
4. Fake News Detection
5. Detecting heart/Parkinson's Disease
6. Customer Segmentation

Blog

1. Use for machine learning for prediction in education system
2. Role of statistics for in data science
3. Role of data scientist
4. Importance of Information retrieval (IR)
5. Advance ETL operations

Surveys

1. Survey of text mining methods for real world problems.
2. Survey of tools/software available for data science.
3. Survey of Machine learning methods.
4. Survey of deep learning methods.
5. Frequent itemset mining methods

Suggest an assessment Scheme:

Suggest an Assessment scheme that is best suited for the course. Ensure 360 degree assessment and check if it covers all aspects of Blooms Taxonomy.

1.Home Assignment

2.MCQ

3.Group discussion

4. seminar

<p>3.LAB-Course Assignment</p> <p>4. Course Project</p> <p>5. CVV.</p>
<p>Text Books: (As per IEEE format)</p> <p>1. Jiawei Han and Micheline Kamber “Data mining: concepts and techniques”, the Morgan Kaufman, 2001.</p> <p>2. T. Mitchell. “Machine Learning”, McGraw-Hill, 1997.</p>
<p>Reference Books: (As per IEEE format)</p> <p>1. Hand, Smyth, Mannila “Principles of Data mining”, MIT press, 2001</p> <p>2. Gagendra Sharma, “Data mining, Data warehousing and OLAP”, S.K. Kataria and sons.</p>
<p>Moocs Links and additional reading material:</p> <ul style="list-style-type: none"> • www.nptelvideos.in • https://www.coursera.org/learn/machine-learning
<p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Understand data science and the key steps involved well enough to lead/manage a real-life data science project 2. Derive useful facts from techniques like classification, clustering, frequent pattern analysis and regression . 3. Apply suitable technique to predict useful patterns 4. Apply predictive analytics and various mining techniques for real life problems. 5. Construct a multi-dimensional modelling solution involving various data sources, ETL, and OLAP. 6. Illustrate use of appropriate Data analysis technique/s given the data Specifications. Solve real life problems using data analysis techniques
<p>COPOMap</p> <p>CO1 – PO2</p> <p>CO2 - PO3</p> <p>CO3 – PO8</p> <p>CO4 – PO10</p> <p>CO5 – PO12</p> <p>CO6 – PSO4</p>

CO attainment levels		
CO1 - 4		
CO2 - 3		
CO3 - 3		
CO4 - 2		
CO5 - 3		
CO6	-	3
Future Courses Mapping:		
Data Analytics, Machine learning,Deep learning		
Job Mapping:		
Data Scientist , Data Architect. ,Data Analyst.,Data Engineer.		

Syllabus Template
IT9013:: Advanced Web Technology

Course Prerequisites:

Basic HTML, CSS, Java Script, Server-Client architecture, Database

Course Objectives:

1. On completion of this course, a student will be familiar with all latest frame works.
2. Apply different modern technologies used for real-time client server application.
3. Develop different attractive and interactive web pages.
4. Familiar with different types of databases.
5. Write Server side code.

Credits:**Teaching Scheme Theory:** Hours/Week**Tut:** Hours/Week**Lab:** Hours/Week**Course Relevance:** Attractive web design, Client side validation, Server side coding

SECTION-1

Topics and Contents

Introduction to HTML 5: New elements, New input types, new attributes, Local Storage, Session Storage, Server sent events, CSS3, Bootstrap JQuery: Introduction to JQuery, loading JQuery, selecting elements, changing styles, creating elements, appending elements, removing elements, handling events, JQuery. AJAX Server side technology and TOMCAT, introduction to servlet, need and advantages, servlet lifecycle, creating and testing of sample servlet, session management. JSP: introduction, advantages of JSP over Servlet, elements of JSP page: directives, comments, scripting elements, actions and templates, JDBC, MongoDB: Introduction, Environment, Create Database, Drop Database, Create Collection, Drop Collection, Read Operations, Write Operations, Data Modelling, Administration.

SECTION-II

Topics and Contents

Web Technology Frameworks: Express Framework: Introduction to Express Framework, Introduction to Nodejs, What is Nodejs, Getting Started with Express, First Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment Angular JS: Overview, MVC architecture, Directives, Expression, Controllers, Filters, Tables, Modules, Forms, Includes, Views, Scopes, Services, Dependency injection, Custom directives, Internationalization, NodeJS: Getting started, Node Core, Node Modules, File System, Debugger, Automation and Deployment.

List of Practicals: (Any Six)

- 1) Design a web page to demonstrate the use of different HTML5 tags.
- 2) Design a web page to demonstrate the use of CSS3 tags.
- 3) Design CRUD (Create, Read, Update, and Delete) application using HTML and JQuery.
- 4) Design application using JQuery to process a simple quiz, checking if the user entered the correct answer and messaging the result.
- 5) Design a web page using AJAX methods.
- 6) Write a program to demonstrate the use of servlet request and response as well as doGet() And doPost() methods.
- 7) Design Registration form with following fields: First Name, Last Name, Username, Password, Address, Contact Number with JSP and using MVC architecture.
- 8) Design a simple application using Express framework.
- 9) Design a Login form using AngularJS
- 10) Build a web app where users can type in a city name and get real-time weather data instantly displayed on their screen using NodeJS and Express.

List of Projects:

Design and deploy web based application using HTML5, CSS, Bootstrap, JQuery, MobgoDB, AngularJS, Nodejs and Express framework.

1. Student Registration System
2. Library Management System
3. Tours and Travel System
4. Online Examination System
5. Online Hotel Management System
6. E-book shop
7. Online Reservation System
8. Online recruitment System
9. Movies management
10. E healthcare system

List of Course Seminar Topics: NA**List of Course Group Discussion Topics: NA****List of Home Assignments:****Design:**

1. Online Banking System
2. School management System
3. Gym management System
4. Online food delivery System
5. Online Movie review management

Case Study:

1. EBay (Online Shopping Cart)
2. Linked in (Social networking site)
3. Uber (Online Cab booking)
4. Yahoo mail (A mail service)
5. Paypal (An online digital cash wallet)

Blog

1. JSP vs Servlet
2. SQL vs Mongo DB
3. Node JS vs Angular JS
4. Servlet life cycle
5. AJAX

Surveys

1. MVC Architecture
2. Express Framework
3. Types of Database Connectors
4. Different types of Servers
5. Mongo DB

Suggest an assessment Scheme:

MCQ 15

Quiz 15

LAB-Course Assignment and Project Evaluation 40

Viva 20

Text Books: (As per IEEE format)

1. Thomas Black Book; “JDBC 4.2, Servlet 3.1 & JSP 2.3”; Dreamtech Press, 2016.
2. Adam Bretz & Colin J Ihrig; “Full Stack Javascript Development with MEAN”; SPD, 1st Edition, Indian Reprint September 2015.
3. Brad Dayley, “Node.js, MongoDB, and AngularJS Web Development”; Addison-Wesley Professional 2014.
4. Azat Mardanov, Anatoliy Chakkaev; “Express.js Guide: The Comprehensive Book on Express.js: The Comprehensive Book on Express.js”; CreateSpace Independent Publishing Platform 2013.

Reference Books: (As per IEEE format)

1. Giulio Zambon; “Beginning JSP, JSF and Tomcat”; 2nd Edition, Apress Publication.
2. Sandeep Panda; “Angular JS: Novice To Ninja”; SPD, 1st Edition, Indian Reprint 2015.
3. Black book; “Web Technologies:HTML,JS,PHP,Java,JSP,ASP.NET,XML and AJAX” ; Dreamtech Press, 2016.
4. Robin Nixon; “Learning PHP, MySQL, JavaScript, CSS and HTML 5”; 4th Edition, O’Reilly publication.

Moocs Links and additional reading material:

1. JavaScript Tutorial for beginners by Navin Reddy- https://www.youtube.com/watch?v=uDwSnnhl1Ng&list=PLY-UbAd0uV4PnOuWei-D7uZYOxp_Ny7wo
2. Angular JS by Naresh IT- https://www.youtube.com/watch?v=csG0pwe3O_M&list=PLVIQHNRlfIP80qHYWmEFXwBn_3CObbX1q
3. Node JS Tutorials for Beginners by Naresh IT- https://www.youtube.com/watch?v=Yg6AdA5AXb0&list=PLVIQHNRlfIP_Pd4-LtOg7OM_rUhJ5pC-i
4. Express JS Tutorial- Ganguly Tech-

https://www.youtube.com/watch?v=Q6swmpfzcgY&list=PLNHw_0qv1zy_Ym-VPmRggL94HmI-3dlGm

Course Outcomes:

The student will be able to –

- 1) Design reliable, efficient, scalable front end view of web pages with HTML5, CSS3 and Bootstrap .
- 2) Apply JQuery concepts for responsive web frontend development.
- 3) Refine dynamic web pages with JSP, Servlet.
- 4) Implement frontend and backend scenarios to read, write and update data stored in MongoDB.
- 5) Build responsive web application using Express framework.
- 6) Develop front end application using Angular JS.

CO PO Map

Co1- Po3

Co2- Po2

Co3- Po1

Co4- Po11

Co5- Po4

Co6- Po5

CO attainment levels

Co1- 2

Co2-3

Co3-4

Co4-4

Co5-5

Co6-5

Future Courses Mapping:

React JS, Riot JS

Job Mapping:

Web designer, Server side developer

Syllabus Template**IT3201::Artificial Intelligence**

Course Prerequisites: Data structures, Computer programming

Course Objectives:

To make students

1. familiar with basic principles of AI
2. capable of using heuristic searches
3. aware of knowledge based systems
4. able to use fuzzy logic and neural networks
5. Learn various applications domains AI

Credits: 4

Teaching Scheme Theory: 3 Hours/Week

Lab: 2 Hours/Week

Course Relevance: This course is highly applied in many scientific and engineering disciplines

SECTION-1**Topics and Contents*****Fundamentals of Artificial Intelligence***

Introduction, A.I. Representation, Non-AI & AI Techniques, Representation of Knowledge, KnowledgeBase Systems, State Space Search, Production Systems, Problem Characteristics, types of production systems, Intelligent Agents and Environments, concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation

Uninformed Search Strategies

Formulation of real world problems, Breadth First Search, Depth First Search, Depth Limited Search, Iterative Deepening Depth First Search, Bidirectional Search, Comparison of Uninformed search Strategies, Searching with partial information, Sensor-less problems, Contingency problems.

Informed Search Strategies

Generate & test, Hill Climbing, Best First Search, A and AO* Algorithm, Game playing: Minimax Search, Alpha-Beta Cutoffs, Waiting for Quiescence*

SECTION-1I

Topics and Contents

Knowledge Representation

Knowledge based agents, Wumpus world. Propositional Logic: Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining. First order

Logic: Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining.

Introduction to PROLOG and ANN

AI Programming Language (PROLOG): Introduction, How Prolog works?, Backtracking, CUT and FAIL operators, Built –in Goals, Lists, Search in Prolog. Expert System: Case study of Expert System in PROLOG

Introduction to Neural networks:- basics, comparison of human brain and machine, biological neuron, general neuron model, activation functions, Perceptron learning rule, applications and advantages of neural networks. Brief introduction to single layer and multiplayer networks.

Handling Uncertainty

Non Monotonic Reasoning, Logics for Non Monotonic Reasoning, Semantic Nets, Statistical Reasoning, Fuzzy logic: fuzzy set definition and types, membership function, designing a fuzzy set for a given application.

List of Practicals: (Any Six)

1. Implement Non-AI and AI Techniques
2. Implement any one Technique from the following
 - a. Best First Search OR A* algorithm
 - b. AO* algorithm
 - c. Hill Climbing
3. Implement Perceptron learning algorithm
4. Implement a real life application in Prolog.
5. Expert System in Prolog-new application
6. Implement any two Player game using min-max search algorithm.
7. Design a fuzzy set for shape matching of handwritten character
8. Conducting Turing test of an online chat robot
9. Any real application of AI in gaming
10. Spam email detection and classification using any simple classifier

List of Projects: (Any project within following domain)

1. Pattern recognition –Classification, Clustering, hybrid-classification clustering
2. Prediction using -Regression –Linear or nonlinear
3. Game playing- single player/2-player/multi-player
4. Use of Knowledge based system for generating inferences
5. Deep Learning
6. Neural network training and using for a real application
7. Use of fuzzy sets for human like reasoning
8. Use of any ML algorithm for solving real world problem
9. Deep Learning framework-PyTorch
10. Expert system applications in medicine suggestions
11. Some other projects decided by instructor

List of Course Seminar Topics:

1. Fuzzy sets theory- Operations on sets
2. Deep Learning
3. Non-monotonic Logic and real applications
4. Neural network training for real applications
5. Predicate Logic for reasoning
6. Expert system design and development
7. PROLOG and LISP comparison
8. Heuristic Search Techniques
9. Game playing - A specific game and its method
10. ML Algorithms for predications
11. Expert systems to replace human experts
12. Medical diagnosis applications of AI
13. Features of RPOLOG
- 14 . Some other topics decided by instructor

List of Course Group Discussion Topics:

1. Semantic Networks
2. Fuzzy set design for real application
3. Neural network training and testing
4. Classification, Clustering and hybrid approaches to pattern recognition
5. Blocks world Domain- STRIPS
6. Predicate logic inference rules
7. Resolution in predicate logic
8. Perceptron Learning rule
9. R-category perceptron learning algorithm and application design
10. Bays theorem and classifier
11. IBM's Watson supercomputer application
12. Working of Alexa and applications
13. Self driving car applications of AI (Tesla car)

14. Chat bot types and applications
15. Some other topics decided by instructor.

List of Home Assignments:**Design:**

1. Heuristic function design for a specific search application
2. Knowledge base design for a small expert system for real application
3. Design of fuzzy sets for a given application
4. Designing Neural network architecture for pattern recognition
5. Design of a reasoning system for the shape matching of objects
6. Any other topics mutually decided by students-instructor

Case Study:

1. PROLOG expert system
2. Alexa
3. Google Assistant
4. Page ranking algorithm
5. Emotion detection
6. Any other topics mutually decided by students-instructor

Blog

1. Future of AI
2. Deep Learning Architectures
3. AI in healthcare
4. AI in finance
5. Neural network classification
6. Any other topic mutually decided by students-instructor
7. Commercial applications of Expert systems
8. Future of self driving cars
9. Developmental phases of PROLOG
10. NLP history
11. Text to speech conversion applications
12. Some other topics decided by instructor

Surveys

1. HCR algorithms
2. Face recognition
3. Thumb print recognition
4. Image captioning
5. Data sampling techniques
6. Any other topic mutually decided by students-instructor
7. Expert systems for medical diagnosis
8. Development of MRI automated diagnosis
9. NLP applications in healthcare
10. Neural networks applications in pattern recognition
11. Some other topics decided by instructor

Suggest an assessment Scheme:

MSE	PPT Presentation	ESE	GD	Viva	Lab assignments +Course Project
10	10	10	10	20	40

Text Books: (As per IEEE format)

1. Elaine Rich and Kevin Knight, *Artificial Intelligence*, 2nd, Ed., Tata McGraw Hill, 1991
2. Stuart Russell & Peter Norvig, *Artificial Intelligence : A Modern Approach*, 2nd, Ed., Pearson Education, 2003

Reference Books: (As per IEEE format)

1. Ivan Bratko, *Prolog Programming For Artificial Intelligence*, 2nd Ed. Addison Wesley, 1986.
2. Eugene, Charniak, Drew Mcdermott, *Introduction to Artificial Intelligence*, Addison Wesley, 1985
3. Dan W Patterson, *Introduction to AI and Expert Systems*, PHI, 1990
4. Nils J. Nilsson, *Principles of Artificial Intelligence*, 1st Ed., Morgan Kaufmann, 1982
5. Carl Townsend, *Introduction to turbo Prolog*, Paperback, 1987
6. Jacek M. Zurada, *Introduction to artificial neural systems*, Jaico Publication, 1994

Moocs Links and additional reading material:

1. <http://www.eecs.qmul.ac.uk/~mmh/AINotes/AINotes4.pdf>
2. <https://www.slideshare.net/JismyKJose/conceptual-dependency-70129647>
3. <https://web.archive.org/web/20150813153834/http://www.cs.berkeley.edu/~zadeh/papers/Fuzzy%20Sets-Information%20and%20Control-1965.pdf>
4. <https://www.youtube.com/watch?v=aircAruvnKk>
5. <https://www.youtube.com/watch?v=IHZwWFHwa-w>
6. <https://silp.iitita.ac.in/wp-content/uploads/PROLOG.pdf>
7. Others suggested by instructor

Course Outcomes:

Upon completion of the course, graduates will be able to -

1. Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents capable of problem formulation.
2. Evaluation of different uninformed search algorithms on well formulate problems along with stating valid conclusions that the evaluation supports.
3. Design and Analysis of informed search algorithms on well formulated problems.
4. Formulate and solve given problem using Propositional and First order logic.
5. Apply planning and neural network learning for solving AI problems
6. Apply reasoning for non-monotonic AI problems.

CO PO Map

CO1-PO2, CO2-PO3, CO3-PO6, CO4-PO7, CO5-PO9, CO6-PSO4

CO attainment levels

CO1-2, CO2-2, CO3-3, CO4-4, CO5-5, CO6-3

Future Courses Mapping:

Mention other courses that can be taken after completion of this course

Fuzzy Logic and soft computing, Artificial Neural networks, Pattern Recognition, Knowledge based systems, Intelligent Searching, Natural Language Processing, Expert systems and any other courses that uses AI techniques.

Job Mapping:

What are the Job opportunities that one can get after learning this course

Developer -Knowledge based systems, Expert system-Developer, AI application Engineer, Developer -AI applications, Architect AI solutions and etc

Syllabus Template

IT9004::Internet of Things

Course Prerequisites: Computer Networks, Computer Programming

Course Objectives:

1. Understand the IOT Terminology and Technology.
2. Describe IOT applications.
3. Analyze Protocol standardization for IOT.
4. Perform an analysis of IOT security issues.
5. Identify the role of cloud computing in IOT.

Credits: 4

Teaching Scheme Theory: 3 Hours/Week

Lab: 2 Hours/Week

Course Relevance: IoT or Internet of Things is primarily a full system of all the interconnected computing devices, having all the mechanical and digital machines. IoT is beneficial because it makes our work easy and is very less time-consuming. IoT has got a lot more scope in terms of making a career and even exploring more opportunities if starting up with their own business. The words such as cyber-attack, hacking we can hear these too jointly with IoT. Despite, of the fear of piracy and cyber attack the internet of things and IoT applications will grow much more faster in the coming years

SECTION-1

Topics and Contents

Introduction – Digital Electronics, Logical gates and its working, Types of sensors: Temperature sensor (LM35, RTD, Thermocouple), Light sensor (photodiode, optocoupler), Distance and range sensor (IR, LVDT), Accelerometer sensor, Touch screen sensor.

Introduction to IOT - Definition & Characteristics, Importance of IoT, Physical Design of IOT, Logical Design of IOT, IOT Enabling technologies, IoT and M2M, IOT Platform Design Methodology, Purpose & Requirements Specification, Process Specification, Domain Model Specification, Information model Specification, Service specification, IOT level Specifications, Functional View Specifications, Operational View Specification, device and component integration, application development

IoT Smart X Application - Smart Cities, Smart Energy & Smart Grid, Smart Mobility & transport, Smart Home, Smart Building & Infrastructure, Smart Factory & Manufacturing, Smart Health, Smart Logistics & Retail. **Embedded suite for IoT Physical device** – Arduino /

Raspberry Pi Interfaces, Hardware requirement of Arduino / Pi, Connecting remotely to the Arduino /Raspberry Pi , GPIO Basics

SECTION-1I

Topics and Contents

Protocols in IOT: *RFID: Introduction, Principle of RFID, Components of an RFID system, RFID Protocols & NFC protocols, CoAP, XMPP, AMQP, MQTT*

Resource Management In The Internet Of Things: *Clustering, Software Agents, Clustering Principles in an Internet of Things Architecture, Design Guidelines, and Software Agents for Object Representation, Data Synchronization.*

Internet of things Challenges: *Vulnerabilities of IoT, Security, Privacy & Trust for IoT, Security requirements Threat analysis, Use cases and misuse cases, Introduction to cloud computing, Role of Cloud Computing in IoT, Cloud-to-Device Connectivity, Cloud data management, cloud data monitoring, Cloud data Exchange.*

List of Tutorials: (Any Three) NO tutorial for this course

List of Practicals: (Any Six)

- 1) Installation of the operating system on Raspberry Pi-3
- 2) Arduino / Raspberry Pi interface to GSM module
- 3) Arduino / Raspberry Pi interface to Wi-fi module
- 4) Arduino / Raspberry Pi interface to Bluetooth module
- 5) Write a code to identify the object and notify the user
- 6) Write a code to connect the PIR and IR sensor, led and toy motor.
- 7) Write a code to connect the ultrasonic sensor
- 8) Understanding of connectivity and configuration of the camera module with raspberry pi. Write a code to capture and store image
- 9) Write a web application to access LED from the internet.
- 10) Write a web application to send sensor data to the cloud using MQTT communication Protocol.

List of Projects:

1. Being Social on Twitter & update status on Twitter through Arduino.
2. IoT Temperature monitor for greenhouse.
3. Arduino Based Home Security System.
4. Arduino Based Heart Rate Monitor:
5. A fall detection system based on Arduino, Windows and Azure
6. Voice Controlled Mini Home Automation using Android Smartphone.
7. Control Devices using Localhost Web Server for Home Automation.
8. Minimizing Electricity Theft by Internet of Things.
9. Internet-of-Things Based Ubiquitous Healthcare Systems.
10. A Design of the IOT Gateway for Agricultural Greenhouse

List of Course Seminar Topics:

1. IOT Protocols
2. IOT Vs M2M
3. Ubiquitous IoT Applications
4. IoT Enabling technologies
5. RPi operating system features over Arduino
6. Arduino architecture and its interfacing techniques
7. IPv6 technologies for the IoT.
8. Sensors in IOT
9. IoT System Management with NETCONF-YANG
10. Future IOT

List of Course Group Discussion Topics:

1. IoT Challenges
2. MQTT Vs CoAP
3. LoWPAN
4. WSN architecture
5. Role of cloud computing in IOT
6. Challenge in integration of IoT with Cloud.
7. RFID Vs NFC with real world example
8. Vulnerabilities of IoT
9. Cloud types; IaaS, PaaS, SaaS with real world example
10. Resource Management In The Internet Of Things

List of Home Assignments:**Design:**

1. Design a complete IOT architecture for Smart office
2. Design a complete IOT architecture for Smart garden
3. Design a complete IOT architecture for Smart industry
4. Provide a complete layered architecture for Weather monitoring system and explain the same
5. Develop the IOT security system for the applications, just to make sure that the data is collected safely and sound

Case Study:

1. Cloud Computing
2. Temperature Monitoring & Control
3. Various sensors and its internal operation w.r.t raspberry pi-3
4. Smart Campus
5. Cloud Storage models and communication APIs

Blog

1. Cloud-to-Device Connectivity
2. Industry 4.0- IOT
3. IOT security issues
4. Internet of Business
5. IOT for Healthcare

Surveys

1. IoT development boards with operating systems
2. Smart Agriculture
3. Rural Development using IOT
4. Smart Supply Chain
5. Smart Transportation

Suggest an assessment Scheme:

1. *MSE*
2. *ESE*
3. *Course Project*
4. *GD/PPT*

Text Books: (As per IEEE format)

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015
- 2 Dr. Ovidiu Vermesan, Dr. Peter Friess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers, ISBN-10: 8792982735
- 3 Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
- 4 Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

Reference Books: (As per IEEE format)

1. Pethuru Raj, Anupama C. Raman, *The Internet of Things Enabling Technologies, Platforms, and Use Cases*, CRC Press Taylor & Francis Group, International Standard Book Number-13: 978-1-4987-6128-4
2. Rajkumar Buyya, Amir Vahid Dastjerdi *Internet of Things – Principals and Paradigms*, Morgan Kaufmann is an imprint of Elsevier, ISBN: 978-0-12-805395-9 Hakima Chaouchi, "The Internet of Things Connecting Objects to the Web" ISBN : 978-1- 84821-140-7, Willy Publications
3. Olivier Hersent, David Boswarthick, Omar Elloumi, *The Internet of Things: Key Applications and Protocols*, ISBN: 978-1-119-99435-0, 2nd Edition, Willy Publications
4. Daniel Kellmireit, Daniel Obodovski, "The Silent Intelligence: The Internet of Things",. Publisher: Lightning Source Inc; 1 edition (15 April 2014). ISBN-10: 0989973700, ISBN-13: 978- 0989973700.

Moocs Links and additional reading material:

1. <https://nptel.ac.in/courses/106/105/106105166/>
2. https://swayam.gov.in/nd1_noc19_cs65/preview

Course Outcomes:

Upon the completion of the course, student will be able to

- 1) Design an application based on IOT Terminology and Technology
- 2) Demonstrate embedded tools usage for IOT applications
- 3) Implement the connectivity technologies and protocols in IOT
- 4) Produce a solution for IOT security challenges.
- 5) Apply Cloud technology concepts for developing IOT based prototype
- 6) Perform programming and data analysis to build and test a complete working IoT system.

CO PO Map

C O	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
C O1			3													
C O2					3											
C O3						3										
C O4							1									
C O5												2				
C O6																3

CO attainment levels

- 1) Design an application based on IOT Terminology and Technology-----2
- 2) Demonstrate embedded tools usage for IOT applications-----1
- 3) Implement the connectivity technologies and protocols in IOT-----3
- 4) Produce a solution for IOT security challenges.-----4
- 5) Apply Cloud technology concepts for developing IOT based prototype-----4
- 6) Perform programming and data analysis to build and test a complete working IoT system.---5

Future Courses Mapping:

Knowledge of IOT can be applied for the development of applications based on AI or ML

Job Mapping:

1. IOT developer
2. IOT Embedded software developer
3. Cloud Engineer
4. Network Engineer
5. Can launch startup business

Syllabus Template

IT9018::Image Processing

Course Prerequisites: Signal processing, Linear algebra

Course Objectives:

1. To learn Image Processing fundamentals.
2. To study Image preprocessing methods.
3. To understand image lossless and lossy compression techniques.
4. To introduce the major ideas, methods, and techniques of computer vision and pattern recognition.
5. To acquaint with Image segmentation and shape representation.

Credits:

Teaching Scheme Theory: Hours/Week

Tut: Hours/Week

Lab: Hours/Week

Course Relevance: Image processing is of fundamental importance to any field in which images must be enhanced, manipulated, and analyzed. It plays a key role in remote sensing, medical imaging, inspection, surveillance, autonomous vehicle guidance, and many more.

SECTION-1

Topics and Contents

Introduction, Elements of image processing system, Scenes and Images, Vector Algebra, Human Visual System, color vision color model: RGB, HVS, YUV, CMYK, YCbCr and some basic relationships between pixels, linear and nonlinear operations. Image types (optical and microwave), Image file formats (BMP, tiff, jpeg, ico, ceos, GIF, png, raster image format). Image sampling and quantization. Thresholding, Spatial domain techniques

{ Image Negative, Contrast stretching, gray level slicing, bit plane slicing, histogram and histogram equalization, local enhancement technique, image subtraction and image average, Image Smoothing: low-pass spatial filters, median filtering, Image Sharpening: high-pass spatial filter, derivative filters, Frequency domain techniques- Ideal low-pass filter, Butterworth low-pass filter, High-pass filter, Homo-morphic filters.

Image segmentation- Classification of image segmentation techniques: Watershed Segmentation, Edge-based Segmentation, region approach, clustering techniques, edge-based, classification of edges and edge detection, watershed transformation.

SECTION-II

Topics and Contents

Introduction to Image compression and its need, Coding redundancy, classification of compression techniques (Lossy and lossless- JPEG, RLE, Huffman, Shannon fano), Object Recognition { Need, Automated object recognition system, pattern and pattern class, relationship between image processing and object recognition, approaches to object recognition. Introduction to two dimensional orthogonal and unitary transforms, properties of unitary transforms. One-two dimensional discrete Fourier Transform (DFT). Cosine, Slant, KL, affine transforms. Singular Value Decomposition, Applications of transforms in Image processing. Sub band coding, Haar Transform – it's application as a Wavelet, multi resolution expansions, Wavelet Transform in one dimensions; Wavelet transforms in two dimensions. DB4, Fast Wavelet Transform, Other Applications of Wavelet in image processing.

List of Practicals: (Any Six)

1. Write matlab code to display following binary images
 - a. Square
 - b. Triangle
 - c. Circle
 - d. Write matlab code to perform following operations on images
 - e. Flip Image along horizontal and vertical direction.
 - f. Enhance quality of a given image by changing brightness of image.
 - g. Image negation operation.
 - h. Change contrast of a given Image.
2. Write Matlab code to implement pseudo coloring operation of a given image. Write Matlab Code for Pseudo Colour of Image by using Gray to colour transform.
3. Study of different file formats e.g. BMP, TIFF and extraction of attributes of BMP.
4. Write matlab code to find following statistical properties of an image.

- a. Mean
- b. Median
- c. Variance
- d. Standard deviation
- e. Covariance.

5. Write matlab code to enhance image quality by using following techniques

- a. Logarithmic transformation
- b. Histogram Equalization
- c. Gray level slicing with and without background.
- d. Inverse transformation.

6. Read an Image and Perform singular value decomposition. Retain only k largest singular values and reconstruct the image. Also Compute the Compression ratio.

7. Write matlab code to enhance image quality by using following techniques

- a. Low pass and weighted low pass filter.
- b. Median filter.
- c. Laplacian mask.

8. Write matlab code for edge detection using Sobel, Prewitt and Roberts operators.

9. Write C-language code to find out Huffman code for the following word COMMITTEE.

10. Write matlab code to design encoder and decoder by using Arithmetic coding for the following word MUMMY. (Probabilities of symbols M-0.4, U-0.2, X-0.3, Y-).

11. Write matlab code to find out Fourier spectrum, phase angle and power spectrum of binary image and gray scale image.

List of Projects:

1. Pseudo colour image processing
2. Image Editing
3. Video Editing
4. Image Compression
5. Video Compression
6. Face detection
7. Check Image tampering
8. Thumb recognition
9. Traffic detection
10. Game development

List of Course Seminar Topics:

1. Color models
2. Image file formats
3. Image sampling and quantization
4. histogram equalization
5. Image Smoothing
6. Image Sharpening
7. Watershed Segmentation,
8. Edge-based Segmentation
9. Region approach for Segmentation
10. Classification of edges and edge detection

List of Course Group Discussion Topics:

1. Lossy Compression Techniques
2. Loss less Compression Techniques
3. Fourier Transform
4. Set Partitioning in Hierarchical Trees-SPIHT Wavelet Transform
5. Image Understanding-Pattern Recognition Models
6. Object Recognitions
7. 3-D models and its applications
8. Wavelet Transform
9. Haar Transform
10. Orthogonal and unitary transforms

List of Home Assignments:**Design:**

1. Character recognition
2. Object recognition

3. Face detection
4. Eyeris detection
5. Smiley face

Case Study:

1. Image Processing for Smart City
2. Image Processing for traffic data
3. Research Areas in Image Processing
4. Image Processing for Swastha Bharat
5. Image Processing in IoT

Blog

1. Image Processing for for Data Science
2. Image Processing for Smart Agriculture
3. Image Processing in Medical Field
4. Usage of AI for Image Processing
5. Job Opportunities in Image Processing

Surveys

1. Steganography and Cryptography
2. Image Processing for Educations
3. Dynamic Texture Synthesis
4. Image & Video Compression
5. Drone based Surveillance

Suggest an assessment Scheme:

MSE, ESE, LAB+Course Project, GD, PPT, VIVA

Text Books: (As per IEEE format)

1. Rafael Gonzalez & Richard Woods, "Digital Image Processing," 3rd Edition, Pearson publications, ISBN 0132345633.

2. S. Jayaraman, S Esakkirajan, & T Veerakumar, "Digital Image Processing," Tata McGraw Hill Education, ISBN(13) 9780070144798.

3. Anil K. Jain, "Fundamentals of Digital Image Processing," 5th Edition, PHI publication, ISBN 13: 9780133361650.

Reference Books: (As per IEEE format)

1. Pratt, "Digital Image Processing," Wiley Publication, 3rd Edition , ISBN 0-471-37407-5.
2. K.R. Castleman, "Digital Image Processing," 3rd Edition, Prentice Hall: Upper Saddle River, NJ, 3, ISBN 0-13-211467 -4.
3. K. D. Soman and K. I. Ramchandran, "Insight into wavelets - From theory to practice," 2nd Edition PHI, 2005.

Moocs Links and additional reading material: www.nptelvideos.in

Course Outcomes:

The student will be able to

1. Describe image model
2. Perform spatial filtering on image
3. Identify Image Segmentation techniques.
4. Apply lossless and lossy compression techniques for image compression.
5. Use various image transforms to analyze and modify image.
6. Understand Wavelet transform for Image Processing Applications.

CO PO Map
CO attainment levels CO1-2 CO2-3 CO3-2 CO4-3 CO5-4 CO6-5
Future Courses Mapping: <i>AR VR, NLP, AI, ML, Video Analytics using GPU</i>
Job Mapping: <i>Image Processing Developer, Machine Vision Engineer, Associate Data Scientist Computer Vision, Data Scientist Image Processing, Computer Vision, Lead Scientist - Image Analytics & Signal Processing, Software Development Engineer - Image Processing, Image Processing & Computer Vision Engineer, Medical Image Processing Engineer, Architect - Video and Image Processing, Lead - Medical Image Analysis Developer, Research Engineer - Image Processing, Image Analysis Scientist - Image Processing/Pattern Recognition.</i>

Syllabus Template

IT9005::Mobile Application Development

Course Prerequisites: Fundamentals of Java Programming

Course Objectives:

1. Understand programming for mobile devices.
2. Develop fundamental and efficient programs.
3. Design database interface.
4. Learn to use google maps and location tracking.
5. Develop android programs by using device resources.

Credits:

Teaching Scheme Theory: Hours/Week

Tut: Hours/Week

Lab: Hours/Week

Course Relevance: Mobile application development has a huge demand in the market. It is a challenging industry and growing day by day. As mobile users across the world are utilizing important services like Banking, Payments, Healthcare, etc. and the requirement for new and innovative mobile applications is going to continue. Due to rapid growth in this industry, it is now an opportunity for skilled application developers to have excellent career growth as employee or entrepreneurs. Over the next few years, the market for mobile application developers is expected to grow substantially.

SECTION-1

Android UI Components & Multimedia

Topics and Contents

Basics-Fundamentals of Java for Android Application Development, Introduction to Mobility, Mobile Platform, App development approaches, Android Platform Architecture, Development Environment for Android, Android app project structure, Logical components of Android app, Android Tool Repository, Introduction of Apple and Window mobile OS Architecture UI Components-Activity life cycle, UI resources, String resources, Image resources, Common attributes of View, Event handling associated with Button, Edit Text, Check Box, List View, Image View, Alert Dialog, Navigation between Activities, Fragments, Life cycle of Fragment, Interaction between Fragments, Action Bar, Menu, Introduction to Material Design Pattern, Layouts, Recycler View, Fragments, Intents Multimedia-Graphics and Animation, Multimedia, Audio, Video, Camera

SECTION-II

Topics and Contents

Data Storage-Internal and External File storage Operation, Shared Preference, SQLite database, Remote database operations, Notification, Thread, Asyn Task, JSON data access. Services-Service, Broadcast Receivers, SMS and Telephony API, Threads & Services, Invading the home screen Advanced Functionalities-Location services and Maps, Geocoding, Sensor, Emailing & Networking in android, Bluetooth, NFC, Wifi, Publishing, monetizing and distributing android application, Paranoid Android, Cloud to device messaging

Guidelines for Lab Work:

- a) Form the group of 3 students (strictly) from the concerned laboratory batch.
- b) Identify client in any domain you are comfortable e.g. Healthcare, Education, Retail, Automobile...
- c) The group may select any project from given project list or identify any other project with consent of faculty conducting this lab course.

List of Practicals: (Any Six)

1. Design an android Application for calculator.
2. Design an android Application student registration form.
3. Design an android Application for Phone Call.
4. Design an android application for audio player.
5. Design an android application for video player.
6. Design an android Application for SMS Manager.
7. Design an android Application to store and retrieve student data from database
8. Design an android Application using Google Map To Trace The Location of Device.
9. Design an android Application for jumping ball animation using graphics library.
10. Design an android Application for study room using Unity 3D
11. Design an android Application for library using Unity 3D
12. Design an android Application for office using Unity 3D

List of Projects:

1. Chatting application
2. Student registration system
3. Hospital management system
4. Office search helper
5. Library management system
6. Simulation of Car driving
7. Simulation of molecule structure
8. City road map
9. Transport alert system
10. Toll plaza management system
11. Path finder
12. Image clipper or photo editor

List of Course Seminar Topics: NA**List of Course Group Discussion Topics:NA**

List of Home Assignments: NA**Suggest an assessment Scheme:**

	Marks		Marks		Marks
Continuous Assessment	30	Course Project	40	Viva Voce	30

Text Books: (As per IEEE format)

1. Jonathan Simon; “Head First Android Development”; O’Reilly Media, Inc., 1005
2. “Beginning Android™ Application Development”; Wiley Publishing, Inc.10475

Reference Books: (As per IEEE format)

1. “Professional Android™ Application Development”; Wiley publishing, Inc.10475
2. Satya Komatineni, Dave MacLean, “Pro Android 4”, Apress,

Moocs Links and additional reading material:

1. www.nptelvideos.in
2. www.coursera.com
3. www.udemy.com
4. swayam.gov.in

Course Outcomes:

The student will be able to –

1. Apply data manipulation using Content Providers, Shared Preferences, embedded database SQLite, Flat files and Multi Media files.
2. Analyze and Design UI-rich apps using all the major UI components
3. Understand selection of suitable software tools, IDE and APIs for the development of Mobile Application.
4. Apply tracing and identify the location of specific/ specialized handheld or mobile devices using Google map and other alternative techniques.
5. Apply HTTP and Socket communication protocol by developing social media applications.
6. Create Package and prepare real world apps for deploying on mobile device.

CO PO Map**CO attainment levels****Future Courses Mapping:****Job Mapping:**

Mobile Application Developer, Entrepreneur