Semester-VII

Theory Courses

Course Code	Title	Scheme of Examination				Hrs./Week		
		Duration (hrs)	IA	UE	Total Marks	L	T	P
ITE-721	UNIX/LINUX & Shell Programming	3	40	60	100	3	1	0
ITE-722	Entrepreneurship Development & Management	3	40	60	100	3	1	0
ITE-723	Computer Based Numerical Techniques using C	3	40	60	100	3	1	0
ITE-724	Major Project-Phase-1	-	100	-	100	-	-	-
	Elective-I	3	40	60	100	3	1	0
	Elective-II	3	40	60	100	3	1	0
Total			**240**	**360**	**600**			

Laboratory Courses

ITE-731	UNIX/LINUX & Shell Programming	2	25	25	50	0	0	2
ITE-732	Computer Based Numerical Techniques using C	2	25	25	50	0	0	2
ITE-733	Industrial Training	2	50	0	50	0	0	2
Total			**100**	**50**	**150**			
Total (Theory + Lab)			**340**	**410**	**750**			

- During semester VII every student shall be allotted a Major Project-Phase I under the supervision of an allotted mentor. Students are required to do preliminary exercise of survey of literature and preparation of a road map of the selected Project under the supervision of their allotted mentor. Major Project- Phase I is to be completed during semester VII and shall be evaluated internally as per university statutes by a committee consisting of:
    i) Head of the Department
    ii) One member nominated by Principal
    iii) Coordinator(s)/Supervisor(s)/Mentor(s) of project

Elective Papers in VII semester:

- Students will be required to opt for two elective papers from ITE-741 to ITE-752.
- The choice of electives will rest with the students. However, in no case will the department run more than two subjects for one elective paper.

Elective-I and Elective-II

CODE	SUBJECT	CODE	SUBJECT
ITE-741	Advanced Java	ITE-747	Data mining and Warehousing
ITE-742	Fundamentals of DIP	ITE-748	Simulation and Modeling
ITE-743	.Net Technologies	ITE-749	Real Time Operating System
ITE-744	System Software	ITE-750	Advanced Computer Architecture
ITE-745	Distributed Computing	ITE-751	Optical Communication
ITE-746	Artificial Intelligence	ITE-752	Compiler Design

Semester VII

Objective: This subject aims to provide students with fundamental principles and comprehensive knowledge of Unix/Linux & Shell Programming.

Course Title: UNIX/LINUX & Shell Programming **Max Marks: 100**
Course Code: ITE-721 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Unit-I

Introduction to the kernel: Architecture of the UNIX, the buffer cache. Internal representation of files**,** inode, accessing blocks, releasing blocks, structure of regular files, conversion of a path name to an inode, inode assignment to a new file, and allocation of disk-block.

Unit-II

System Calls: System calls for the file systems**;** open, read, write, close. The pipe system call, opening a named pipe, reading and writing pipes, closing pipes, dup, mounting and un-mounting file system, link, unlink. System calls for time and clock.

Unit-III

Processes: The structure of processes, process states and transitions, layout of system memory, the context of a process, saving the context of the process, manipulation of the process address space. Process Control, process creation, signals, process termination, awaiting process termination, the user id of a process, changing the size of the process, the system boot and init process.

Unit-IV

Shell Programming: Study of different types of shells like Bourne shell, C & K shell. Shell variable, shell script, shell command. Looping and making choices, for loop, while and until, passing arguments to scripts. Programming with different shells.

Unit-V

Inter Process Communication: Inter process communication, process tracing, network communication sockets. Multiprocessor system, problem of multiprocessor systems, solution with master and slave processor, solution with semaphores. Study of distributed UNIX system.

Text Books:

1. **Maurice J Bach.,** The design of the UNIX operating system, Prentice-Hall, 1986.
2. **Raymond S. Eric**, The Art of UNIX Programming, Addison-Wesley Professional.

Reference Books:

1. **Stephen Prata,** Advanced UNIX: A Programmer Guide, Howard W. Sams, 1987
2. **Rochkind,** Advanced Unix Programming, Pearson Education India.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Semester VII

Course Title: Entrepreneurship Development & Management **Max Marks: 100**
Course Code: ITE-722 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: To give an overview of who the entrepreneurs are and what competences are needed to become an entrepreneur and to create an awareness of the need for systematic management of projects.

Unit-I

Entrepreneurship Development: Meaning, Objectives, Type of Entrepreneurs, Importance of Entrepreneurship Training, Factors affecting Entrepreneurship, Linkage between Entrepreneurship and Economic Development, Problem of Increasing Unemployment, Balanced Regional Growth, Harnessing Locally Available Resources, New Industrial Policy and Innovation in Enterprises.

Unit-II

Entrepreneurship Support System: Small Industries Development Bank of India, Small Industries Service Institute, State Small Industries and Export Corporation, District Industrial Centres and other Supporting Agencies.

Unit-III

Project Report Preparation: Identifying Business Opportunities, Project Report and its Importance, Various Contents of Project Report: Managerial and Entrepreneurial Capabilities, Socio-Economic Benefits, Demand Analysis, Technical Feasibility and Financial Viability.

Unit-IV

Introduction to Marketing Management: Brief Introduction to various types of Product Strategies, Pricing Strategies, Channel Strategies and Promotional Strategies.
Introduction to Production Management: Types of Production Systems, Production Planning and Control, Functions of Production Manager and Materials Management.

Unit-V

Introduction to Human Resource Management: Manpower Planning, Recruitment, Selection, Placement and Induction, Training and Development, Compensation.
Introduction to Financial Management: Source of Finance and Working Capital Management.

Text Books:

1. **Holt David H**, Entrepreneurship: New Venture Creation, PHI (4000).
2. **Saini Jasmer Singh**, Entrepreneurship Development Programmes and Practices, Deep and Deep Publications, New Delhi (1997).

Reference Books:

1. **Dollinger**, Entrepreneurship Strategies and Resources, Pearson Education (4003).
2. **Jose Paul & Kumar Ajith N**, Entrepreneurship Development and Management, Himalaya Publishers, New Delhi (4000).
3. **Hisrich Robert D and Micheal Peters P**, Entrepreneurship, TMH, (4002).

Semester VII

Course Title: Computer Based Numerical Techniques Using C **Max Marks: 100**

Course Code: ITE–723 **University Exam: 60**

Duration of Exam: 3 hours **Internal Assessment: 40**

Objective*:* The objective of this course is to introduce students to the various numerical techniques which find their applications in almost every sphere of Science and Engineering*.*

Unit-I

Introduction: Errors and Significant Digits. Algebraic Equations: Bisection Method, Secant Method, Newton Raphson Method, Graeffe's Root Squaring Method, Regula-Falsi Method

Unit-II

Solution for Systems of Equations: Gauss Elimination, Gauss Jordan and Partition Method for Linear System of Equations.

Unit-III

Interpolation: Introduction. Forward, Backward, Central and Divided Differences, Newton's Formula for Equal and Unequal Intervals. Lagrange's Interpolation Formula. Sterling's and Bessel's Formula.

Unit-IV

Numerical Integration and Differentiation: Introduction. Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule. Gaussian Integration.

Unit-V

Difference Equations and their Solutions: Numerical Methods, Taylor Series Methods, Euler's Method, Range Kutta Method, Predictor Corrector Method, Adams Bashforth Method.

Text Books:

1. **Balagurusamy**, Numerical Methods, TMH.
2. **V. Rajaraman**, Introduction to Numerical Methods, TMH.

Reference Books:

1. **Schilling**, Applied Numerical Methods for Engineers using MATLAB and C, Cengage India.
2. **Cheney**, Numerical Mathematics & Computing, Cengage India.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Semester VII

Course Title: UNIX/LINUX & Shell Programming **Max Marks: 50**
Course Code: ITE-731 **University Exam: 25**
Duration of Exam: 3 hours **Internal Assessment: 25**

The lab course will address the demand for Information technology professionals with UNIX training and experience.

1. Using the visual editor (vi) and the Pico editor.
2. Setting file and directory permissions.
3. Controlling user processes.
4. Managing, printing, and archiving large files.
5. Accessing and touring graphical desktops.
6. Administering a Linux PC system.
7. General administration issues, root account, creating user in Linux, changing password, deleting user, disabling user account, Linux Password & Shadow File Formats System Shutdown and Restart creating groups, Custom Configuration and administration issues.
8. Practicing various Commands, Using various editors, Shell programming, Networking and TCP/IP on Linux.
9. Common Network Troubleshooting on Linux.
10. FTP and Telnet settings, Web server configuration.

Note: This is only the suggested list of experiments. Instructor may frame additional experiments relevant to the course contents

Semester VII

Course Title: Computer Based Numerical Techniques Using C **Max Marks: 50**

Course Code: ITE-732 **University Exam:25**

Duration of Exam: 3 hours **Internal Assessment: 25**

List of Experiments:

1. Bisection method.
2. Secant method.
3. Newton Raphson Method.
4. Root Squaring Method.
5. Guass Elimination.
6. Guass Jordan method.
7. Forward, backward, central and divided differences.
8. Newton's formula for equal and unequal intervals.
9. Lagrange's Interpolation formula.
10. Sterling's and Bessel's formula.
11. Trapezoidal rule.
12. Simpson's 1/3 rule.
13. Simpson's 3/8 rule.
14. Gaussian Integration.
15. Taylor series methods.
16. Euler's method.
17. Range Kutta method.
18. Predictor Corrector method.
19. Adams Bashforth method.

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

Semester VII
Elective

Course Title: Advanced Java **Max Marks: 100**
Course Code: ITE-741 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: To emphasize on the basic concepts of advanced Java and web based development.

Unit-I

Introduction: Concepts of Classes and Objects, Constructors, Inheritance, Function Overloading, Polymorphism, Packages and Interfaces, exception handling, file streams and their manipulation.

Unit-II

Design of User Interfaces: Swing, Japplet, Icons and Labels, Text Fields, Buttons, Jbutton Class, Check Box, Radio Buttons, The Container, Panel, Windows, and Frame Classes, Combo Box, Tabbed Panes, Scroll Panes, Trees, Tables, Custom Rendering of Jlist Cells.

Unit-III

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, working with statements, Creating and Executing SQL statements, working with Result Set Object & Result Set Meta Data.

Unit-IV

Servlets: Introduction to Servlets, Life cycle of Servlets, Creating, Compiling and running servlet, Reading the servlet Parameters, Reading Initialization parameter, Packages- javax.servlet Package, Handling HTTP Request and Response (GET / POST Request), Cookies and Session Tracking.

Unit-V

Java Beans: Java Bean, Installing, Starting Bean Development Kit, Use of JAR files and the use of Java Beans API.
JSP: JSP Architecture, JSP Access Mode, JSP Syntax Basic (Directions, Declarations, Expression, Scriplets and Comments), JSP Implicit Object, Object Scope, Synchronization Issue, Session Management.

Text Books:

1. **Gary Cornell and Horstmann Cay S.,** Core Java, Vol I and Vol II, Sun Microsystems Press.
2. **Herbert Schildt**, Java: The Complete Reference, McGraw-Hill.

Reference Books:

1. **Philip Hanna,** JSP: The Complete Reference, McGraw-Hill.
2. **Deital and Deital,** Java How to Program, Prentice Hall (2007).

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.

Semester VII

Elective

Course Title: Fund. of Digital Image Processing **Max Marks: 100**
Course Code: ITE–742 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: Study the image fundamentals, mathematical transforms necessary for image processing, image enhancement techniques, image compression procedures.

Unit-I

Introduction: Digital Image Representation, Fundamental Steps in Image Processing. Elements of Digital Image Process Systems, Application of Digital Image Processing: Medical Science, Industries & Security. Relationship between Pixels. Brief Introduction to Image Data Types and File Formats; 1-Bit Images, 8-Bit Gray Level Images, 8-Bit Color Images, 24-Bit Color Images, Color Lookup Tables, Formats; GIF, JPEG, PNG, TIFF.

Unit-II

Image Enhancement in the Spatial Domain: Background, Some Basic Grey Level Transformations, Histogram Processing, Basics of Spatial Filtering: Smoothing Using Linear/Non-Linear Spatial Filters, Sharpening Spatial Filters; Second Derivative (Laplacian), First Order Derivative (Gradient).

Unit-III

Image Enhancement in the Frequency Domain: Background, Introduction to the 2D-Discrete Fourier Transform and its Inverse, Basics of Frequency Domain Filtering, Image Smoothing Frequency Domain Filters, Image Sharpening Frequency Domain Filters.

Unit-IV

Image Compression: Coding Redundancy, Inter-Pixel Redundancy, Fidelity Criteria, Image Compression Models, Error-Free Compression, Variable Length Coding, Bit-Plane Coding, Wavelet Coding, Digital Image Watermarking, Image Compression Using Discrete Cosine Transform (JPEG).

Unit-V

Image Segmentation: Point, Line and Edge Detection, Edge Linking and Boundary Detection, Thresholding: Global Thresholding, Local Thresholding, Region Based Segmentation: Region Growing, Region Splitting & Merging.

Text Books:

1. **Gonzalez R. & Wood E.R.**, Digital Image Processing, Prentice Hall India.
2. **JAIN R. K.**, Fundamentals of Image Processing.

Reference Books:

1. **Low Andrian**, Introductory Computer Vision and Image Procession, TMH
2. **Robert Scholkoff & John Willey & Sons**, Pattern Recognition-Statistical, Structural and neural approach.
3. **Pratt W.K.**, Digital Image Processing, McGraw Hill.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Semester VII

Elective

Course Title: .Net Technologies **Max Marks: 100**
Course Code: ITE-743 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The objective of the course is to enable a student to acquire the knowledge pertaining to fundamentals of .NET Technology.

Unit-I

Introduction: Microsoft .net Platform, Design Goals and Overview.
Common Language Runtime: CLR Environment and Executables, Metadata, Assemblies, Intermediate Language, CLR Execution.
Programming in .net Framework: Common Programming Model, Features and Languages, Language Integration.

Unit-II

.net Framework Components: Deployment options, Distributed components, COM+ services, Message queuing.

Unit-III

Data and XML: ADO.NET Architecture and Benefits, Content components, Managed providers, Datasets and XML.

Unit-IV

Web services: Web services in practice, Web services Framework, Provider, Customer and Security.
Web forms: ASP, ASP.NET, Web Form syntax, Data binding, Use of templates, State management and scalability, Application development, ASP.NET and Web services.

Unit-V

Windows forms: Introduction, System. Windows. Forms Namespace, Windows Forms development, Windows Forms and Web services.

Text Books:

1. **Hoang Lam, Thuan L. Thai**, .NET Framework Essentials, O'Reilly Publications.
2. **Joe Duffy,** Professional .Net Framework 2.0, Wrox Library Books.

Reference Books:

1. **Jeffrey Richter**, Applied Microsoft .NET Framework Programming, Microsoft Press.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.

Semester VII
Elective

Course Title: System Software **Max Marks: 100**
Course Code: ITE–744 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective*:* The objective of this course is to introduce students to the various numerical techniques which find their applications in almost every sphere of Science and Engineering.

Unit-I

Introduction: System software and machine architecture – The Simplified Instructional Computer (SIC), Machine architecture , Data and instruction formats , addressing modes , instruction sets , I/O and programming

Unit-II

Assemblers: Basic assembler functions , A simple SIC assembler – Assembler algorithm and data structures , Machine dependent assembler features , Instruction formats and addressing modes – Program relocation , Machine independent assembler features , Literals – Symbol, defining statements – Expressions , One pass assemblers and Multi pass assemblers , Implementation example , MASM assembler

Unit-III

Loaders and Linkers: Basic loader functions , Design of an Absolute Loader – A Simple Bootstrap Loader , Machine dependent loader features , Relocation – Program Linking – Algorithm and Data Structures for Linking Loader , Machine,independent loader features , Automatic Library Search – Loader Options , Loader design options , Linkage Editors – Dynamic Linking – Bootstrap Loaders , Implementation example , MSDOS linker.

Unit-IV

Macroprocessors: Basic macro processor functions , Macro Definition and Expansion – Macro Processor Algorithm and data structures , Machine,independent macro processor features , Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters,Macro within Macro,Implementation example , MASM Macro Processor – ANSI C Macro language.

Unit-V

System Software Tools: Text editors , Overview of the Editing Process , User Interface – Editor Structure. , Interactive debugging systems , Debugging functions and capabilities – Relationship with other parts of the system – User,Interface Criteria.

Text Books:

3. **Leland L. Beck**, "System Software – An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2000

Reference Books:

3. **D. M. Dhamdhere,**"Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw, Hill, 1999.
4. **John J. Donovan,** "Systems Programming", Tata McGraw,Hill Edition, 1972.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Semester VII

Elective

Course Title: Distributed Computing **Max Marks: 100**
Course Code: ITE–745 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The objective of this course is to introduce students to the fundamentals and techniques of distributed computing. Students are expected to develop distributed applications using latest technologies.

Unit-I

Introduction: Introduction to Distributed System; Goals, Hardware Concepts, Software Concepts and Client-Server Model. Examples of Distributed Systems.

Unit-II

Process and Interprocess Communication: Communication: Layered Protocols, Remote Procedures Call, Remote Object Invocation, Message-Oriented Communication.
Processes: Threads, Code Migration, Software Agent.

Unit-III

Naming & Synchronization: Naming: Naming Entities, Locating Mobile Entities, Removing Un-Referenced Entities.
Synchronization: Election Algorithms, Mutual Exclusion, Distributed Transactions.

Unit-IV

Consistency and Replication: Consistency and Replication: Introduction, Data Centric Consistency Models, Client Centric Consistency Models, Distribution Protocols.
Fault Tolerance; Introduction, Process Resilience, Reliable Group Communication. Distributed Commit.

Unit-V

Security Policies: Security: Introduction, Secure Channels, Access Control, Security Management.

Text Book:

1. **Tannenbaum A. S.**, "Distributed Systems: Principles and Paradigms", PHI.
2. **M. Singhal & N. Shivaratri**, Advanced Concepts in Operating Systems, TMH.

Reference Book:

1. **G. Coulouris, J. Dollimore, and T. Kindberg**, Distributed Systems: Concepts and Design, Pearson Education.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Semester VII

Elective

Course Title: Artificial Intelligence **Max Marks: 100**
Course Code: ITE-746 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The objective of this subject is to complement and broaden what students learn in the subject Artificial Intelligence and Natural Language Processing.

Unit- I

Introduction to Artificial Intelligence. Problem Solving Concepts. Definition of Pattern Recognition. Production System. Problem and Production. System Characteristics. Two Path Problem. Analysis of Artificial Intelligence Techniques. Criteria and Success.

Unit- II

Knowledge Representation. Formal And Non-Formal Logic. Representation Evaluation Criteria. Level Of Representation. Formal Logic Schemes. Resolutions. Predicate And Proportional Logic. Conversion To Clause Form. Semantic Networks. Frames. Scripts. Production Systems.

Unit- III

Problem Solving Algorithms and Fuzzy Logic: Problem Solving Strategies. Dealing with Uncertainty. Defining the Problem. Control Strategies. Exhaustive Search. Generate and Test. Matching. Weak Methods. Hill Climbing. Breadth and Depth First Searches. Search Algorithms Based on Probability. Fuzzy Reasoning.

Unit- IV

Neural Networks: Principles and Promises. Pattern and Pattern Recognition Tasks. Conventional Methods Scope.

Unit- V

Expert System: Introduction to Expert System Development. Matlab Simulation.

Text Books:

1. **Flante Rich,** Artificial Intelligence.
2. **Nilson and Springer**, Principles of Artificial Intelligence.

Reference Books:

1. **David W. Rolston**, Principles of Expert System Development

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Semester VII

Elective

Course Title: Data Mining and Data Warehousing **Max Marks: 100**
Course Code: ITE-747 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems.

Unit-I

Introduction: Dimensional Modeling: Goals of a Data Warehouse, Components of a Data Warehouse, Operational Data Store, Fact and Dimension Tables Star, Snowflake and Hybrid Schemas, Confirmed Facts and Dimensions. Slowly Changing Dimensions, Casual Dimensions, Helper Tables and Surrogate Keys.

Unit-II

Data Warehouse: Introduction, Sources, Users and Applications, Software Architecture and Design, Data Sub System, Data Granularity Model, Characteristics of a Data Warehouse, Data Warehouse Bus Architecture.

Unit-III

Meta Data: Introduction, Need, Types and Metadata Versioning, Metadata Process Concept. Data Marts and Characteristics, Decision Support System and Uses, Using Data Warehouse for DSS, Comparison between OLTP and OLAP.

Unit-IV

Populating a Data Warehouse: Survey of Data Warehouse, Populating Issues, Architecture Solution Models, Techniques and Solutions for constructing a Central Data Warehouse, Extract, Transform and Build Methods, Managing a Data Warehouse Environment.

Unit-V

Introduction to Data Mining and Uses: Introduction to Data Mining and Uses. Introduction to Decision Trees and its Working. Data Mining Techniques: Concept of Neural Networks. Nearest Neighbor & Clustering. Genetic Algorithms and Data Visualization Concepts.

Text Books:

1. **Gray & Smith**, Data Warehousing handbook, CRS, PHI.
2. **Berson**, Data Warehousing, Data Mining & OLAP.

Reference Books:

1. **Mallach**, Data Warehousing System, McGraw Hill.

2. **Prabhu**, Data Warehousing:Concepts,Techniques,Products and Applications, 2nd Ed., PHI.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Semester VII
Elective

Course Title: Simulation & Modeling **Max Marks: 100**
Course Code: ITE-748 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The aim of this subject is to provide the basic knowledge of fundamental concepts of simulation and simulation languages.

Unit-I

Fundamentals: Definition and reasons for simulation. Continuous (time-oriented) and discrete (event) systems, Modeling/programming simple deterministic systems, Rates and system dynamics.

Unit-II

Concepts in Simulation: Stochastic variables; discrete vs. continuous probability; algorithms for generating random numbers, their comparison with respect to speed & validity; continuous uniformly distributed random numbers; methods for generating non-uniform distributions.

Unit-III

Building Simulation Programming Models: Arrival patterns, service times, and queue formation. Formulating systems as events and entities (such as resources, queues, gates, and linkages). Congestion in systems; arrival patterns; Poisson arrivals; the exponential distribution; the coefficient of variation; service times; normal distribution; queuing disciplines; Measures for Queues; Analytic Solutions of Queuing Problems; Utilization as a Design Factor; Other factors like grade of service.

Unit-IV

Discrete Event System Simulation: Discrete events; representation of time; queues and servers; generation of arrival patterns; resource seizing; departures simulation of a telephone system and computer networks; simulating components of an operating system; delayed calls; modeling policies; priority queues; tasks; gathering statistics; counters and summary statistics; measuring utilization and occupancy; recording distributions and transit times.

Unit-V

Introduction to Simulation Languages: Simulation in C++, GPSS, Simulations Packages. Trends in simulation Software. SIMSCRIPT programs; SIMSCRIPT system concepts; organization of a SIMSCRIPT program; blocks, names, and labels; SIMSCRIPT statements; entities, events, and activities; defining the system; defining the system model; referencing variables; the procedural structures; arrival event; timing routine; disconnect event; closing event; execution, debugging and validation; interpreting outputs and system optimization via modification.

Text Books:

1. **Law and Kelton**, Simulation Modeling and Analysis, McGraw-Hill, 3rd Edn. 2000.
2. **Banks**, Discrete-Event System Simulation, (Second Edition), Prentice-Hall, 1996.

Reference Books:

1. **Dunning**, Getting Started in GPSS, , Engineering Press, San Jose, CA, 1985.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.

Semester VII

Elective

Course Title: Real Time Operating System **Max Marks: 100**
Course Code: ITE-749 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The aim of the subject is to provide basic and necessary information about the working of RTOS and Embedded Systems.

Unit 1

Introduction to RTOS and Embedded System
Brief History of Operating system, Introduction to real time operating system, Introduction to Embedded Systems, Definition of RTOS, Characteristics and Features Real Time Kernels, Scheduler, Objects, Services

Unit 2

Tasks & Memory Management
Tasks and memory management:
Introduction, Defining Tasks, Task state and scheduling, Task operation, Task structures, Synchronization, communication and concurrency.
Memory management concepts in RTOS

Unit 3

IPC Mechanism
Defining Semaphore, Semaphore operation, use of semaphore.
Defining Message queues, Message queue states, Message queue contents, use Pipes, Signals, Condition variables.

Unit 4

Exceptions & Interrupts
Defining exceptions and interrupts. How they are implemented. Applications of exceptions and interrupts, Types of interrupts, Handling interrupts

Unit 5

Timer & Timer Services
Real Time clocks and system clocks, Programmable interval timers, Timer interrupt, Service routines.
Basic I/O concepts, The I/O Subsystem.

Text Books:

1. **Qing Li**, RTOS concepts in Embedded Systems, CMP Publications.
2. **V. Penumchu**, Simple RTOS, Trafford Publications.

References:

1. **Mall Rajib**, Real Time Systems: Theory & Practice.

Note for paper setter:

The question paper shall comprise 10 questions, two questions from each unit. The students are required to attempt five questions, one from each unit.

Semester VII

Elective

Course Title: Advanced Computer Architecture **Max Marks: 100**
Course Code: ITE-750 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The objective of this course is to learn the advanced aspects of computer architecture design and analysis.

Unit-I

Introduction: Introduction to Parallel Processing and Pipelining, Array Computers, Multiprocessor Systems, Dataflow Diagrams and Applications of Parallel Processors.

Unit-II

Pipeline Processors: Various Types of Pipeline Processors like Arithmetic Pipelines, Instruction Pipelines etc. Reservation Table, Design of various types of Pipelines, Instruction Pre-Fetching and Branch Handling in Pipelines, Data Buffering and Busing Structures in Pipelines.

Unit-III

Streams: Meaning of Instruction Streams and Data Streams, Classification of Computers Based on these as SISD, SIMD, MISD and MIMD, SIMD Computer Organization, Various types of SIMD Interconnected Networks like Static and Dynamic Networks, Mesh-Connected, Networks, Cube Connected Networks etc. SIMD Matrix Multiplication and Parallel Sorting Algorithms.

Unit-IV

Arrays and Associative Processors: Various types of Array and Associative Processors, Loosely and Tightly Coupled Microprocessors, Various types of Interconnection Networks like Time Shared or Common Bus, Crossbar Switch, Multi-Port Memories etc.

Unit-V

Control Flow and Data Flow Computers: Control Flow and Data Flow Computers, Data Flow Computers, Data Flow Graphs and Languages, Static and Dynamic Data Flow Computers, Systolic Array Architecture.

Text Books:

1. **V. Carl Hamacher**, Computer Organization, TMH.
2. **John P. Hayes**, Computer Architecture and Organization, TMH.

Reference Books:

1. **Kai Hwang,** Advanced Computer Architecture, TMH.

2. **David A. Patterson and John l. Hennessy**, Computer Organization and Design, Elsware India.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Semester VII
Elective

Course Title: Optical Communication **Max Marks: 50**
Course Code: ITE-751 **University Exam:25**
Duration of Exam: 3 hours **Internal Assessment: 25**

Objective: To introduce to the students the basic concepts of optical fiber communication system.

Unit-I

Overview of Optical Fibre Communication: Basic concepts, lightwave components, principle of light transmission, channel capacity etc. Nature of light, polarization, basic laws and definition, mode theory analysis for optical communication, optical fibre modes and configuration, wave propagation in optical fibre, operating wavelength, single mode and multimode fibres, V–numbers, mode field diameter, numerical aperture, refractive index profiles.

Unit-II

Signal Degradation in Optical Fibres: Attenuation, absorption, scattering losses, bending losses in optical fibres. Dispersion inoptical waveguides, group delay, material dispersion, waveguide dispersion, intermodal dispersion and chromatic dispersion in single mode fibres.

Unit-III

Optical Sources: Basic concepts from semiconductor electronics, energy bands. Light emitting diodes: Structure, principle, material, modulation response, transient response. Laser diodes: Principle of action, structure, efficiency and characteristics of laser diodes, modulation He–Ne lasers, DFB lasers.

Unit-IV

Optical detectors: Basic concepts, photodiodes, PIN photodiode, avalanche photodiode, detector response time, avalanche gain, receiver noise, receiver sensitivity, BER.

Unit-V

Transmission Systems: Overview of analog and digital optical link, power launching and coupling. Point to point link system consideration: Link power budget and risk time analysis.

Text books:

1. **G. Keiser, Optical Fiber Communication**, 3rd Edn, McGraw Hill Intl 4000.
2. **D. F. Mynbacv and L. Scheiner** , Fiber Optic Communication Technique, Pearson Education.

Reference Books:

1. **Ghatak & K Thyangarajan**, Introduction to fiber optics, Cambridge university press, 1998.

Note for paper setter: -The Question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one from each unit.

Semester VII
Elective

Course Title: Compiler Design **Max Marks: 100**
Course Code: ITE-752 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The aim of the subject is to help the learners to understand the fundamentals of Compiler Design.

Unit-I

Introduction: Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction. Lexical Analysis: Interface with Input, Parser and Symbol Table, Token, Lexeme and Patterns. Difficulties in Lexical Analysis. Error Reporting. Implementation. Regular Definition, Transition Diagrams, LEX.

Unit-II

Syntax Analysis: CFGS, Ambiguity, Associativity, Precedence, Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing, Bottom Up Parsing, Operator Precedence Grammars, LR Parsers (SLR, LALR, LR), YACC. Syntax Directed Definitions: Inherited and Synthesized Attributes, Dependency Graph, Evaluation Order, Bottom Up and Top Down Evaluation Of Attributes, L- and S-Attributed Definitions.

Unit-III

Type Checking: Type System, Type Expressions, Structural and Name Equivalence of Types, Type Conversion, Overloaded Functions and Operators, Polymorphic Functions. Run Time System: Storage Organization, Activation Tree, Activation Record, Parameter Passing, Symbol Table, Dynamic Storage Allocation.

Unit-IV

Intermediate Code Generation: Intermediate code, postfix notation, three address code- quadruples triples, translation of Assignment statement, Boolean Expression, Statements that alter the flow of control.

Unit-V

Code optimization And Generation: Loop optimization, DAG Representation of basic blocks, Global data flow Analysis, Issues in the design of code generator, Peephole optimization, a simple code generator Register Allocation & Assignment.

Text Book:

1. **Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman**, Compilers Principles, Techniques and Tools, Pearson Education, 2008.
2. **Steven S. Muchnick**, Advanced Compiler Design & Implementation, Morgan Kaufmann Publishers, 2000.

Reference Book:

1. **David Galles**, Modern Compiler Design, Pearson Education Asia, 2007.
2. **C. N. Fisher and R. J. LeBlanc**, Crafting a Compiler with C, Pearson Education, 2000.

Note for paper setter: The Question paper will comprise of ten questions. Two questions shall be set from each unit. The student has to attempt five questions, at least one from each unit.