Kurukshetra University, Kurukshetra

('A+' Grade, NAAC Accredited)

Bachelor of Technology (Information Technology)
Credit-Based Scheme of Studies/Examination(Modified)
Semester V & VI

A. Definition of Credit:

1 Hour Lecture (L) per week	1 credit
1HourTutorial (T) per week	1 credit
1 HourPractical (P) per week	0.5 credit
2 Hours Practical(Lab) per week	1 credit

B. Range of Credits:

A total credit of 160is required for a student to be eligible to get Under Graduate degreeinInformation Technology (IT).

C. Abbreviations Used for Various Course Codes:

BS: Basic Science Courses
ES: Engineering Science Courses
HM: Humanities and Social Sciences including Management Courses
PC: Professional Core Courses
MC: Mandatory Courses
PE: Professional Elective Courses/Program Elective Courses
OE: Open Elective Courses
PROJ: Project
IT: Information Technology (IT)
OE-IT: Open Elective Courses-Information Technology (IT)

Bachelor of Technology (Information Technology)										
Credit-Based Scheme of Studies/Examination										
Semester V										
S. No.	**Course Code**	**Subject**	**L:T:P**	**Hours/Week**	**Credits**	**Examination Schedule (Marks)**				**Duration of Exam (Hrs)**
						Major Test	**Minor Test**	**Practical**	**Total**	
1	ES-301A	JAVA Programming	3:0:0	3	3	75	25	0	100	3
2	PC-IT-301A	Internet and Web Technology	3:0:0	3	3	75	25	0	100	3
3	PC-IT-303A	Computer Graphics	3:0:0	3	3	75	25	0	100	3
4	PC-IT-305A	Computer Organization & Architecture	3:0:0	3	3	75	25	0	100	3
5	OE	Elective-I	3:0:0	3	3	75	25	0	100	3
6	PC-IT-307AL	Programming with MATLAB	0:0:2	2	1	0	40	60	100	3
7	PC-IT-309AL	JAVA programming Lab	0:0:3	3	1.5	0	40	60	100	3
8	PC-IT-311AL	Internet and Web Technology Lab	0:0:3	3	1.5	0	40	60	100	3
9	PC-IT-313AL	Computer Graphics Lab	0:0:2	2	1	0	40	60	100	3
Total				**25**	**20**	**375**	**285**	**240**	**900**	
10	MC-904A	Energy Resources & Management	3:0:0	3	0	0	100	0	100	3
11	SIM-301A*	Seminar on Summer Internship	2:0:0	2	0	0	50	0	50	

OE Elective-I
Digital Data Communication: OE-IT-T301A
Computer Networks: OE-IT-T303A
Wireless sensor networks: OE-IT-T305A

***Note:** SIM-301*is a mandatory credit-less course in which the students will be evaluated for the Summer Internship undergone after 4th semester and students will be required to get passing marks to qualify.

ES-301A	JAVA Programming						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**The students acquire the technical skills with JAVA Programming.**						
	Course Outcomes						
CO1	The model of object oriented programming: Teach the basic concepts and techniques which form the object oriented programming paradigm.						
CO2	Test, document and prepare a professional looking package for applications.						
CO3	Understand the need of fundamental features of an object oriented language like interfaces, Exceptions, multithreading and input output handling in java to develop applications for long term use.						
CO4	Design & Develop platform-independent GUIs.						

Unit-1

Introduction to Java & Principles of Object Oriented Programming: Basic Concepts of OOP and it's Benefits. Application of OOP. The Creation of Java, Importance of Java for the Internet, Java's Magic: The Byte-code, Features of Java. Object-Oriented Programming in Java, Java Program Structure.

Defining Classes: Defining of a Class, Definition of Methods, Constructors, Creating Objects of a Class, Assigning ObjectReference Variables, The keyword "this" , Defining and Using a Class, Automatic Garbage Collection.

Arrays and Strings: Arrays, Arrays of Characters, String handling Using String Class, Operations on String Handling Using String Buffer Class.

Extending Class and Inheritance: Using Existing Classes, Class Inheritance, Choosing Base Class, Access Attributes,Polymorphism, Multiple Levels of Inheritance, Abstraction through Abstract Classes, Using Final Modifier, The Universal Super class-Object Class.

Unit-2

Package & Interfaces: Understanding Packages, Defining a Package, Packaging up your Classes, Adding Classes from aPackage to your Program, Understanding CLASSPATH, Standard Packages, Access Protection in Packages, Concept of Interface.

Exception Handling: The Idea behind Exceptions, Types of Exceptions, Dealing with Exceptions, Exception Objects,Defining Your Own Exceptions, Checked and Unchecked Exceptions.

Multithreading Programming: The Java Thread Model, Understanding Threads, The Main Thread, Creating a Thread:extending Thread and implementing Runnable, Creating Multiple Threads, Thread Priorities, Synchronization, Deadlocks inter-thread communication, Deadlocks.

Input/Output in Java: I/O Basic, Byte and Character Structure, I/O Classes, Reading Console Input, Writing to ConsoleOutput, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File. Stream Benefits.

Unit-3

Creating Applets in Java: Applet Basics, Applets Architecture, Applet Life Cycle, Simple Applet Display Methods,Requesting Repainting, Using the Status Window, The HTML APPLET Tag, Passing parameters to Applets.

Java Data Base Connectivity (JDBC): Database Connectivity- Relation Databases, JDBC API, Reusing DatabaseObjects, Transactions, Advance Techniques.

Working with Windows: AWT Classes, Window Fundamentals, Working with Frame, Creating a Frame Window in anApplet, displaying information within a Window.

Unit-4

Event Handling: Two Event Handling Mechanisms, The Delegation Event Model, The Event Handling process, EventClasses, Sources of Events, event Listener Interfaces, Using the Delegation Event Model, Adapter Classes. **Java Servlet Programming:** Role and Advantages of Java Servlets in Web application Development.

HTTP Servlets- Introduction, page generation, server side includes, servlet chaining, java Server pages.

Server Life Cycle: Servlet Alternative, Reloading, Init and Destroy, Single Thread Model, Background Processing LastModified times, synchronization, Persistent state capabilities.

Suggested books

1. HerbertzSchildt ,*The complete Reference Java,*McGraw.
2. Ivor Horton ,*Beginning JAVA 2 (JDK1.3 Edition),* , WROX Public.
3. Bruce Eckel ,*Thinking in Java*, Prentice Hall.
4. Jamie Jaworski, "*Java Unleashed",* SAMS Techmedia Publication, 1999.
5. JAVA 2 (1.3) API Documentations.
6. E. Balaguruswamy*, "Programming with Java"* , Tata McGraw-Hill Education.

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PC-IT-301A	Internet and Web Technology						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**To make the students conversant with Web designing.**						
	Course Outcomes						
CO1	To study fundamentals of Internet, its working techniques with their characteristics and various modes of connecting internet.						
CO2	To learn about the requirements for world-wide-web formats and its techniques.						
CO3	To study the working of E-mail and elements of HTML, XML and DHTML languages						
CO4	To introduce Servers, Privacy and Security providing tools.						

Unit-1

The Internet: Introduction to networks and internet, history, Internet, Intranet & Extranet, Working of Internet, Internet Congestion, Network Topologies, Modes of Connecting to Internet, Internet Service Providers(ISPs), Internet address, standard address, Introduction to OSI and TCP/IP, domain name, DNS, Telnet and FTP, HTTP, IP.v6,Modems..

Unit-2

World Wide Web : Introduction, Miscellaneous Web Browser details, searching the www: Directories search engines and meta search engines, search fundamentals, search strategies, working of the search engines.

Electronic Mail: Introduction, advantages and disadvantages, User Ids, Pass words, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, MIME, Newsgroups, mailing lists, chat rooms, secure-mails, SMTP,POP,IMAP.

Unit-3

HTML:HTML basics; HTML tags; text formatting; text styles; lists: ordered, unordered and definition lists; layouts; adding graphics; tables; linking documents; images as hyperlinks; Form; frames and layers.

CSS – basic style sheet concept, using style sheet in your document.

JAVASCRIPT Features of JavaScript, Variables, Control Structures, operators, loping, conditional statements & functions in JavaScript

Unit-4

Privacy and security topics: Introduction, Need of Security, Attacks, Types of attacks, security policy, Introduction to Encryption and Decryption, Secure Web document, Digital Signatures, Firewalls, Intrusion detection systems, Proxy Server,VPN.

Introduction to Server:-Introduction to client-server architecture, Apache, Internet Information Server

Suggested books

1. Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp – 2001, TMH
2. Internet & World Wide Programming, Deitel, Deitel& Nieto, 2000, Pearson Education
3. HTML – Complete Reference By Thomas A Powell – TMH
4. JavaScript – Unleased - 3 rd Edition from SAMS – Tech Media
5. Complete idiots guide to java script,.Aron Weiss, QUE, 1997
6. Network firewalls, Kironjeetsyan -New Rider Pub.
7. Networking Essentials – Firewall Media.

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PC-IT-303A	Computer Graphics						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**To aware the students about the Computer graphics designing.**						
	Course Outcomes						
CO1	To understand the foundations of computer graphics and students will be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.						
CO2	To understand concept of geometric, mathematical and algorithmic concepts necessary for programming computer graphics.						
CO3	To make the students familiar with techniques of two dimensional and three dimensional graphics transformations.						
CO4	To understand the comprehension of windows, clipping and view-ports object representation in relation to images displayed on screen.						

Unit – 1

Introduction: What is Computer Graphics, Computer Graphics Applications, Two dimensional Graphics Primitives: Points and Lines, Point Plotting Techniques: Coordinate system, Incremental Method, Linedrawing algorithms: DDA&Bresenhams's; Circle generating algorithms: Using polar coordinates, Mid-point circle drawing algorithms. Filled area algorithms: Scan line polygon filling algorithms, Boundary filled algorithms.

Graphic devices: Light pen, Mouse, Tablet, Touch panel, Digitizers

Unit – 2

Two Dimensional Viewing: Two dimensional geometric transformation, Viewingpipeline, window to viewport transformation, Window to view port mapping.

Clipping: Point & Line clipping algorithm, Cohen-Sutherland Line clipping algorithms, Polygon clipping: Sutherland-Hodgeman Polygon clipping algorithm. Curve clipping, Text clipping.

Unit – 3

Three Dimensional Viewing: Introduction to Three-dimensional display methods : Parallel & Perspective Projection depthcueing , surface rendering ; Three-Dimensional Geometric and Modeling Transformations; Viewing pipeline, Viewing coordinates,.

Unit – 4

Representation of 3-D Curves and Surfaces: Curved lines and surfaces, spline representations, interpolation andapproximation splines, Parametric continuity conditions, Geometric continuity conditions. Bezier curves and surfaces: Bezier curves, properties of Bezier curves, Bezier surfaces, B-spline curves and surfaces.

Hidden Surfaces removal: Classification of Visible-Surface Detection algorithms, Hidden surface elimination, depth bufferalgorithm, scan line coherence and area coherence algorithm, priority algorithm.

Suggested books

1. Hern& Baker – *Computer Graphics*, 2nd Ed. PHI.
2. Newmann& Sprawl – *Introduction to interactive Computer Graphics*, MGH.
3. Harrington – *Computer Graphics* – A programming Approach.
4. Rogers – *Principles of Computer Graphics* – MGH.
5. Folay – *Fundamental of Interactive Computer Graphics* – Addison Welsey

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PC-IT-305A	Computer Organization & Architecture						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**To provide the conceptual knowledgeabout the architectureof computer**						
	Course Outcomes						
CO1	To study computer architecture and instruction set						
CO2	To familiarize with different addressing modes						
CO3	To get familiarize with fetching and decoding of instruction.						
CO4	To study the process of pipelining						

UNIT -I

GeneralSystemArchitecture: Von-neumannModel, Storeprogram control concept,Flynn's classificationof computers(SISD, MISD,MIMD);Multilevelviewpointofamachine:digitallogic, microarchitecture,ISA, operatingsystems,highlevellanguage

Structuredorganization:CPU,caches, mainmemory,secondary memory units& I/O, Instruction Codes, Computer registers, Computer Instructions, Timing and Control, Instruction Cycle, Type of Instructions :Memory reference instructions, Register reference instructions, Input output instructions Design of accumulator logic

UNIT -II

Register Transfer and Microoperations: Register Transfer Language (RTL), register transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit, Microprogrammed Control: Control memory; address sequencing, microprogram sequencer, Design of Control Unit

UNIT -III

Central Processing Unit: CPU Architecture types (accumulator, register, stack, memory/register), Instruction formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Program Interrupt, RISC, CISC.

UNIT –IV

Memory Organization: Memory hierarchy, Mainmemory(SemiconductorRAM& ROM organization,memoryexpansion,Static&dynamicmemorytypes);Cachememory(Associative& directmappedcache organizations. Auxiliary Memory, Associative Memory, Cache memory, Virtual Memory, Direct Memory Access(DMA),Input-Output Processor(IOP).

Suggested Books

- W. Stallings, Computer Organisation and Architecture, 4th Edition, Pearson Education
- Harry, Jordan, Computer Systems Design & Architecture, Edition, Addison Wesley
- J. D. Carpinelli, Computer Systems Organization & Architecture, Addison Wesley.
- P. V. S. Rao, "Computer System Architecture", PHI, 2009.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

PC-IT-307AL	Programming with MATLAB						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**0**	**2**	**1**	**60**	**40**	**100**	**3 Hour**
Purpose	**To understand the basics of MATLAB.**						
	Course Outcomes						
CO1	To study MATLAB environment						
CO2	To study data types, variables, operators and assignment statements in MATLAB						
CO3	To implement the control structures in MATLAB						
CO4	To implement the arithmetic operations						

LIST OF EXPERIMENTS

1. To study MATLAB environment and to familiarize with Command Window, History, Workspace,CurrentDirectory,Figurewindow,Editwindow, Shortcuts, Helpfiles.
2. Datatypes,Constants andVariables,Characterconstants, operators,Assignmentstatements.
3. ControlStructures:Forloops,While,Ifcontrolstructures,Switch,Break,Continuestatements Input-Outputfunctions,Reading andStoring Data.
4. WriteaMATLABprogramtocalculatethefollowingexpressionandroundtheanswerstothe nearestinteger.

a)$z=5x^2+y^2$where x = 2, y = 4

b) $z=3\sin(x) +4\cos(x) +3e^y$wherex = π/3 , y =2

5. Vectors andMatrices, commandstooperateon vectors and matrices,matrixManipulations.
6. ArithmeticoperationsonMatrices,RelationaloperationsonMatrices,Logicaloperationson Matrices.
7. If x = [1 4;8 3], find:

a) theinversematrixof x .
b) thetranspose of x.
c) Determinantof x

8. PolynomialEvaluation,Roots of Polynomial,Arithmeticoperations onPolynomials
9. Graphics:2D plots,Printinglabels, Grid &Axes box, Textinplot, Bar andPie chart
10. Toplotasine wave of frequency 1Khz.
11. Studyof Simulink
12. Toimplementa simplecalculatoras a GUI
13. Solvethe followingsystem

    x + y - 2z = 3
    2x + y = 7
    x + y - z = 4

14. writea programto readthree bitsx, y,z, thencompute:

    a)v =(x and y)or z
    b) w = not(x or y)and z

15. Representthefollowing complexnumbersin polarcoordinate

    Z= 3+ 4j

Note :A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

PC-IT-309AL	JAVA Programming Lab						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hour**
Purpose	**To build software development skills using JAVA programming for real world applications**						
	Course Outcomes						
CO1	Implement programs using different reference keywords.						
CO2	Implement the concept of Multithreading and Synchronization.						
CO3	Implement applets to create GUI's.						
CO4	Study and Implement java connectivity with different databases.						

List of experiments:

1. Write a program to illustrate the concept of simple and multilevel inheritance.
2. Write a program to illustrate the concept of "this" keyword.
3. Write a program to illustrate the concept of Constructor and method Overloading.
4. Write a program to draw a Pyramid in JAVA.
5. Write a program to implement Binary Search.
6. Write a program to illustrate the concept of Threads by using yield (), stop (), and sleep () methods.
7. Write a program to illustrate the concept of synchronization in Threads.
8. Write a program to illustrate the concept of applets.
9. Write a program to draw shapes using Graphics Methods
10. Write a program to read a record into database using JDBC Connectivity.
11. Write a program to illustrate the concept of Event Handling

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

PC-IT-311AL	Internet and Web Technology Lab						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hour**
Purpose	**To demonstrate knowledge and skills utilizing various HTML tags for designing a static web page.**						
	Course Outcomes						
CO1	Understanding different PC software and their applications						
CO2	To be able to learn HTML.						
CO3	To be able to write Web pages using HTML.						
CO4	Implement CSS and Java Scripts.						

LIST OF EXPERIMENTS

1. Create a new document that takes the format of a business letter. Combine <P> and <BR> tags to properly separate the different parts of the documents. Such as the address, greeting, content and signature.
2. a) Create a seven-item ordered list using Roman numerals. After the fifth item, increase the next list value by 5.

   b) Beginning with an ordered list, create a list that nests both an unordered list and a definition list.
3. Create a table using HTML basic tags.
4. Create a online form in HTML.
5. Create frame with anchor tag.
6. Create links in HTML with the graphics embedding.
7. Create a style sheet in HTML.
8. Find the factorial of a number using looping conditional statement in javascript.
9. Create a program to find out whether the string is palindrome or not using javascript.
10. Create a form & check the form validation through javascript.

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

PC-IT-313AL	Computer Graphics Lab						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**0**	**2**	**1**	**60**	**40**	**100**	**3 Hour**
Purpose	**To make students aware of the concepts underlying Computer Graphics and Machine Vision**						
	Course Outcomes						
CO1	To understand inbuilt Graphics function of C.						
CO2	To Implement different line drawing algorithms.						
CO3	To implement different circle drawing algorithms.						
CO4	To implement different application of transformation and clipping algorithms.						

List of experiments:

1. Write a program to implement DDA line drawing algorithm.
2. Write a program to implement Bresenham's line drawing algorithm.
3. Implement the Bresenham's circle drawing algorithm.
4. Write a program to implement the midpoint circle drawing algorithm.
5. Write a program to implement 2-D transformations.
6. Write a program to show a ball moving on the screen according to the given requirements.
7. Write a program to implement the midpoint circle drawing algorithm.
8. Write a program to implement the Beizer curve.
9. Implement the line clipping algorithm using C.
10. Implement boundary fill algorithm using C.
11. Implement the depth buffer algorithm using C.

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

OE-IT-T301A	Digital Data Communication						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**To master the fundamentals of data communications networks by gaining a working knowledge of data transmission concepts**						
	Course Outcomes						
CO1	To study amplitude modulation.						
CO2	To study angle modulation.						
CO3	To study data encoding.						
CO4	To study Asynchronous and synchronous transmission.						

Unit-1

Introduction

What is communication , Elements of communication system , Signal , Concept of bandwidth , sources of signal , Types of communication channels , classification of electronic communication system , Modulation , Introduction to analog modulation system – AM , FM , PM ; Elements of Digital communication system , Comparison of analog and digital modulation , advantages and disadvantages of digital communication , Limitations of communication system , Electromagnetic spectrum for communication

Unit-2

Pulse Modulation: Sampling theorem, Nyquist rate, Introduction to PAM, PWM, PPM; Quantization, Introduction to PCM and delta modulation, Introduction to TDM and FDM

Unit-3

Digital Modulation: Line coding, introduction to Encoding schemes: RZ , NRZ ; Modulation Techniques – ASK-FSK-PSK-QPSK

Unit-4

Digital data Transmission: Classification: Parallel, Serial, Asynchronous and synchronous transmission; Error Detection and correction techniques: Parity checks, Hamming code; DTE & DCE interface,

Introduction to: a) RS-232C, b) RS-449, c) USB, d) HDMI.

Suggested books

1. W.Stalling, *"Wireless Communication And Networks"* , Pearson.
2. Stallings, *"Data & computer Communications",* PHI.
3. Forouzen*, "Data Communication & Networking",* Tata Mcgraw Hill.
4. Miller, *"Introduction to Digital & Data Communications"*, Jaico Pub.
5. Proakis, *"Digital Communications",*McGraw Hill.
6. Sanjay Sharma , *" Digital communication"* , S.K. Kataria and sons

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OE-IT-T303A	Computer Networks						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**This course covers the concepts of computer networking and communication.**						
	Course Outcomes						
CO1	To understand OSI layer model in networking protocols and services.						
CO2	To understand, differentiate & analyze various high speed LAN, MAN & WAN. .						
CO3	Study different protocols of TCP/IP layers with real life applications.						
CO4	Learn Mobile IP principles, multicast protocols and security issues for mobile IP.						

Unit-1

Introduction: Basics of Computer Networks, need and Evolution of computer networks, description of LAN, MAN, WAN & wireless networks.

Basics terminology of Computer Networks: Bandwidth, physical and logical topologies, media 10 base 2, 10base 5, 10base-T, 100 base FX, 100base LX.

LAN & WAN devices – Repeaters, Hubs, Switches, Bridges, Router, Gateway

OSI Reference Model: Laying architecture of networks, OSI model, Functions of each layer, Services and Protocols of each Layer.

Unit-2

TCP/IP: Introduction History of TCP/IP, Layers of TCP/IP, Protocols, Internet Protocol, Transmission control protocol, User Datagram Protocol, Internet control Protocols, ARP, RARP,DHCP, ICMP, application layer, Domain Name System, Email-SMTP, POP, IMAP, FTP, HTTP, SNMP,TELNET, overview of IP version 6.

OSI and TCP/IP model with description of data encapsulation & peer to peer communication, comparison of OSI and TCP/IP model.

Unit – 3

Physical Layer: Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise. Different types of media-twisted pair, unshielded twisted pair, coaxial cable, optical Fiber cable and wireless.

Data Link Layer: LLC and MAC sub layer, framing error control and flow control. Error detection & correction-CRC, block codes parity and checksum, elementary data link protocol, sliding window protocol, channel allocation problem-static and dynamic, Multiple Access protocol- ALOHA, CSMA/CA, Token bus, Token ring, FDDI.

Unit – 4

Network Layer: Internet address: IP addressed Classes. Subnetting – Sub-network, Subnet Mask, Routing techniques, static vs. dynamic routing, routing table, Routing algorithms: optimality principle, shortest path algorithm, distance vector routing, link state routing, hierarchical routing, Broadcast routing, Multicast routing, Routing for mobile host.

Transport Layer: Process to process delivery; TCP & UDP. Three way handshaking.ATM AAL layer protocol.

Suggested books

1. Tanenbaum.“ComputerNetworks”,PHI
2. Behrouz A. Forouzan, ”Data Communications and Networking”,McGraw-Hill
3. Darlx,“ComputerNetworkandtheirprotocols”,DLALabs.
4. Freer,“Comp.CommunicationandNetworks”,East–West-Press.
5. HalsallFred,DataCommunications,ComputerNetworks&opensystems AddisonWesley
6. FitzgeraldJerry,Businessdatacommunications,
7. LarryL.Peterson& BruceS.DavieComputerNetworks–Asystemapproach,,2ndEdTMH.

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OE-IT-T305A	Wireless Adhoc And Sensor Networks						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**This course will provide students with an understanding of wireless adhoc and sensor networks enable them to recognize the wide range of applicability of these networks**						
	Course Outcomes						
CO1	Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks						
CO2	Describe the MAC protocol issues of ad hoc networks						
CO3	Describe routing protocols for ad hoc wireless networks with respect to TCP design issues						
CO4	Explain the concepts of network architecture and MAC layer protocol for WSN						

UNIT I

INTRODUCTION

Fundamentals of Wireless Communication Technology -The Electromagnetic Spectrum -Radio propagation Mechanisms -Characteristics of the Wireless channel mobile ad hoc networks (MANETs) -Wireless Sensor Networks (WSNs): concepts and architectures -Applications of Ad Hoc and Sensor Networks-Design Challenges in Ad hoc and Sensor Networks.

UNIT II

MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS

Issues in designing a MAC Protocol -Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks-Design Goals of a MAC Protocol for Ad Hoc Wireless Networks -Classification of MAC Protocols -Contention based protocols -Contention based protocols with Reservation Mechanisms -Contention based protocols with Scheduling Mechanisms -Multi channel MAC-IEEE802.11.

UNIT III

ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORK

Routing Protocol: Issues in designing a routing protocol for Ad hoc networks-Classification-proactive routing-reactive routing (on-demand)-hybrid routing -Transport Layer protocol for Ad hoc networks -Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks -Classification of Transport Layer solutions-TCP over Ad hoc wireless -Network Security -Security in Ad Hoc Wireless Networks -Network Security Requirements.

UNIT IV

WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS

Single node architecture: hardware and software components of a sensor node -WSN Network architecture: typical network architectures -data relaying and aggregation strategies -MAC layer protocols: self-organizing -Hybrid TDMA/FDMA and CSMA based MAC -IEEE 802.15.4.

Suggested books

1.C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Pearson Education, 2008.
2.Labiod. H, “Wireless Adhoc and Sensor Networks”, Wiley,2008.
3.Li, X, “Wireless ad -hoc and sensor Networks: theory and applications”, Cambridge University Press,2008.

4.Carlos De MoraisCordeiro, Dharma PrakashAgrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2nd edition,2011.
5.Feng Zhao and LeonidesGuibas, "Wireless Sensor Networks", Elsevier Publication
6.Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005 (soft copyavailable)
7.KazemSohraby, Daniel Minoli, &TaiebZnati, “Wireless Sensor Networks Technology, Protocols, and Applications”, John Wiley, 2007.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

MC-904 A	ENERGY RESOURCES & MANAGEMENT						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**-**	**-**	**0**	**100**		**100**	**3**
Purpose	To make the students conversant with the basics concepts and conversion of various form of Energy						
COURSE OUTCOMES							
CO1	An overview about Energy Resources, Conventional and Non-conventional sources						
CO2	Understand the Layout and working of Conventional Power Plants						
CO3	Understand the Layout and working of Non-Conventional Power Plants						
CO4	To understand the Energy Management, Audit and tariffs, Role of Energy in Economic development and Energy Scenario in India						

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy, Conventional and Non-conventional sources, Need for Non-Conventional Energy based power generation.

UNIT-II

Conventional Energy sources: Types of Conventional Energy sources, Selection of site**,** working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages/ disadvantages.

UNIT-III

Non-Conventional Energy sources: Types of Non-Conventional Energy sources , Basic principle, site selection of Solar energy power plant, photovoltaic technologies, PV Systems and their components, Wind energy power plant , Bio energy plants ,Geothermal energy plants and Tidal energy plants.

UNIT-IV

Energy Management: General Principles of Energy Management, Energy Management Strategy, Modern trends and developments towards Computerizations of Power System.

Energy Audit: Need, Types, Methodology and Approach.

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Indian energy scenario, long term energy scenario, energy sector reforms in India, energy strategy for the future.

References:

1. Energy Studies-Wiley Dream Tech India.
2. Non-conventional energy resources- Shobhnath Singh, Pearson.
3. Electrical Power Systems : Soni, Gupta, Bhatnagar – Dhanpat Rai & Sons
4. NEDCAP: Non Conventional Energy Guide Lines
5. Non conventional energy sources : G.D. Roy
6. Non Conventional energy resources :B H Khan - McGraw Hill
7. Applied Solar Energy : Meinel A B - Addison Wesley Publications
8. Direct Energy Conversion George: Sutton -McGraw

Bachelor of Technology (Information Technology)										
Credit-Based Scheme of Studies/Examination										
Semester VI										
S. No.	**Course Code**	**Subject**	**L:T:P**	**Hours/Week**	**Credits**	**Examination Schedule (Marks)**				**Duration of Exam (Hrs.)**
						Major Test	**Minor Test**	**Practical**	**Total**	
1	PC-IT-302A	Software Engineering	3:0:0	3	3	75	25	0	100	3
2	PC-IT-304A	Linux Operating System	3:0:0	3	3	75	25	0	100	3
3	PE	Elective-II	3:0:0	3	3	75	25	0	100	3
4	PE	Elective-III	3:0:0	3	3	75	25	0	100	3
5	OE	Open Elective-I	3:0:0	3	3	75	25	0	100	3
6	PROJ –IT-302A	Project-1	0:0:6	6	3	0	40	60	100	3
7	PC-IT-306AL	Software Engineering Lab	0:0:3	3	1.5	0	40	60	100	3
8	PC-IT-308AL	Linux Lab	0:0:3	3	1.5	0	40	60	100	3
Total				**29**	**21**	**375**	**245**	**180**	**800**	

PEC Elective-II	**PEC Elective-III**
Data ware housing and Data Mining: PE-IT-S302A	Analysis & Design of Algorithms: PE-IT-S310A
Advance Database management System: PE-IT-S304A	Mobile Computing: PE-IT-S312A
Big Data Analytics: PE-IT-S306A	Simulation and Modelling:PE-IT-S314A

OEC Elective-I
Soft Skills and Interpersonal Communication: OE-IT-302A
Non conventional Energy Resources: OE-IT-304A
E-Commerce: OE-IT-306A

Note: Students be encouraged to go to 6-8 weeks summer internships mandatory during the summer break after the completion of sixth semester exams.

The course of both PE & OE will be offered at 1/3rd strength or 20 students (whichever is smaller) of the section.

PC-IT-302A	Software Engineering						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**To present software engineering concepts and principles in parallel with the software development life cycle.**						
	Course Outcomes						
CO1	To study the fundamental concepts of software engineering.						
CO2	Learn the skills to construct efficient software.						
CO3	To study the software process models.						
CO4	To understand the basic concepts of software requirements and analysis.						

Unit-1

Introduction: Program vs. software products, emergence of software engineering, software life cycle, models: waterfall, prototype, evolutionary and spiral model, Software Characteristics, Applications, Software crisis.

Software project management: Project management concepts, software process and project metrics Project planning, project size estimation metrics, project estimation techniques, empirical estimation techniques, COCOMO,A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking.

Unit-2

Requirements Analysis and specification : Requirements engineering, system modeling and simulation ,Analysis principles modeling, partitioning Software, prototyping, Prototyping methods and tools, Specification principles, Representation, the software requirements specification and reviews Analysis Modeling: Data Modeling, Functional modeling and information flow: Data flow diagrams, Behavioral Modeling, The mechanics of structured analysis: Creating entity/relationship diagram, data flow model, control flow model, the control and process specification, The data dictionary, Other classical analysis methods.

System Design: Design concepts and principles: the design process: Design and software quality, design principles, Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure software procedure, information hiding, Effective modular design: Functional independence, Cohesion, Coupling, Design Heuristics for effective modularity; The design model; Design documentation. Architectural Design: Software architecture, Data Design: Data modeling, data structures, data bases and the data warehouse, Analyzing alternative Architectural Designs, architectural complexity; Mapping requirements into software architecture; Transform flow, Transaction flow; Transform mapping; Refining thearchitecturaldesign.

Unit-3

Testing and maintenance: Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, Unit testing: white box testing, basic path testing: Control structure testing: Black box testing, testing for specialized environments, architectures and applications. Software Testing Strategies: Verification and validation, Integration testing, Validation testing, alpha and beta testing. System testing: Recovery testing, security testing, stress testing performance testing; the art of debugging process debugging approaches. Software re-engineering: Reverse engineering, restructuring, forward engineering.

Unit-4

Software Reliability and Quality Assurance: Quality concepts, Software quality assurance, SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and record keeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability, The ISO9000 Quality standards, SEI-CMM Capability Maturity Model.

Computer Aided Software Engineering: CASE, building blocks, integrated case environments and architecture, repository.

SuggestedBooks:

1. RogerS. Pressman,*SoftwareEngineering–APractitioner's Approach*,,1966,MGH.
2. RajibMall,*FundamentsofsoftwareEngineering*,, PHI
3. PankajJalote,*AnIntegratedApproachto SoftwareEngineering*1991Narosa.
4. IanSommerville,*SoftwareEngineering*, PearsonEdu,5thedition,1999,AW.
5. AliBehforoozandFrederickJ.Hudson.*SoftwareEngineeringFundamentals*,OxfordUniversity,

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

PC-IT-304A	Linux Operating System						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**To introduce the knowledge of basic issues with fundamental of operating systems mechanism**						
	Course Outcomes						
CO1	Develop an awareness of the function and complexity of linkers, loaders and assemblers						
CO2	Give students the knowledge of process management, memory management which covers a broad range of engineering aspects.						
CO3	Learn concurrent programming and synchronization mechanisms and introduce concept of files & directories						
CO4	Provide a thorough coverage of the basic issues in programs interacting directly with Operating systems.						

Unit-1

Introduction: Basic concepts of the operating system. Commands, shells and processes; users and groups; file system anddirectories. System installation, configuration and upgrade Installation stages; network installation; disk partitioning; post-install system customization and upgrade; dpkg and APT package installation, remove, upgrade and query; semiautomatic system installation. **Kernel:** Kernel tasks; managing kernel modules at runtime; kernel configuration and compilation boot loaders GRUB and LILO.

Unit-2

Linux Networking: Basic concepts of networking: Network packets, TCP/IP protocol suit, address resolution protocol (ARP); IPaddresses and network mask; subnets and routing; IPV4 and Network classes; ports. Configuring Linux machine on the network; arp, ipconfig and netstat commands. Network services and tools; telnet, rsh, ftp, rcp, ssh, rsync, inetd.conf; opening and closing ports.

Network File system (NFS): File system sharing or the network; remote procedure call (RPC) services; NFS server and client sides;NFS installation & configuration; and statistic mount and auto mount configuration; when trouble shooting NFS; security and optimization

Network information service (NIS): Centralized authentication systems; sharing user and host information or the network; IS serverand client sides and configuration; compatibility mode; net group; security issues.

Unit –3

Integrating Linux and Windows: Elements of windows networking; Net BIOS SMB\ CIFS protocols; domain controller; Sambaserver on Linux for centralized window logon; file sharing and printing, samba client; samba installation and configuration; Unix and windows password. Dual Boot: running windows and Linux on the same PC; GRUB and NT Boot loaders; accessing windows files systems from Linux and vice versa;

Light Weight Directory Access Protocol (LDAP): Overview of Unix authentication and naming service; introduction to LDAP: Domaincomponent (DC); organizational Unit (OU); common names (CN); Schemas; IDIF format; services; polls and commands; server and client sides; Open LDAP installation and configuration; LDAP applications. Shell scripting, syntax of brash; looping; case statement; function; command substitution; awk, grep, sed. Startup and Run Levels.

Unit-4

Linux Security: System vulnerabilities; port scanning; encryption, encrypted services and connections; PGP/GPG Intrusion protection:tcp-wrappers, IP-firewalls (iptables), NAT and DMZ; Intrusion detection systems: tripwire; Secure system management practices.

Email Server: Steps of Email transaction; Email envelope and headers; SMTP servers; IMAP and POP3 servers; E-mail relay; Postfixconfiguration; Spam and viruses,

Domain Name Server (DNS): Host name resolution; domain name hierarchy; DNS zones; configuration of master, slave and cachingDNS servers with BIND 9.

Suggested Books

1. Bell &Duff ,*Red Hat Linux 9* –- Pearson.
2. Richard L. Peterson ,*Complete Reference, Red Hat Linux*—TMH.
3. Tery Dawson, Gregor N. Purdy, Tony Bautts ;*Linux N/W Administration Guide*– OREILLY.
4. Christopher Negus , *Red Hat Linux 9 Bible*- WILEY publishing.
5. Patrick Volker Ding, Kevin Richard, Eric Foster-Johnson, *Linux Configuration & Installation* BPB publication.
6. John Goerzen, *Linux Programming Bible* -Wiley Dream Tech India (P) Ltd.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

PC-IT-306AL	Software Engineering Lab						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hour**
Purpose	**To familiarizethestudentswiththeconceptofdesigningthesoftwareapplications.**						
	Course Outcomes						
CO1	Implementtheconceptofdesigningthesoftwareapplications.						
CO2	Study requirement and designing phase of software development & learn about the reasons for the software crisis.						
CO3	Understand & implement different softwarelife cyclemodels and software testing techniques.						
CO4	Study and implementtestingandmaintenancephaseofsoftwaredevelopment.						

LISTOF EXPERIMENTS

1. Studyandcategorizethegenericphasesofsoftwaredevelopmentandmaintenance.
2. Studyvarioussoftwaredevelopmentmodels.
3. Studyvarioustypesoffeasibilitystudyandstepsindoingfeasibilitystudy.
4. Studyvariousstepsfordoingtherequirementanalysisofanyproject.
5. Write algorithm and draw flow chart to implement the constructive cost estimation model (COCOMO).
6. Making use of Graphical Design notation, study the concept in developing data flow diagram (DFD)for any selected project.
7. Making use of object oriented design, implement a student &employee record system using the concept of inheritance.
8. Selectanappropriateprogramminglanguage&translatethedetaileddesignmadeinexperiment7inappropriate programminglanguage.
9. Developacomplete teststrategyfor theprojectselectedin exp-8.Documentitinatestspecification.
10. Apply the debugging process to the project selected in exp-9 in accordance with the result generated from its testing in exp-9.
11. Study various concepts involved in cost/benefit analysis.
12. Draw flow chart and write algorithm for designing an editor.

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

PC-IT-308AL	Linux Lab						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
-	**0**	**3**	**1.5**	**60**	**40**	**100**	**3 Hour**
Purpose	**To make students familiar with the Linux command-line environment and develop the skills of shell scripting**						
	Course Outcomes						
CO1	To develop shell scripts to solve and Complete various computing tasks.						
CO2	Understanding static and dynamic library management.						
CO3	To implement File systems and File structures						
CO4	To understand and implement basic linux administration						

LIST OF EXPERIMENTS

1. Install Linux on the system dual boot with the windows Operating System.
2. Do the following tasks :-
   a) Create, remove & resize various types of partitions through GUI as well as command line.
   b) Configure printers in Linux through GUI as well as command line.
3. Creating, Removing of Swap space as well as swap files trough command line as well as GUI.
4. Implementation Disk Quotas- enabling, creating, mounting, configuring, assigning, disabling.
5. Managing Users and Groups in Linux- Adding, Modifying, Password aging.
6. Configuration Networks on Linux through GUI & Command Line- Ethernet, Modem, ISDN,Wireless.
7. Configuring NFS (Network File System) on Linux both GUI & Command Line.
8. Configuring Samba server on Linux both GUI & Command line.
9. Configuring D.N.S (Domain Name system) server on Linux both GUI & Command Line.
10. Configure an e-mail server in Linux-send mail.
11. Configuring Firewalls and managing various services of Linux.
12. Configuring Log Server in Linux.

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Threeexperiments may be designed & set by the concerned institution as per the scope of the syllabus.

PE-IT-S302A	Data ware housing and Data Mining						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**Thiscourseprovidesaway tounderstandtheorganizationandcollectionofdata.**						
	Course Outcomes						
CO1	Understand the fundamentals of Data Warehousing and Data Mining and its applications and challenges.						
CO2	Study & understand the architecture & design techniques of data warehousing.						
CO3	Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.						
CO4	Understand the rules of mining associations in single dimensional databases & multi-dimensional databases.						

UNIT- 1

Introduction of Data Ware housing: The evolution of Data Warehousing (The Historical Context).The data ware housing–a brief history, today's development environment. Principles of Data Ware housing (Architecture and Design Techniques): Types of data and their uses, conceptual data architecture, design techniques, introduction to the logical architecture. Creating the Data Asset: Business Data Warehouse Design.

UNIT-2

Introduction to Data Mining: Introduction, Scope of Data Mining, What is Data Mining, How does Data Mining Works, Predictive Modeling, Data Mining and Data Warehousing, Architecture for Data Mining, Profitable Applications, Data Mining Tools.

Data Preprocessing: Introduction, Data Preprocessing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT-3

Data Mining Techniques- An Overview: Introduction, Data Mining, Data Mining Versus Database Management System, Data Mining Techniques- Association rules, Classification, Regression, Clustering, Neural networks.

Clustering: Introduction, Clustering, Cluster Analysis, Clustering Methods- K means, Hierarchical clustering, Agglomerative clustering, Divisive clustering, clustering and segmentation software, evaluating clusters.

UNIT-4

Data Warehouse & OLAP: Introduction: What is OLAP?, Characteristics of OLAP, Steps in the OLAP Creation Process, Advantageous of OLAP, What is Multidimensional Data, OLAP Architectures; MOLAP, ROLAP, HOLAP, Data Warehouse and OLAP, Hypercube & Multi cubes.

Applications of Data mining: Introduction, Business Applications Using Data Mining- Risk management and targeted marketing, Customer profiles and feature construction, Medical applications (diabetic screening), Scientific Applications using Data Mining, Other Applications.

Suggested Books

1. J. Han & M. Kamber, *Data Mining*: *Concepts and Techniques*, Morgan Kaufmann/Elsevier, India, 2001
2. D. Hand, H. Mannila, & P. Smyth. *Principles of Data Mining*, MIT press,2001.
3. M. Jarke et al. *Fundamentals of Data Warehouses (2nd ed.)*, Springer, 2003, ISBN 3-540-42089-4.
4. C. Seidman, *Data Mining with Microsoft SQL Server 2000* Technical Reference Microsoft Press, ISBN 0-7356-1271-4

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

PE-IT-S304A	Advance Database Management System						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**The student will get knowledge of query optimization, parallel and distributed database systems**						
	Course Outcomes						
CO1	To study the fundamental theories and requirements that influence the design of modern database systems						
CO2	To apply acquired knowledge for developing holistic solutions based on databasesystems/database techniques						
CO3	To study and evaluate methods of storing, managing and interrogating complex data						
CO4	To analyze the background processes involved in queries and transactions, and explain how this impact on database operation and design						

Unit-1

Parallel & Distributed Databases : Architecture for parallel database, parallel query evolution,parallelizing individual operations, parallel query optimization introduction to distributed databases, distributed DBMS architectures, sorting data in a distributed database DBMS, Distributed catalog management, Distributed query processing, updating distributed data, introduction to distributed transactions, Distributed concurrency control, recovery.

Unit-2

Data Mining: Introduction, counting co-occurrences, mining for rules, tree structured rules, clustering,similarity search over sequence

Unit-3

Object Database Systems: User defined ADT, structured types, objects and reference types,inheritance, design for an ORDBMS, challenges in implementing an ORDBMS, OODBMS, comparison of RDBMS with OODBMS and ORDBMS

Unit-4

Advanced topics: Advanced transactions processing, integrated access to multiply data source, mobiledata bases, main memory databases, multimedia data bases, GIS, Temporal and sequenced databases.

Suggested Books:

1. R. Ramakrishna & J. Gehrks “Database Management Systems” MGH, International Ed., 2000.
2. Korth, Silberschatz, Sudershan: Data Base concepts, MGH, 2001.
3. C. J. Date, Database Systems, 7th Ed., Addison Wesley, Pearson Education, 2000.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

PE-IT-S306A	Big Data Anaytics						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	The course provides grounding in basic and advanced methods to big data technology and tools.						
	Course Outcomes						
CO1	Students will learn injecting data into Hadoop .						
CO2	Learn tips and tricks for Big Data use cases and solutions.						
CO3	Learn to build and maintain reliable, scalable, distributed systems						
CO4	To learn distributed systems with Apache Hadoop.						

UNIT-1

INTRODUCTION TO BIG DATA (6 hours) Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

UNIT-2

INTRODUCTION HADOOP (6 hours) Big Data – Apache Hadoop&HadoopEcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

UNIT- 3

HADOOP ARCHITECTURE (6 hours) Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, HadoopMapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH &Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

UNIT-4

HADOOP ECOSYSTEM AND YARN (6 hours) Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features- NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

Suggested Books:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide” , O Reilly 2012.
4. VigneshPrajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.
5. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

PE-IT-S310A	Analysis and Design of Algorithms						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**Describe, apply and analyze the complexity of various sorting and searching algorithms.**						
	Course Outcomes						
CO1	Demonstrate different ways to measure the efficiency of algorithms using Asymptotic notation.						
CO2	Identify and analyze various single source shortest path algorithms.						
CO3	Study various algorithms and implementation methods for divide and conquer, greedy and dynamic programming approaches.						
CO4	Demonstrate a familiarity with major algorithms like Back Travelling and Branch & Bound.						

Unit-1

Introduction: Algorithm, Analyzing algorithm, Designing algorithm, Concept of algorithmic efficiency, Run time analysis of algorithms, Asymptotic Notations.

Divide and conquer: Structure of divide and conquer algorithms: examples; binary search, quick sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.

Unit-2

Greedy Method: Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), approximate solution (Knapsack problem), Singles source shortest paths.

Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, Matrix multiplication, Travelling salesman problem, longest common sequence.

Unit-3

Back tracking: Overview, 8-queen problem, and Knapsack problem

Branch and bound: LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem.

Unit-4

Graph searching and Traversal: Overview, Traversal methods (depth first and breadth first search).

Trees: Review of trees, Binary search tree, Traversal, Insertion & Deletion in Binary Search Tree, B-Trees, B+ Trees, Basic operations on B Trees.

Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP- complete classes, examples.

Suggested Book:

1. E. Horowitz, S. Sahni, and S. Rajsekran, *" Fundamental of Computer Algorithms,"* Galgotia Publication

2. T. H. Cormen, Leiserson, Revest and Stein, *"Introduction of Somputer algorithm,"* PHI.

3. Sara Basse, A. V. Gelder, " *Computer Algorithms,"* Addison Wesley.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

PE-IT-S312A	Mobile Computing						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To impart knowledge of mobile and wireless computing systems and techniques.						
	Course Outcomes						
CO1	Describe the concepts of mobile computing and cellular networks.						
CO2	Learn the basic concepts of wireless networks.						
CO3	Study of various issues of mobile computing and						
CO4	Description and applications of Ad hoc networks.						

UNIT – 1

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, Mobile computing Architecture, Design considerations for mobile computing, Mobile Computing through Internet, Making existing applications mobile enabled. GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in Cellular systems, WCDMA, GPRS 3G, 4G.

UNIT – 2

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP : Architecture, Traditional TCP, Classical TCP, improvements in WAP, WAP applications.

UNIT –3

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations Mobile Agents computing, security and fault tolerance, transaction processing in mobile computingenvironment.

Cloud Architecture model, Types of Clouds: Public Private & Hybrid Clouds, Resource management and scheduling, Clustering, Data Processing in Cloud: Introduction to Map Reduce for Simplified data processing on Largeclusters.

UNIT – 4

Ad hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks,applications.

Suggested Books:

1. Rajkamal, Mobile Computing, 2/E Oxford UniversityPress,2011.
2. J. Schiller, Mobile Communications, AddisonWesley
3. Yi Bing Lin, Wireless and Mobile Networks Architecture , JohnWiley.
4. 4.A. Mehrotra , GSM SystemEngineering.

5.M. V. D. Heijden, M. Taylor, Understanding WAP, ArtechHouse.

6.Charles Perkins, Mobile IP, AddisonWesley.

7.Charles Perkins, Ad hoc Networks, AddisonWesley.

8.Judith Hurwitz, Robin Bllor, Marcia Kaufmann, Fern Halper, Cloud Computing forDummies, 2009.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

PE-IT-S314A	Simulation and Modeling						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**To introduce the principles and paradigms of Computer Modeling and Simulation for solving a wide variety of problems. In addition, how to use simulator to simulate the live systems.**						
	Course Outcomes						
CO1	Learn the basic concepts of System, SystemModeling, types of Models, simulation, and need of simulation.						
CO2	Learn the simulation of continuous and discrete systems with the help of different examples						
CO3	Learn the concept of generation of uniformly and non-uniformly distributed random numbers						
CO4	Learn the simulation of queuing system and PERT.						

Unit-1

Modeling:System Concepts,system boundariesand environment,continuousanddiscrete systems,system modeling, typesofModels, Model validation, Principles & Nature of Computer modeling.

Simulation: Introduction, Basic nature of simulation, when to simulate, Advantages, disadvantages and limitations of simulation, Concepts of simulation of continuous and discrete system with the help of example.

Unit-2

Continuous System Simulation: Analog vs. digital simulation, continuous simulation vs. numerical integration, simulation of a chemical reactor, simulation of a water reservoir system.

Discrete System Simulation: Fixed time-step vs. event-to-event model, Monte-Carlo computation vs. stochastic simulation, generation of random numbers, and generation of non-uniformly distributed random numbers.

Unit-3

Simulators for the Live systems: Simulation of queuing Systems: basic concepts of queuing theory, simulation of single server, two server and more general queuing system.

Simulation of PERT network:Network model of a project, analysis of an activity network, critical path computation, uncertainties in activity durations, simulation of an activity network.

Unit-4

Simulation of inventory control systems: Elements of inventory theory, inventory models, generation of Poisson and Erlangvariates, simulator for complex inventory systems. Simulation of hypothetical computers.

Suggested Books:

1.Gordon G.: Systemsimulation, Prentice-Hall of India Pvt. Ltd. New Delhi 1993
2.NarsinghDeo: SystemSimulation with Digital Computer:, PHI New Delhi, 1993
3. Neelankavil Frances: Computer Simulation and Modelling, John Wiley & Sons, NewYork, 1987.
4. Payne, James A.: Introduction to simulation: Programming TechniquesandMethodsof Analysis, McGraw-Hill International Editions, Computer Science services, New York (1998).
5.ReitamJulian: ComputerSimulation Experiments, Wiley Interscience 1971.

Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.

OE-IT-302A	Soft Skills and Interpersonal Communication						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**Understand the significance and essence of a wide range of soft skills.**						
	Course Outcomes						
CO1	To apply soft skills in a wide range of routine social and professional settings.						
CO2	To employ soft skills to improve interpersonal relationships.						
CO3	To employ soft skills to enhance employability and ensure workplace and career success.						
CO4	To understand the interpersonal communication for better goal settings.						

UNIT 1

Getting Started on Soft Skills: An Introduction–Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development.
Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue.
Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.

UNIT 2

Interpersonal Communication : Interpersonal relations; communication models, process and barriers; team communication; developing interpersonal relationships through effective communication; listening skills; essential formal writing skills; corporate communication styles–assertion, persuasion, negotiation.
Public Speaking: Skills, Methods, Strategies and Essential tips for effective public speaking.
Group Discussion: Importance, Planning, Elements, Skills assessed; Effectively disagreeing, Initiating, Summarizing and Attaining the Objective.
Non-Verbal Communication: Importance and Elements; Body Language.
Teamwork and Leadership Skills: Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills.

UNIT 3

Interview Skills: Interviewer and Interviewee–in-depth perspectives.Before, During and After the Interview.Tips for Success.
Presentation Skills: Types, Content, Audience Analysis, Essential Tips–Before, During and After, Overcoming Nervousness.
Etiquette and Manners–Social and Business. Time Management–Concept, Essentials, Tips. Personality Development–Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.

UNIT 4

Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.
Conflict Management: Conflict-Definition, Nature, Types and Causes; Methods of Conflict Resolution.
Stress Management: Stress-Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models andImpact of Stress; Measurement and Management of Stress.
Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertivness Skills.
Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

Suggested Books:

- Managing Soft Skills for Personality Development–edited by B.N.Ghosh, McGraw Hill India, 2012.
- English and Soft Skills–S.P.Dhanavel, Orient Blackswan India, 2010.

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OE-IT-304A	Non-Conventional Energy Resources						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	To provide a survey of the most important renewable energy resources and the technologies for harnessing these resources within the framework of a broad range of simple to state- of -the-art energy systems.						
	Course Outcomes						
CO1	To demonstrate the generation of electricity from various **Non-Conventional sources** of **energy**, have a working knowledge on types of fuel cells.						
CO2	Estimate the solar **energy**, Utilization of it, Principles involved in solar **energy** collection and conversion of it to electricity generation.						
CO3	Understand of renewable and non-renewable sources of energy						
CO4	Understand the applications of different renewable energy sources like ocean thermal, hydro, geothermal energy etc.						

Unit I

Introduction: Energy , Types of energy **,**Classification of Energy Resources, Comparison of Conventional and Non-Conventional energy resources, Introduction to Energy Management and Energy audit , energy conservation.

Solar energy: Introduction to Solar Radiation and its measurement. , Benefits of solar energy , Solar thermal Systems: Types of collectors, Solar water heating system, Solar Thermal Electric power generation ; Solar Photo-Voltaics, Solar Cell Principle, Classification , Types of solar modules , Conversion efficiency, Basic Photo Voltaic electric Power Generation , Classification of solar electric plants

Unit II

Wind Energy: Principle of energy from wind, basic windmill construction; Basic components of Wind Energy Conversion System (WECS) - Wind energy collectors: Horizontal and vertical axis rotors- Advantages and Disadvantages of WECS

Ocean Energy: Ocean thermal electric conversion (OTEC) methods: Open cycle and Closed cycle ;

Principles of tidal power generation - Energy from tides, basic principle of tidal power, single basin and double basin tidal power plants, advantages, limitation and scope of tidal energy. Wave energy and power from wave, wave energy conversion devices, advantages and disadvantages of wave energy

Unit III

Geothermal energy: Principle of geothermal energy , Geothermal Sites, Geothermal Resources, Geothermal Power Generation, Geothermal Electric Power Plant, advantages and disadvantages of geothermal energy

Fuel cells: Principle of Operation of Fuel Cell, Fuel Cell Types, Energy Output of a Fuel Cell, Efficiency, and EMF of a Fuel Cell, Operating Characteristics of Fuel Cells, Thermal Efficiency of a Fuel Cell.

Unit IV

Biomass energy: Introduction to biomass, biofuels , Brief overview about biomass conversion technologies, Biochemical conversion and Biogas technologies. Factors affecting biogas production, biogas plants- types & description. Utilization of biogas - Gasifiers, direct thermal application of Gasifiers. Advantages & problems in development of Gasifiers, use in I.C. engines, Pyrolysis scheme.

Hybrid energy systems: Hybrid Systems and its types. Concept of Electric and Hybrid Electric Vehicles.

Suggested Books:

1. Kothari, Singal and Ranjan , Renewable Energy Sources and Emerging Technologies,2nd ed, PHI.
2. G.D. Rai, Non-Conventional Sources of Energy, Khanna Publishers.
3. B H Khan, Non-Conventional Energy Resources, McGraw Hill Education.

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OE-IT-306A	E-Commerce						
L	**T**	**P**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hour**
Purpose	**Identify the major management challenges for building and using information systems and learn how to find appropriate solutions to those challenges.**						
	Course Outcomes						
CO1	Understand the basic concepts and technologies used in the field of managementinformation systems						
CO2	Understand the processes of developing and implementing information systems						
CO3	Be aware of the ethical, social, and security issues of information systems						
CO4	Develop an understanding of how various information systems work together to accomplish the information objectives of an organization						

Unit-1

INTRODUCTION: Definition of Electronic Commerce, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, framework,classification of E-commerce, Impact of E-commerce on business, E-Commerce Models.

Unit-2

NETWORK INFRASTRUCTURE FOR E- COMMERCE: Internet and Intranet based E-commerce-Issues,EDI, Network Infrastructure, Intranet,LAN,MAN,WAN,Network protocols, The Internet Hierarchy, Basic Blocks of e-commerce, Networks layers & TCP/IP protocols, The Advantages of Internet, World Wide Web

Unit-3

WEB SECURITY: Security Issues on web, Importance of Firewall, components of Firewall,Types of attack , Network Security, Encryption techniques, Symmetric Encryption: Keys and data encryption standard, Digital Signatures, Virtual Private Network.

UNIT-4

ELECTRONIC PAYMENTS: Overview, The SET protocol, Payment Gateway,SEPP,Architecture of SEPP, online Banking.E- Commerce Law, Electronic Cash, Smart Cards and Electronic Payment Systems, Credit Card Based Electronic Payment Systems, Risks and Electronic Payment Systems.

Suggested Books:

1. Ravi Kalakota, Andrew Winston, “Frontiers of Electronic Commerce”, Addison Wesley.
2. Pete Lohsin , John Vacca “Electronic Commerce”, New Age International
3. Goel, Ritendra “E-commerce”, New Age International
4. Laudon, “E-Commerce: Business, Technology, Society”, Pearson Education
5. Bajaj and Nag, “E-Commerce the cutting edge of Business”, TMH
6. Turban, “Electronic Commerce 2004: A Managerial Perspective”, Pearson Education

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