

**Kurukshetra University, Kurukshetra**

**( 'A+' Grade, NAAC Accredited)**

**Bachelor of Technology (Information Technology )**

**Credit-Based Scheme of Studies/Examination(Modified)**

**Semester V & VI(w.e.f. session 2020-2021 )**

**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 degree in Information 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)

<b>Bachelor of Technology (Information Technology )</b>										
<b>Credit-Based Scheme of Studies/Examination</b>										
<b>Semester V(w.e.f. session 2020-2021 )</b>										
<b>S. No.</b>	<b>Course Code</b>	<b>Subject</b>	<b>L:T:P</b>	<b>Hour s/Week</b>	<b>Credits</b>	<b>Examination Schedule (Marks)</b>				<b>Duration of Exam (Hrs)</b>
						<b>Major Test</b>	<b>Minor Test</b>	<b>Practical</b>	<b>Total</b>	
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
<b>Total</b>				<b>25</b>	<b>20</b>	<b>375</b>	<b>285</b>	<b>240</b>	<b>900</b>	
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	

<b>OE Elective-I</b>
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 4<sup>th</sup> 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
<b>Purpose</b>	<b>The students acquire the technical skills with JAVA Programming.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	The model of object oriented programming: Teach the basic concepts and techniques which form the object oriented programming paradigm.						
<b>CO2</b>	Test, document and prepare a professional looking package for applications.						
<b>CO3</b>	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.						
<b>CO4</b>	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.

**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-301A	Internet and Web Technology						
L	T	P	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hour
<b>Purpose</b>	<b>To make the students conversant with Web designing.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	To study fundamentals of Internet, its working techniques with their characteristics and various modes of connecting internet.						
<b>CO2</b>	To learn about the requirements for world-wide-web formats and its techniques.						
<b>CO3</b>	To study the working of E-mail and elements of HTML, XML and DHTML languages						
<b>CO4</b>	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 – Unleashed - 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
<b>Purpose</b>	<b>To aware the students about the Computer graphics designing.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	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.						
<b>CO2</b>	To understand concept of geometric, mathematical and algorithmic concepts necessary for programming computer graphics.						
<b>CO3</b>	To make the students familiar with techniques of two dimensional and three dimensional graphics transformations.						
<b>CO4</b>	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&Bresenham'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 and approximation 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 buffer algorithm, 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. Foley – *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
<b>Purpose</b>	<b>To provide the conceptual knowledge about the architecture of computer</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	To study computer architecture and instruction set						
<b>CO2</b>	To familiarize with different addressing modes						
<b>CO3</b>	To get familiarize with fetching and decoding of instruction.						
<b>CO4</b>	To study the process of pipelining						

### UNIT -I

**General System Architecture:** Von-neumann Model, Store program control concept, Flynn's classification of computers (SISD, MISD, MIMD); Multilevel viewpoint of a machine: digital logic, microarchitecture, ISA, operating systems, high level language

**Structured organization:** CPU, caches, main memory, 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, Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types); Cache memory (Associative & direct mapped cache 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.

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

## LIST OF EXPERIMENTS

1. To study MATLAB environment and to familiarize with Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files.
2. Data types, Constants and Variables, Character constants, operators, Assignment statements.
3. Control Structures: For loops, While, If control structures, Switch, Break, Continue statements      Input-Output functions, Reading and Storing Data.
4. Write a MATLAB program to calculate the following expression and round the answer to the nearest integer.
  - a)  $z = 5x^2 + y^2$  where  $x = 2, y = 4$
  - b)  $z = 3\sin(x) + 4\cos(x) + 3e^y$  where  $x = \pi/3, y = 2$
5. Vectors and Matrices, commands to operate on vectors and matrices, matrix Manipulations.
6. Arithmetic operations on Matrices, Relational operations on Matrices, Logical operations on Matrices.
7. If  $x = [1 \ 4; 8 \ 3]$ , find:
  - a) the inverse matrix of  $x$ .
  - b) the transpose of  $x$ .
  - c) Determinant of  $x$
8. Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials
9. Graphics: 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart
10. Top plot as sine wave of frequency 1 KHz.
11. Study of Simulink
12. To implement a simple calculator as a GUI
13. Solve the following system
 
$$\begin{aligned} x + y - 2z &= 3 \\ 2x + y &= 7 \\ x + y - z &= 4 \end{aligned}$$
14. Write a program to read three bits  $x, y, z$ , then compute:
  - a)  $v = (x \text{ and } y) \text{ or } z$
  - b)  $w = \text{not}(x \text{ or } y) \text{ and } z$
15. Represent the following complex numbers in polar coordinate
 
$$Z = 3 + 4j$$

**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
-	0	3	1.5	60	40	100	3 Hour
<b>Purpose</b>	<b>To build software development skills using JAVA programming for real world applications</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	Implement programs using different reference keywords.						
<b>CO2</b>	Implement the concept of Multithreading and Synchronization.						
<b>CO3</b>	Implement applets to create GUI's.						
<b>CO4</b>	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
<b>Purpose</b>	<b>To demonstrate knowledge and skills utilizing various HTML tags for designing a static web page.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	Understanding different PC software and their applications						
<b>CO2</b>	To be able to learn HTML.						
<b>CO3</b>	To be able to write Web pages using HTML.						
<b>CO4</b>	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
<b>Purpose</b>	To make students aware of the concepts underlying Computer Graphics and Machine Vision						
	<b>Course Outcomes</b>						
<b>CO1</b>	To understand inbuilt Graphics function of C.						
<b>CO2</b>	To Implement different line drawing algorithms.						
<b>CO3</b>	To implement different circle drawing algorithms.						
<b>CO4</b>	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
<b>Purpose</b>	<b>To master the fundamentals of data communications networks by gaining a working knowledge of data transmission concepts</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	To study amplitude modulation.						
<b>CO2</b>	To study angle modulation.						
<b>CO3</b>	To study data encoding.						
<b>CO4</b>	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
<b>Purpose</b>	<b>This course covers the concepts of computer networking and communication.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	To understand OSI layer model in networking protocols and services.						
<b>CO2</b>	To understand, differentiate & analyze various high speed LAN, MAN & WAN. .						
<b>CO3</b>	Study different protocols of TCP/IP layers with real life applications.						
<b>CO4</b>	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. "Computer Networks", PHI
2. Behrouz A. Forouzan, "Data Communications and Networking", McGraw-Hill
3. Darlx, "Computer Network and their protocols", DLALabs.
4. Freer, "Comp. Communication and Networks", East-West-Press.
5. Halsall Fred, Data Communications, Computer Networks & open systems Addison Wesley
6. Fitzgerald Jerry, Business data communications,
7. Larry L. Peterson & Bruce S. Davie Computer Networks – A system approach, 2nd Ed TMH.

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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
<b>Purpose</b>	<b>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</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks						
<b>CO2</b>	Describe the MAC protocol issues of ad hoc networks						
<b>CO3</b>	Describe routing protocols for ad hoc wireless networks with respect to TCP design issues						
<b>CO4</b>	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 MoraesCordeiro, 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 copy available)
7. KazemSohraby, Daniel Minoli, & Taieb Znati, “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
<b>Purpose</b>	To make the students conversant with the basics concepts and conversion of various form of Energy						
<b>COURSE OUTCOMES</b>							
<b>CO1</b>	An overview about Energy Resources, Conventional and Non-conventional sources						
<b>CO2</b>	Understand the Layout and working of Conventional Power Plants						
<b>CO3</b>	Understand the Layout and working of Non-Conventional Power Plants						
<b>CO4</b>	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



<b>Bachelor of Technology (Information Technology )</b>										
<b>Credit-Based Scheme of Studies/Examination</b>										
<b>Semester VI(w.e.f. session 2020-2021 )</b>										
<b>S. No.</b>	<b>Course Code</b>	<b>Subject</b>	<b>L:T:P</b>	<b>Hours/Week</b>	<b>Credits</b>	<b>Examination Schedule (Marks)</b>				<b>Duration of Exam (Hrs.)</b>
						<b>Major Test</b>	<b>Minor Test</b>	<b>Practical</b>	<b>Total</b>	
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
<b>Total</b>				<b>29</b>	<b>21</b>	<b>375</b>	<b>245</b>	<b>180</b>	<b>800</b>	

<b>PEC Elective-II</b>	<b>PEC Elective-III</b>
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
<b>OEC Elective-I</b>	
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 1/3<sup>rd</sup> 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
<b>Purpose</b>	<b>To present software engineering concepts and principles in parallel with the software development life cycle.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	To study the fundamental concepts of software engineering.						
<b>CO2</b>	Learn the skills to construct efficient software.						
<b>CO3</b>	To study the software process models.						
<b>CO4</b>	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 the architectural design.

### 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.

**Suggested Books:**

1. Roger S. Pressman, *Software Engineering—A Practitioner's Approach*, 1966, MGH.
2. Rajib Mall, *Fundamentals of Software Engineering*, PHI
3. Pankaj Jalote, *An Integrated Approach to Software Engineering* 1991 Narosa.
4. Ian Sommerville, *Software Engineering*, Pearson Edu, 5th edition, 1999, AW.
5. Ali Behforooz and Frederick J. Hudson. *Software Engineering Fundamentals*, Oxford University,

**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
<b>Purpose</b>	<b>To introduce the knowledge of basic issues with fundamental of operating systems mechanism</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	Develop an awareness of the function and complexity of linkers, loaders and assemblers						
<b>CO2</b>	Give students the knowledge of process management, memory management which covers a broad range of engineering aspects.						
<b>CO3</b>	Learn concurrent programming and synchronization mechanisms and introduce concept of files & directories						
<b>CO4</b>	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 and directories. 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); IP addresses 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 on 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 on the network; IS server and 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; Samba server 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: Domain component (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
<b>Purpose</b>	<b>To familiarizethestudentwiththeconceptofdesigningthesoftwareapplications.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	Implementtheconceptofdesigningthesoftwareapplications.						
<b>CO2</b>	Study requirement and designing phase of software development & learn about the reasons for the software crisis.						
<b>CO3</b>	Understand & implement different software life cycle models and software testing techniques.						
<b>CO4</b>	Study and implement testing and maintenance phase of software development.						

### **LIST OF EXPERIMENTS**

1. Study and categorize the generic phases of software development and maintenance.
2. Study various software development models.
3. Study various types of feasibility study and steps in doing feasibility study.
4. Study various steps for doing the requirement analysis of any project.
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. Select an appropriate programming language & translate the detailed design made in experiment 7 in appropriate programming language.
9. Develop a complete test strategy for the project selected in exp-8. Document it in a test specification.
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
<b>Purpose</b>	<b>To make students familiar with the Linux command-line environment and develop the skills of shell scripting</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	To develop shell scripts to solve and Complete various computing tasks.						
<b>CO2</b>	Understanding static and dynamic library management.						
<b>CO3</b>	To implement File systems and File structures						
<b>CO4</b>	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. Three experiments 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
<b>Purpose</b>	<b>This course provides a way to understand the organization and collection of data.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	Understand the fundamentals of Data Warehousing and Data Mining and its applications and challenges.						
<b>CO2</b>	Study & understand the architecture & design techniques of data warehousing.						
<b>CO3</b>	Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.						
<b>CO4</b>	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
<b>Purpose</b>	<b>The student will get knowledge of query optimization, parallel and distributed database systems</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	To study the fundamental theories and requirements that influence the design of modern database systems						
<b>CO2</b>	To apply acquired knowledge for developing holistic solutions based on databasesystems/database techniques						
<b>CO3</b>	To study and evaluate methods of storing, managing and interrogating complex data						
<b>CO4</b>	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, mobile data 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 Analytics						
L	T	P	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hour
<b>Purpose</b>	The course provides grounding in basic and advanced methods to big data technology and tools.						
	<b>Course Outcomes</b>						
<b>CO1</b>	Students will learn injecting data into Hadoop .						
<b>CO2</b>	Learn tips and tricks for Big Data use cases and solutions.						
<b>CO3</b>	Learn to build and maintain reliable, scalable, distributed systems						
<b>CO4</b>	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
<b>Purpose</b>	<b>Describe, apply and analyze the complexity of various sorting and searching algorithms.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	Demonstrate different ways to measure the efficiency of algorithms using Asymptotic notation.						
<b>CO2</b>	Identify and analyze various single source shortest path algorithms.						
<b>CO3</b>	Study various algorithms and implementation methods for divide and conquer, greedy and dynamic programming approaches.						
<b>CO4</b>	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
<b>Purpose</b>	To impart knowledge of mobile and wireless computing systems and techniques.						
	<b>Course Outcomes</b>						
<b>CO1</b>	Describe the concepts of mobile computing and cellular networks.						
<b>CO2</b>	Learn the basic concepts of wireless networks.						
<b>CO3</b>	Study of various issues of mobile computing and						
<b>CO4</b>	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 computing environment.

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 Large clusters.

### 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 University Press, 2011.
2. J. Schiller, Mobile Communications, Addison Wesley
3. Yi Bing Lin, Wireless and Mobile Networks Architecture, John Wiley.
4. 4.A. Mehrotra, GSM System Engineering.
5. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
6. Charles Perkins, Mobile IP, Addison Wesley.
7. Charles Perkins, Ad hoc Networks, Addison Wesley.
8. Judith Hurwitz, Robin Bllor, Marcia Kaufmann, Fern Halper, Cloud Computing for Dummies, 2009.

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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
<b>Purpose</b>	<b>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.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	Learn the basic concepts of System, System Modeling, types of Models, simulation, and need of simulation.						
<b>CO2</b>	Learn the simulation of continuous and discrete systems with the help of different examples						
<b>CO3</b>	Learn the concept of generation of uniformly and non-uniformly distributed random numbers						
<b>CO4</b>	Learn the simulation of queuing system and PERT.						

### Unit-1

**Modeling: System** Concepts, system boundaries and environment, continuous and discrete systems, system modeling, types of Models, 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 Erlang variates, simulator for complex inventory systems. Simulation of hypothetical computers.

#### **Suggested Books:**

1. Gordon G.: Systems simulation, Prentice-Hall of India Pvt. Ltd. New Delhi 1993
2. Narsingh Deo: System Simulation with Digital Computer:, PHI New Delhi, 1993
3. Neelankavil Frances: Computer Simulation and Modelling, John Wiley & Sons, New York, 1987.
4. Payne, James A.: Introduction to simulation: Programming Techniques and Methods of Analysis, McGraw-Hill International Editions, Computer Science services, New York (1998).
5. Reitan Julian: Computer Simulation Experiments, Wiley Interscience 1971.

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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
<b>Purpose</b>	<b>Understand the significance and essence of a wide range of soft skills.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	To apply soft skills in a wide range of routine social and professional settings.						
<b>CO2</b>	To employ soft skills to improve interpersonal relationships.						
<b>CO3</b>	To employ soft skills to enhance employability and ensure workplace and career success.						
<b>CO4</b>	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 and Impact of Stress; Measurement and Management of Stress.

Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertiveness 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
<b>Purpose</b>	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.						
	<b>Course Outcomes</b>						
<b>CO1</b>	To demonstrate the generation of electricity from various <b>Non-Conventional sources of energy</b> , have a working knowledge on types of fuel cells.						
<b>CO2</b>	Estimate the solar <b>energy</b> , Utilization of it, Principles involved in solar <b>energy</b> collection and conversion of it to electricity generation.						
<b>CO3</b>	Understand of renewable and non-renewable sources of energy						
<b>CO4</b>	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
<b>Purpose</b>	<b>Identify the major management challenges for building and using information systems and learn how to find appropriate solutions to those challenges.</b>						
	<b>Course Outcomes</b>						
<b>CO1</b>	Understand the basic concepts and technologies used in the field of management information systems						
<b>CO2</b>	Understand the processes of developing and implementing information systems						
<b>CO3</b>	Be aware of the ethical, social, and security issues of information systems						
<b>CO4</b>	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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