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Item No. 4.77

UNIVERSITY OF MUMBAI



Syllabus for the M.Sc. Sem. I & II

Program: M.Sc.

Course: Information Technology

(Credit Based Semester and Grading System with
effect from the academic year 2012–2013)

Preamble

The subject of Information Technology is one of the important application tool which can be applied to different areas in teaching, training and learning which is considered to be important in terms of human resource development, Information Processing and Decision Making which enhances the development of a Nation.

Information Technology as an application science is studied to be applied for other areas, right from Mathematics to other basic sciences, applied sciences, social sciences and each and every aspect of human life.

The main aim of the course is to focus on the technological tools and concepts available and how they can be applied to the developmental processes

The various concepts include Simulation, Mobile Computing, Networking, Artificial Intelligence, Distributed Computing, Multimedia, Datawarehousing, Datamining, Digital Image Processing, Digital Signal Processing, Speech Recognition, Software Architecture and so on..

Information Technology Experts are very much required right from academic institutions, Research and Development to Industries both Public and Private Sectors.

The two year programme of M.Sc. (Information Technology) is prescribed according to the credit system of University of Mumbai from the academic year 2012-13. The course has been divided in to four semesters. The programme has a total 16 theory papers, and four in each semester.

The programme is designed to provide students a focused elaborate training in Information Technology concepts and tools as well as exposing them to the advanced fields. In addition to theoretical knowledge, significant emphasis has been given to provide hands on experience to the students in the frontier areas of Information Technology. A multidisciplinary approach has been employed to provide best leverage to students to enable them move into advanced and frontier areas of interdisciplinary research in the future.

M.Sc. Information Technology
(Based on Credit and grading system)

Semester I

Paper code	Paper Nomenclature	Lectures	Credit	Practical Paper	Hrs	Credit	Total Credit
PSIT101	Computer Simulation and Modeling	60	04	PSITP101	60	02	06
PSIT102	Mobile Computing	60	04	PSITP102	60	02	06
PSIT103	Digital Image Processing	60	04	PSITP103	60	02	06
PSIT104	Data Warehousing and DataMining	60	04	PSITP104	60	02	06
	Total						24

Semester II

Paper code	Paper Nomenclature	Lectures	Credit	Practical Paper	Hrs	Credit	Total Credit
PSIT201	Programming with Components	60	04	PSITP201	60	02	06
PSIT202	Advanced Computer Networks	60	04	PSITP202	60	02	06
PSIT203	Speech Recognition	60	04	PSITP203	60	02	06
PSIT204	Advanced Database Management Systems	60	04	PSITP204	60	02	06
	Total						24

Total credits for M.Sc. Part I=(Sem I- 24 and sem II-24) =48

Evaluation: The students will be evaluated externally. The external evaluation will be done by the committee appointed by the University norms. Standard of passing and scale as per the university norms.

**Information Technology Syllabus
Credit Based and Grading System**

SEM: I

Paper I: Computer Simulation and Modelling:	PSIT101
Paper II: Mobile Computing:	PSIT102
Paper II: Digital Image Processing:	PSIT103
Paper III: Data Warehousing and Data Mining:	PSIT104

SEM: II

Paper I: Programming with Components:	PSIT201
Paper II: Advanced Computer Networks:	PSIT202
Paper III: Speech Recognition:	PSIT203
Paper IV: Advanced Database Management Systems:	PSIT204

SEMESTER I

Course 1: Computer Simulation and Modelling: PSIT101

Course Code	Unit	Description	Credits
PSIT101	I	Introduction and General Principles to Simulation and Simulation Examples	4
	II	Simulation Software and Statistical Models in Simulation	
	III	Random Number and Random Variate Generation	
	IV	Input and Output Modeling	
	V	Verification and Validation of Simulation Model	

Course 2 : Mobile Computing: PSIT102

Course Code	Unit	Description	Credits
PSIT102	I	Wireless Transmission and Medium Access Control	4
	II	Telecommunication Systems	
	III	Satellite Systems and Broadcast Systems	
	IV	Wireless LAN	
	V	Mobile Network Layer and Transport Layer	

Course 3: Digital Image Processing: PSIT103

Course Code	Unit	Description	Credits
PSIT103	I	Introduction to computer Graphics & Digital Image Processing Systems	4
	II	Image Transform	
	III	Image Enhancement in Spatial and Frequency Domain	
	IV	Image data compression with Morphological Image Processing	
	V	Image Segmentation with Image Representation & Description	

Course 4: Data Warehousing and Mining: PSIT104

Course Code	Unit	Description	Credits
PSIT104	I	Overview And Concepts, Planning And Requirements, Architecture And Infrastructure	4
	II	Data Design And Data Representation, Information Access And Delivery, Implementation And Maintenance	
	III	Introduction, Data Mining Algorithms, Knowledge Discovery	
	IV	Web Mining, Advanced Topics, Visualisation	
	V	Data Mining Primitives, Languages, and System Architectures	

Semester I Detail Syllabus

Course Code	Title	Credits
PSIT101	Computer Simulation and Modeling-I	4
Unit I : Introduction and General Principles to Simulation and Simulation Examples System and System environment, Components of system, Type of systems, Type of models, Steps in simulation study, Advantages and Disadvantages of simulation, Simulation of Queueing systems, and Other examples of simulation, Concepts of discrete event simulation.[6L]		
Unit II : Simulation Software and Statistical Models in Simulation History of simulation software, Desirable software features, General-purpose simulation packages, Object oriented simulation, Trends in simulation software, Useful statistical model, Discrete distribution, Continuous distribution, Poisson process, Empirical distribution [8L]		
Unit III : Random Number and Random Variate Generation Properties of random numbers, Generation of pseudo random numbers, Techniques for generating random numbers, Tests for random numbers, Inverse transform technique, Convolution method, Acceptance rejection techniques [14L]		
Unit IV : Input and Output Modeling Data Collection, Identifying the Distribution of data, Parameter estimation, Goodness of fit tests, Selection input model without data, Multivariate and Time series input models, Types of simulations with respect to output analysis, Stochastic nature of output data, Measure of performance and their estimation, Output analysis of terminating simulators, Output analysis for steady state simulation [14L]		
Unit V : Verification and Validation of Simulation Model Model building, Verification, and Validation, Verification of simulation models, Calibration and Validation of models. [8]		

<p>References:</p> <p>Jerry Banks, John Carson, Barry Nelson, David Nicol, “<i>Discrete Event System Simulation</i>”</p> <p>Averill Law, W. David Kelton, “<i>Simulation Modeling and Analysis</i>”, McGRAW-HILL</p> <p>Geffery Gordon, “<i>System Simulation</i>”, PHI</p> <p>Bernard Zeigler, Herbert Praehofer, Tag Gon Kim, “<i>Theory of Modeling and Simulation</i>”, Academic Press</p> <p>Narsing Deo, “<i>System Simulation with Digital Computer</i>”, PHI</p> <p>Donald W. Body, “<i>System Analysis and Modeling</i>”, Academic Press Harcourt India</p> <p>W David Kelton, Randall Sadowski, Deborah Sadowski, “<i>Simulation with Arena</i>”, McGRAW-HILL</p>	
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Course Code	Title	Credits
PSIT102	Mobile Computing	
<p>Unit I: Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access. [25L]</p>		4
<p>Unit II: GSM: Mobile services, System architecture, Radio interface, Protocols, Localization And Calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture; TETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode . [10L]</p>		
<p>Unit III: History, Applications, Basics: GEO, LEO, MEO; Routing, Localization, Handover, Examples , Overview, Cyclic repetition of data, Digital audio broadcasting: Multimedia object transfer protocol; Digital video broadcasting [10L]</p>		
<p>Unit IV: Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical layer, Channel access control. Sublayer, Medium access control Sublayer, Information bases And Networking; Bluetooth: User scenarios, Physical layer, MAC layer, Networking. Security, Link management. [05L]</p>		
<p>Unit V: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation , Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence</p>		

distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics , Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP [10L]	
<p>References:</p> <ol style="list-style-type: none"> 1. Jochen Schiller, <i>Mobile communications.</i>, Addison wisely , Pearson Education 2. William Stallings, <i>Wireless Communications and Networks.</i> 3. Rappaort, <i>Wireless Communications Principals and Practices.</i> 4. YI Bing Lin , <i>Wireless and Mobile Network Architectures.</i>, John Wiley 5. P. Nicopolitidis , <i>Wireless Networks.</i>, John Wiley 6. K Pahlavan, P. Krishnamurthy, <i>Principles of Wireless Networks.</i> 7. M. Richharia , <i>Mobile Satellite Communication: Principles and Trends.</i>, Pearson Education 	

Course Code	Title	Credits
PSIT103	Digital Image Processing	4
Unit I: Introduction to computer Graphics & Digital Image Processing Systems: Geometry and line generation, Graphics primitives, Transformations , Structure of human eye, Image formation in the human eye, Brightness adaptation and discrimination, Image sensing and acquisition, Storage, Processing, Communication, Display. Image sampling and quantization, Basic relationships between pixels [10L]		
Unit II: Image Transform Introduction to Fourier transform, DFT and 2-D DFT, Properties of 2-D DFT, FFT, IFFT, Walsh transform, Hadamard transform, Discrete cosine transform, Slant transform, Optimum transform: Karhunen - Loeve (Hotelling) transform. [12L]		
Unit III: Image Enhancement in Spatial and Frequency Domain Gray level transformations, Histogram processing, Arithmetic and logic operations, Spatial filtering: Introduction, Smoothing and sharpening filters . Frequency domain filters: Smoothing and Sharpening filters, Homomorphic filtering [15L]		
Unit IV: Image data compression with Morphological Image Processing Fundamentals, Redundancies: Coding, Interpixel, Psycho-visual, Fidelity criteria, Image compression models, Error free compression, Lossy compression, Image compression standards: Binary image and Continuous tone still image compression standards, Video compression standards. Introduction, Dilation, Erosion, Opening, Closing, Hit-or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on gray-scale images [13L]		
Unit V: Image Segmentation with Image Representation & Description		

Detection of discontinuities, Edge linking and Boundary detection, Thresholding, Region based segmentation. Representation schemes, Boundary descriptors, Regional descriptors [10L]	
References: <ol style="list-style-type: none"> 1. R.C.Gonsales R.E.Woods, “<i>Digital Image Processing</i>”, Second Edition, Pearson Education . 2. Anil K. Jain, “<i>Fundamentals of Image Processing</i>”, PHI William Pratt, “<i>Digital Image Processing</i>”, John Wiley 3. S. Harrington, “<i>Computer Graphics</i>”, McGraw Hill 4. Milan Sonka, Vaclav Hlavac, Roger Boyle, “<i>Image Processing, Analysis, and Machine Vision</i>” Thomson Learning 5. B. Chanda, D. Dutta Majumder, “<i>Digital Image Processing and Analysis</i>”, PHI 	

Course Code	Title	Credits
PSIT104	DATA WAREHOUSING AND MINING	4
Unit I: Overview And Concepts, Planning And Requirements, Architecture And Infrastructure Overview And Concepts Need for data warehousing, Basic elements of data warehousing, Trends in data warehousing. Planning And Requirements: Project planning and management, Collecting the requirements. Architecture And Infrastructure: Architectural components, Infrastructure and metadata		
Unit II: Data Design And Data Representation, Information Access And Delivery, Implementation And Maintenance Data Design And Data Representation: Principles of dimensional modeling, Dimensional modeling advanced topics, data extraction, transformation and loading, data quality. Information Access And Delivery: Matching information to classes of users, OLAP in data warehouse, Data warehousing and the web. Implementation And Maintenance: Physical design process, data warehouse deployment, growth and maintenance.		
Unit III: Introduction, Data Mining Algorithms, Knowledge Discovery Introduction: Basics of data mining, related concepts, Data mining techniques. Data Mining Algorithms: Classification, Clustering, Association rules. Knowledge Discovery : KDD Process		
Unit IV: Web Mining, Advanced Topics, Visualisation Web Mining: Web Content Mining, Web Structure Mining, Web Usage		

<p>mining.</p> <p>Advanced Topics: Spatial mining, Temporal mining.</p> <p>Visualisation : Data generalization and summarization-based characterization, Analytical characterization: analysis of attribute relevance, Mining class comparisons: Discriminating between different classes, Mining descriptive statistical measures in large databases</p>	
<p>Unit V: Data Mining Primitives, Languages, and System Architectures</p> <p>Data mining primitives, Query language, Designing GUI based on a data mining query language, Architectures of data mining systems</p>	
<p>References:</p> <p>1. Paulraj Ponnian, “<i>Data Warehousing Fundamentals</i>”, John Wiley.</p> <p>2. M.H. Dunham, “<i>Data Mining Introductory and Advanced Topics</i>”, Pearson Education</p>	

Practical Components:

PSITP101	<p>Computer Simulation and Modeling : Laboratory experiments using MSEXCEL, C and C++</p> <ol style="list-style-type: none"> 1. To Implement a Single Server queuing problem 2. To Implement a two server system 3. To Implement a Newspaper seller problem 4. To stimulate a reliability problem 5. To Simulate squadron of bombers attempting to destroy an ammunition depot using 6. Monte Carlo method 7. Simulate discrete distributions 8. Simulate continuous distributions 9. To generate random numbers and random variates 10. Testing of Random Numbers 11. To perform goodness of fit test using Kolmogorov – Smirnov 	2
PSITP102	<ol style="list-style-type: none"> 1. Write a program to use different GUI Controls on mobile. 2. Write a ticker program to continuously scroll a data message on the mobile screen. 3. Write a program to access data from a specific URL. The Stream Connection is used to connect the application to the specific url by Airtime (connect to the internet). 4. Write a program to read the contents of a file. 5. Write a program to record data and print it on the console. 6. Introduction to mobile toolkit and Study of WML tags<access>, <card>, <head>, <meta>, <template>, <wml> , <!-->,
, <p>, <table>, <td>, <tr>, , <big> , , <i>, <small>, , <u>, <a> <anchor> , 7. Study of WML event, task, input and variable elements: <do>, <onevent>, <postfield>, <go>, <noop>, <prev>, <refresh>, <fieldset>, <input>, <optgroup>, <option>, <select> <setvar>, <timer> 	2

	<p>8. Integration of WML with ASP or JSP. Design a simple application with WML and ASP or JSP. (non-database)</p> <p>9. Integration of WML with ASP / JSP and Database. Design a simple database application using WML and ASP or JSP to retrieve records from database and update the records.</p> <p>10. Design a simple m-commerce Application using VS 2008/J2ME. (Example: Application involving Simple accounting principles like money transfer from one to other account)</p>	
<p>PSITP103</p>	<p>Image Processing using Matlab/C/Java</p> <ol style="list-style-type: none"> 1. I. To apply geometric transformation on geometric objects using <ol style="list-style-type: none"> A. Translation B. Rotation C. Scaling II. Designing output primitives <ol style="list-style-type: none"> A. Midpoint Circle Algorithm B. Bresenham's Circle Algorithm 2. To perform following techniques using image enhancement <ol style="list-style-type: none"> A. Thresholding B. Contrast Adjustment C. Brightness Adjustment D. Gray level Slicing 3. Basic transformation <ol style="list-style-type: none"> A. Log transformation B. Power law transformation C. Image Negative 4. Different Filters (LPF, HPF, Laplacian, LOG etc.) <ol style="list-style-type: none"> 1. To generate mask for LOG use the following formula. $h_g(n_1, n_2) = e^{-\frac{(n_1^2 + n_2^2)}{2\sigma^2}}$ $h(n_1, n_2) = \frac{(n_1^2 + n_2^2 - 2\sigma^2)h_g(n_1, n_2)}{2\pi\sigma^6 \sum_{n_1} \sum_{n_2} h_g}$ <p>A Write a program to apply a mask on the image.</p> <ol style="list-style-type: none"> a. Accept the size of mask from the user. b. Check whether the mask is of odd size. c. The program should work for any high pass and low pass mask. d. Check the sum of all the elements of the mask. For low pass filter the sum should be one and zero for high pass filter. e. Compare the output for different size of masks. <p>Write a program to plot a Histogram.</p> <p>6 Write a program to apply Histogram equalization</p> <p>7 Write a program to apply Gaussian filter on a gray level image.</p>	<p>2</p>

	<p>a. Write a code to generate a Gaussian mask and then apply the mask on the image.</p> <p>b. Accept the size of mask and the sigma value from the user to generate a mask.</p> <p>c. Use the following formula to generate Gaussian mask.</p> $h_g(n_1, n_2) = e^{-(n_1^2 + n_2^2) / (2\sigma^2)}$ $h(n_1, n_2) = \frac{h_g(n_1, n_2)}{\sum_{n_1} \sum_{n_2} h_g}$ <p>8 Apply following morphological operations on the image:</p> <p>a. Opening</p> <p>b. Closing</p> <p>c. Morphological gradient</p> <p>d. Top-hat transformation</p> <p>9 Write a program for boundary detection.</p> <p>10 Write a program to Apply DFT on image matrix</p>	
<p>PSITP104</p>	<p>Developing SQL Server Data warehouse from foodmart.mdb using DTS package.</p> <p>Implement the ETL process and create the OLAP cubes. And also retrieve the data from the OLAP cubes using MDX Sample Application.</p> <p>Implement K-nearest neighbor technique to demonstrate prediction and analysis under XLMiner/SPSS.</p> <p>Implement Decision Tree algorithm to demonstrate the concept of classification using XLMiner/SPSS.</p> <p>Implement K-Nearest Neighbour algorithm to demonstrate the concept of classification using XLMiner/SPSS.</p> <p>Implement the hierarchical clustering method to demonstrate the Data Reduction and Exploration using XLMiner.</p> <p>Demonstrate data partitioning using standard portioning technique using XLMiner/SPSS.</p> <p>Demonstrate and implement classification using Bayes Theorem under XLMiner/SPSS.</p>	<p>2</p>

SEMESTER II

Course 1: Programming with Components: PSIT201

Course Code	Unit	Description	Credits
PSIT201	I	Introduction to object oriented systems and distributed objects	4
	II	Component Object Model (COM) introduction with interface in COM-DCOM	
	III	Classes and Objects in COM-DCOM, Apartments and Object Web	
	IV	CORBA and CORBA Services	
	V	Enterprise Java Beans and JAVA Interface	

Course 2: Advanced Computer Networks: PSIT202

Course Code	Unit	Description	Credits
PSIT202	I	Introduction to Transmission Technologies and Optical Networking	4
	II	Physical Layer Protocols and Access Technologies	
	III	Common Protocols and Interfaces in the LAN environment	
	IV	Frame Relay and Common WAN Protocol	
	V	Common Protocols and Interfaces in the Upper Layers(TCP/IP), Mature Packet Switched Protocol	

Course 3: Speech Recognition : PSIT203

Course Code	Unit	Description	Credits
PSIT203	I	Fundamentals of Speech Recognition and Speech Signal	4
	II	Signal Processing and Analysis Methods for Speech Recognition and Pattern Comparison Techniques	
	III	Speech Recognition System Design And Implementation Issues	
	IV	Theory And Implementation Of HMM and Speech Recognition based on Connected Words Model	
	V	Large Vocabulary Continuous Speech Recognition and Task oriented Applications of Automatic Speech Recognition	

Course 4: Advanced Database Systems : PSIT204

Course Code	Unit	Description	Credits
PSIT204	I	The Extended Entity Relationship Model and Object Model	4
	II	Object-Oriented & Object Relational Databases	
	III	Parallel and Distributed Databases and Client-Server Architecture	
	IV	Databases on the Web and Semi Structured Data	
	V	Enhanced Data Models for Advanced Applications	

Semester II Detail Syllabus

Course Code	Title	Credits
PSIT201	Programming with Components	4
<p>Unit I : Introduction to object oriented systems and distributed objects Preview of Object-orientation, Concept of distributed object systems, Reasons to distribute for centralized objects. Mapping objects to locations. Object oriented system architecture, client-server system architecture, multi tier system architectures. Design of object oriented system architecture and component technology compound document. Computing standards, OMG, Overview of CORBA, Overview of COM/DCOM and of an open doc, Overview of Object Web, Overview of java, Enterprise java beans.[6L]</p>		
<p>Unit II : Component Object Model (COM) introduction with interface in COM-DCOM Com as better C++ software distribution, Dynamic linking, Separating interface and COM implementation, Run time polymorphism, Introduction to DCOM. Introduction to interfaces, Interface definition language (IDL), Interface and IDL, Using COM interface pointers, Optimizing query interface, Code sharing and reuse.[10L]</p>		
<p>Unit III : Classes and Objects in COM-DCOM, Apartments and Object Web Introduction, Classes and servers, Optimizations, Classes and IDL, Class emulation, Query interface types and properties, Object services and dynamic composition. Cross-apartments access, lifecycle management. Web technologies interfacing with distributed objects over client server and distribute architecture[12L]</p>		

<p>Unit IV : CORBA and CORBA Services</p> <p>Introduction and concepts, distributed objects in CORBA, CORBA components, architectural features, method invocations static and dynamic: IDL (Interface Definition Language) models and interfaces. Structure of CORBA IDL, CORBA's self-describing data; CORBA interface repository.</p> <p>Services for object naming, Object lifecycle, Event, Transaction service features, concurrency control services, persistent object service and CORBA security service.[14L]</p>	
<p>Unit V : Enterprise Java Beans and JAVA Interface[8L]</p>	
<p>References:</p> <p>Booch, Jacobson, Ramburg, "<i>Essential COM</i>", Pearson Education</p> <p>Don Box, "<i>Essential COM</i>", Pearson Education.</p> <p>Jason Pritchard, "<i>COM and CORBA side by side</i>", Pearson Education.</p> <p>Tom Valesky, "<i>Enterprise Java Beans</i>", Pearson Education</p>	

Course Code	Title	Credits
PSIT202	Advanced Computer Networks	4
Unit I: Hardware selection in the design process, SONET/SDH standards, Dense wavelength division multiplexing (DWDM), Performance and Design considerations. [08L]		
Unit II: Physical Layer Protocols and Interfaces, Accessing the Network, Copper access technologies, Cable Access Technologies, Fiber Access Technologies, Air Access Technologies.[07L]		
Unit III: Data link layers protocols, LLC and MAC sub layer protocol, Ethernet, Token Ring, Token Bus and FDDI, Bridge protocols, Switching in the LAN environment.[10L]		
Unit IV: FR specification and design, VoFR: Performance and Design considerations, Advantages and disadvantages of FR, ATM: Many faces of ATM, ATM protocol operation (ATM cell and Transmission), ATM networking basics, Theory of operations, B-ISDN protocol reference model, PHY layer, ATM layer (Protocol model), ATM layer and cell (Definition), Traffic descriptors and parameters, Traffic and Congestion control defined, AAL Protocol model, Traffic contract and QoS, User plane overview, Control plane AAL, Management plane, Sub-DS3 ATM, ATM public services. [10L]		
Unit V: Background (Routing protocols), TCP/IP suite, Network layer (Internetwork layer), Transport layer, Application layer, Addressing and routing design. ITU Recommendation X.25, User connectivity, Theory of Operation, Network layer functions, X.75 Internetworking protocol, switched multimegabit data service (SMDS), SMDS and IEEE 802.6, Subscriber Interface and Access protocol, Addressing and Traffic control.[10L]		
References: 1) Darren L Spohn, “Data Network Design”, TMH 2) D. Bertsekas, R. Gallager, “Data Networks”, PHI 3) W.R. Stevens, “Unix Network Programming”, Vol.1, Pearson Education 4) J.Walrand, P. Varaiya, “High Performance Communication Networks”, Morgan Kaufmann 5) Y. Zheng, S. Akhtar, “Networks for Computer Scientists and Engineers”, Oxford 6) A.S. Tanenbaum, “Computer Networks” 7) Peterson & Davie, “Computer Networks”, Harcourt Asia. 8) James D. McCabe , “Practical Computer Analysis and Design”, Harcourt Asia.		

Course Code	Title	Credits
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PSIT203	Speech Recognition	4
<p>Unit I: Fundamentals of Speech Recognition and Speech Signal Introduction, The paradigm for speech Recognition, out line, Brief history of speech recognition research. Production, reception, and Acoustic-phonetic characterization: The speech production system, Representing speech in time and frequency domains, Speech Sounds and features, Approaches to automatic speech recognition by machine. [[10L]</p>		
<p>Unit II: Signal Processing and Analysis Methods for Speech Recognition and Pattern Comparison Techniques The bank-of-filters front-end processor. Linear predictive model for speech recognition, Vector quantization, Auditory based Spectral analysis model. Speech detection, Distortion Measures-Mathematical Considerations, Distortion Measures-Perceptual Considerations, Spectral-Distortion Measures, Incorporation of spectral dynamic features into distortion measures, Time Alignment and Normalization. [17L]</p>		
<p>Unit III: Speech Recognition System Design And Implementation Issues Application of source coding techniques to recognition, Template training methods, Performance analysis and recognition enhancements, Template adoption to new talkers, Discriminative methods in speech recognition, Speech recognition in adverse environment. [15L]</p>		
<p>Unit IV: Theory And Implementation Of HMM and Speech Recognition based on Connected Words Model Discrete time Markov processes, Extensions to hidden Markov Models, The three basic problems for HMMs, Types of HMMs, Implementation issues for HMMs, HMM system for isolated word recognition. General notations for the connected Word-Recognition problem, The two level dynamic programming algorithm, The level building algorithm, The one pass algorithm, Multiple candidate strings, Grammar networks for connected digit recognition, Segmental K-Means training procedure, Connected digit recognition implementation. [13L]</p>		
<p style="text-align: center;">Unit V: Large Vocabulary Continuous Speech Recognition and Task oriented Applications of Automatic Speech Recognition [5L]</p>		
<p>References:</p> <ol style="list-style-type: none"> 1. L. Rabiner and B. Juang, “<i>Fundamentals of Speech Recognition</i>”, Pearson Education. 2. L R Rabiner and RW Schafer, “<i>Digital Processing of Speech Signals</i>”, Pearson Education 3. B. Gold and N. Morgan, “<i>Speech and Audio Signal Processing</i>”, John Wiley. 4. D. Jurafsky and J.H. Martin, “<i>Speech and Language Processing</i>”, Pearson Education. 		

Course Code	Title	Credits
PSIT204	ADVANCED DATABASE SYSTEMS	4
Unit I: The Extended Entity Relationship Model and Object Model The ER model revisited, Motivation for complex data types, User defined abstract data types and structured types, Subclasses, Super classes, Inheritance, Specialization and Generalization, Constraints and characteristics of specialization and Generalization, Relationship types of degree higher than two.		
Unit II: Object-Oriented & Object Relational Databases Object Oriented : Overview of Object-Oriented concepts, Object identity, Object structure, and type constructors, Encapsulation of operations, Methods, and Persistence, Type hierarchies and Inheritance, Type extents and queries, Complex objects, OQL, Persistent programming languages Object Relational: Database design for an ORDBMS - Nested relations and collections; Storage and access methods, Query processing and Optimization, Systems comparison of RDBMS, OODBMS, ORDBMS		
Unit III: Parallel and Distributed Databases and Client-Server Architecture Architectures for parallel databases, Parallel query evaluation; Parallelizing individual operations, Sorting, Joins; Distributed database concepts, Data fragmentation, Replication, and allocation techniques for distributed database design; Query processing in distributed databases; Concurrency control and Recovery in distributed databases. An overview of Client-Server architecture		
Unit IV: Databases on the Web and Semi Structured Data Web interfaces to the Web, Overview of XML; Structure of XML data, Document schema, Querying XML data; Storage of XML data, XML applications; The semi structured data model, Implementation issues, Indexes for text data		
Unit V: Enhanced Data Models for Advanced Applications Active database concepts. Temporal database concepts.; Spatial databases, Concepts and architecture; Deductive databases and Query processing; Mobile databases, Geographic information systems		
References: 1. Elmasri and Navathe, “ <i>Fundamentals of Database Systems</i> ”, Pearson Education 2. Raghu Ramakrishnan, Johannes Gehrke, “ <i>Database Management Systems</i> ”, McGraw-Hill		

Practical Component

<p>PSITP201</p>	<p>Programming with Components: Laboratory experiments using Java, VS 6.0, VS 2008, IIS</p> <ol style="list-style-type: none"> 1. Create a DLL in VC++ environment and Test it in VC++. 2. Build a OCX COM object in Visual Basic and test in VB and ASP 3. Create ATL (ActiveX Template Library) COM using ATL COM Appwizard and integrate it in VB and ASP 4. Create a COM in VC++ and Use it in C++ 5. Create a DLL in Vb.Net test it in Visual Basic 6. Create a bean component and Test it in JSP 7. Implement the native method interface using JAVA and C++ [Java Native 8. Interface] 9. Write a CORBA application from Java to Java 10. Create a com in Vb.Net & test it in Vb.net 11. Create a component in ASP.net/ Vb.net & test it in ASP application 	<p style="text-align: center;">2</p>
<p>PSITP202</p>	<ol style="list-style-type: none"> 1. Study of the following TCP/IP utilities in detail: Diagnostic commands: arp,hostname,ipconfig,lpq,nbtstat, netstat,ping,route, and tracert Connectivity commands: finger,ftp,lpr,rcp,rexec,rsh,telnet, and tftp 2. Setting up VPN based remote access. 3. Remote Machine event handling 4. Creating and Configuring a Server Cluster under Windows / LINUX 5. Study of different transmission media: UTP, Co-axial cables, RJ-45 connectors, BNC connectors, terminators, Switch, connecting networks using these. Optical fibres. 6. Implementation of POP3 Client on Windows / Linux. 7. Implementation of SMTP Client on Windows / Linux. 8. Implementation of FTP Client on Windows / Linux. 9. Design of Simple Instant Messenger. 10. Simulating Routing techniques 	<p style="text-align: center;">2</p>
<p>PSITP203</p>	<p>Speech Recognition using Matlab</p> <ol style="list-style-type: none"> 1. To generate basic function 2. To perform convolution and co-relation operations on the given sequences. 3. To apply low pass filter on the signal 4. To apply high pass filter on the signal 5. To perform demonstration of the spectrogram, narrowband or wideband. 6. To demonstrate representation of speech in the frequency domain. 7. A. To Perform Short-Time Speech Measurements, Short-Time energy Calculation. B. To Perform Short-Time Speech Measurements, Average Magnitude calculation 	<p style="text-align: center;">2</p>

	8. A. To perform Short-Time Speech Measurements, Short-Time Autocorrelation, Varying Window Length. B. To perform Short-Time Speech Measurements, Short-Time Autocorrelation, Voiced and Unvoiced Speech 9. To demonstrate Linear Prediction by Autocorrelation method. 10. To analyze the Hidden Markov Model	
PSITP204	1. Horizontal fragmentation of database. 2. Vertical fragmentation of database 3. Creating Replica of database. 4. Create Temporal Database. 5. Inserting and retrieving multimedia objects in database (Image / Audio / Video). 6. Implement Active database using PL/SQL. 7. ORDBMS Application 8. Implement and retrieve records from a Spatial Database 9. Create an XML Application using database and any programming language (Java / VB.NET –ASP.NET, C#-ASP.NET). 10. Prolog programming.	2