BHARATI VIDYAPEETH UNIVERSITY,
Pune.

(Established under Section 3 of UGC ACT 1956)

COURSE STRUCTURE AND SYLLABUS

B. Tech. (IT) (Sem. V & VI)

COURSE STRUCTURE & SYLLABUS

BHARATI VIDYAPEETH UNIVERSITY, PUNE

B. Tech. (IT) (Sem. V & VI)

HIGHLIGHTS

Bharati Vidyapeeth University College of Engineering (BVUCOE) is the largest Engineering College in Maharashtra with an intake of 700 students in each academic year. Imparting quality technical education from Under Graduate to Doctorate Level, BVUCOE is probably the only Engineering College in India with an accreditation from both NAAC as well as NBA. The faculty at BVUCOE boasts of highly qualified academicians, a quality that is further emphasized by the fact that 15 of them are presently pursuing their Ph.D. degree.

BVUCOE has been ranked 29th amongst the Top 50 Technical Schools of India in survey conducted by DATAQUEST-IDC. We have enjoyed a ranking in this list for the last 4 years. Research is of utmost importance in all our programs. A total of 113 research papers were published in the academic year 2007-2008.

Currently we have 12 ongoing research projects. The infrastructure of BVUCOE is state-of-the-art with 62 classrooms, 59 laboratories and a well-stocked library that currently holds 27,130 titles. The college has an international presence with MoUs signed with the North Carolina A&T State University (Greensboro, USA), University of Venice (Italy), Actel Corporation (USA). Corporate interaction is also inculcated in our programs through our association with Oracle India Ltd., Infosys Ltd. and Tata Consultancy Services.

SALIENT FEATURES

Information Technology deals in study, design, development, implementation, support and management of software. The department runs an under-graduate programme viz. B.Tech. (IT) and one post-graduate programme viz. M.Tech. (IT). The department has incorporated all the latest facilities for the benefit of the students. The department has well-equipped laboratories. The latest software and hardware equipments are provided to the students. The department has specialized laboratories in Software Engineering, Linux Operating System, Multimedia.

The Association of Computer & Information Technology Engineering Students (ACIES) organizes various events and expert lectures on different technologies. The syllabi of the department are revised regularly so as to match the needs of the industry. Apart from giving thorough technical knowledge using the state-of-art technology, the students are taught communication skills and are given experience in working in groups on live projects.

MAJOR GROUPS/AREAS

Operating Systems, Multimedia, Image Processing, Computer Networks, Software Engineering, System Programming

EXPERTISE IN RESEARCH AND CONSULTANCY

The department of Information Technology has received fund from UGC for Modernization of Research Laboratory "Object Oriented Modeling and Design".

ON GOING RESEARCH PROJECTS

High Non Stationary EEG Analysis, Brain-Computer Interface, Hidden Relation Finder, Video Steganography

COMPLETED PROJECTS

Visual Modeling of Real Time System, NeTailor- A Network Patch Management Solution, Voice Message Transform, Artillery Command Post Execution Software, MAFCOG 1.0 Mathematical Formula Analysis and Generator, Object Oriented Learning Environment Using ASP, Real Time Complex System, Implementation of Sniffers, EEG Analysis using Time Domain, Steganographic System.

MAJOR EQUIPMENTS

Pentium - IV 2.46 GHz - 100, Microprocessor Kits, Microcontroller Kits

SOFTWARES

Operating Systems	:	MS-DOS, Windows 95, Windows 98, SCO Xenix 2.1, Linux 7.0, Microsoft OS/2, SDK Ver 1.02, Sun Solaris 7.1
RDBMS	:	Oracle 8, Oracle 8i, Oracle 9i, SQL Ver 7.0 & 8.0
Developing Softwares	:	Visual Studio 6.0, Microsoft Office-2000, Turbo C + + For Dos 4.5, Microsoft C 6.0, Microsoft Fortran, Turbo Pascal, Microsoft COBOL, Turbo C, Visual Studio MS.Net, Developer 2000, MS Project 2003
Web Designing Softwares	:	Adobe Photoshop, PageMaker, Corel Draw
Customized Softwares	:	Payroll, Stores/Purchase, Library/Libsys, Student, Exam Section, Admission

LABORATORIES

I T Lab I - Software Engineering Laboratory & Project Laboratory

I T Lab II - Programming Laboratory

I T Lab III - Linux Laboratory

Microprocessor Laboratory

STRUCTURE & EXAMINATION PATTERN

B. Tech. - IT

Semester V

Total Duration : 32 Hrs / Week
Total Marks : 750

Subject Code	Subject	Teaching Scheme Hrs / Week			Examination Scheme				Total (marks)
		L	P	T	Theory	Unit Test	TW & Pr	TW & Or	
K30301	Advanced Data Structures	04	-	-	80	20	-	-	100
K30302	System Software & Operating Systems	04	-	-	80	20	-	-	100
K30303	Computer Organization & Architecture	04	02	-	80	20	50	-	150
K30304	Procedural Elements of Computer Graphics	04	02	-	80	20	-	50	150
K30305	Software Engineering	04	02	-	80	20	50	-	150
K30306	IT Lab 3	02	02	02	-	-	50	50	100
	Total	22	08	02	400	100	150	100	750

Teaching Scheme			Examination Scheme				Total
Lectures	Practical	Tutorial	Theory	Test	T. W. & Pr	T. W. & Or	
22	08	02	400	100	150	100	750

Semester VI

Total Duration : 32 Hrs / Week
Total Marks : 750

Subject Code	Subject	Teaching Scheme Hrs / Week			Examination Scheme				Total
		L	P	T	Theory	Unit Test	TW & Pr	TW & Or	
K30307	Web Technologies	04	-	-	80	20	-	-	100
K30308	Multimedia Computing	04	02	-	80	20	-	50	150
K30309	High Performance Computer Networks	04	02	-	80	20	50	-	150
K60310	Operational Research	04	-	-	80	20	-	-	100
K30311	Object Oriented Modeling & Design	04	02	-	80	20	50	-	150
K30312	IT Lab 4	02	02	02	-	-	50	50	100
	Total	22	08	02	400	100	150	100	750

Teaching Scheme			Examination Scheme				Total
Lectures	Practical	Tutorial	Theory	Test	T. W. & Pr	T. W. & Or	
22	08	02	400	100	150	100	750

RULES FOR CONDUCTING TESTS

Mode of the test

- In each semester for each subject three tests shall be conducted. The schedule for the same will be declared at the commencement of academic year in the academic calendar.
- Each test shall carry 20 marks.
- University examination pattern has given weightage of 20 marks for the tests.
- To calculate these marks following procedure is followed:

  i) Out of the three tests conducted during the semester, the marks of only two tests in which the candidate has shown his / her best performance shall be considered, to decide the provisional marks in each subject.

  ii) Average marks obtained in two tests in which students have performed well, shall be considered as provisional marks obtained by the student in the tests.

  iii) If the candidate appears only for two tests conducted during the semester, he / she will not be given benefit of the best performance in the tests.

  iv) If the candidate appears only for one test conducted during the semester, to calculate the marks obtained in the tests it will be considered that the candidate has got 0 (zero) marks in other tests.

  v) The provisional marks obtained by the candidate in class tests should reflect as proportional to theory marks. In cases of disparity of more than 15% it will be scaled down accordingly; These marks will be final marks obtained by the student. No scaling up is permitted.

  vi) If the candidate is absent for theory examination or fails in theory examination his final marks for tests of that subject will not be declared. After the candidate clears the theory, the provisional marks will be finalized as above.

- Paper Pattern for Tests

  i) All questions will be compulsory with weightage as following

Question 1	-	7 marks
Question 2	-	7 marks
Question 3	-	6 Marks

  ii) There will not be any sub-questions.

- For granting the term it is mandatory to appear for all the three tests conducted in each semester.
- Roll numbers allotted to the students shall be the examination numbers for the tests.

SEMESTER - V

K30301: ADVANCED DATA STRUCTURES

TEACHING SCHEME

Lectures : 04 Hrs / Week

EXAMINATION SCHEME

Theory : 80 Marks
Duration : 03 Hours
Unit Test : 20 Marks

Unit-I (08 Hours)

Introduction

Algorithms, performance analysis-time complexity and space comlexity, O-notationl Omega notation and Theta notation, Review of basic data structures-stack, queue, Priority Queues,Binary search trees, AVL trees, height of and AVL tree, Introduction to Red-Black trees and splay Trees, B-Trees-B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees.

Unit-II (10 Hours)

Algorithm Analysis:

Algorithms, Designing algorithms, ananlyzing algorithms, asymptotic notations, heap and heap sort. Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, Strassen's matrix multiplication.

Unit-III (06 Hours)

Greedy Strategy:

Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm, etc.

Unit-IV (08 Hours)

Dynamic Programming:

Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm, etc.

Unit-V (10 Hours)

Problem Solving Concept:

Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc. Introduction to branch and bound method, examples of branch and bound method like travelling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem, introduction to parallel algorithms.

Unit-VI (06 Hours)

Implementations:

Binary search trees, height balanced trees, 2-3 trees, B-trees, basic search and traversal techniques for trees and graphs) In order, pre-order, post-order, DFS, BFS), NP-completeness, Biconnected components, Disjoint set operations, union and find algorithms.

Text Books / References

- Coreman Thomas, Leiserson CE, Rivest RL, "Introduction to Algorithms", PHI
- Horowitz & Sahani, "Analysis & Design of Algorithm"
- Dasgupta, "Algorithms", TMH
- Ullmann, "Analysis & Design of Algorithm"
- Michael T Goodrich, Robarto Tamassia, "Algorithm Design", Wiely India

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K30302: SYSTEM SOFTWARE AND OPERATING SYSTEM

TEACHING SCHEME
Lectures : 04 Hrs / Week

EXAMINATION SCHEME
Theory : 80 Marks
Duration : 03 Hours
Unit Test : 20 Marks

Unit-I (10 Hours)

Introduction:

Definition, Components of system software, Evolution of system software, Language translators, Fundamentals of Language processing and language specification, Language Grammar, Assemblers and Macro Processor : Structure of an assembler, Design of Two pass assembler, (Single Pass assembler–Table of incomplete instruction, back patching, Cross-assembler. Macro instructions, Features of a macro facility. Design of two pass macro processor, Implementation of nested macros Nested Macro Definition.

Unit-II (08 Hours)

Compilers and Interpreters:

Compiler phases (Introduction, with input / output for each phase must be dealt with), Concept of cross compiler (introductory part only). Features of machine dependent and independent compilers, Types of compilers with definitions only, Declarations, binding attributes to names, in built data structures such as arrays, records, sets, strings, expression evaluation, statements of different types, parameter passing (call by reference, value, name), storage management, recursion. Interpreter. Concept of front end and back end.

Unit-III (10 Hours)

Linkers and Loaders Schemes:

Compile and Go, General loader scheme, absolute loader, Static and Dynamic Binding, Subroutine linkages, relocating loaders. Direct linking loader. Dynamic linking loader, Overlay structure. Design of Absolute loader, direct linking loader, Implementation example - MS DOS linker.

Software Tools: Tools for program testing. Text editors - screen editor, line editor. Word processors. Debug monitors.

Unit-IV (08 Hours)

Introduction to Operating Systems:

Early Systems, Simple Batch Systems, Multiprogrammed Batched Systems, Time Sharing Systems, Personal-Computer Systems, Parallel Systems, Distributed Systems, Real-Time Systems, Operating Systems Structures

System Components, Operating-System Services, System Calls, System Programs, System Structures, Virtual Machines, System Design And Implementation, System Generation

Unit-V (06 Hours)

Processes:

Process definition control, scheduling policies, Deadlocks: Definition, Handling deadlocks, deadlock detection and resolution, deadlock avoidance, Process Synchronization, Implementing control synchronization, Critical section, Semaphores, Monitors, Threads, Interprocess communications, Banker's Algorithm, Process State Diagram.

Unit-VI (10 Hours)

Memory Management:

Address Space, Swapping, Contiguous Allocation, Paging Segmentation, paged Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Frame Allocation, Thrashing. File Systems, File Concept, Access Method, Directory Structure, Protection, File-Systems Structure, Allocation Methods, Free-Space Management, Directory Implementation, Efficiency and performance, Recovery, Segmented Paging.

Text Books / References

- Nutt G., "Operating System a Modern Perspective", 2nd ed., Addison Wesley, 2000.
- Siberschatz A., "Operating System Concepts", 5th ed., Addison Wesley, 1997;
- Flynn I. and McHoes A., "Understanding Operating Systems", 2nd ed., PWS Publishing Company, 1997

- Dietel H, "An Introduction to Operating System", Addison Wesley, 1990

Additional References:

(i) Stallings W., "Operating System", 2nd ed., Prentice Hall, 1995;

(ii) Tanenbaum A., "Modern Operating System", Prentice Hall, 1992

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K30303: COMPUTER ORGANISATION & ARCHITECTURE

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04 Hrs / Week	Theory	: 80 Marks
Practical	: 02 Hrs / Week	Duration	: 03 Hours
		Unit Test	: 20 Marks
		T. W. & Pr.	: 50 Marks

Unit-I (08 Hours)

Computer components & functions:- Interconnection structures, Bus Interconnection, PCI, Computer memory system overview, semiconductor main memory, chip logic, error correction, cache memory, elements of cache design, Associative mapping, Advanced DRAM organization, magnetic disk, RAID, CD-ROM.

Unit-II (09 Hours)

External devices, I/O modules, Programmed I/O, DMA, Interrupt I/O, I/O channels & IOPs, SCSI & firewire interfaces. Operating system overview, Integer representation and arithmetic, Booth's algorithm, Floating point representation and arithmetic, Precision considerations, guard bits, rounding, quiet and signaling NaNs, Denormalised numbers, Little, Big and Bi-Endian

Unit-III (10 Hours)

ALU: Machine instruction characteristics, operand types, operation types, Addressing modes, Instruction formats, CPU structure, processor organization, register organization, instruction cycle, instruction pipelining and Branch prediction. Memory management, SDRAM, SRAM, DRAM.

Unit-IV (07 Hours)

RISC machine, Instruction Execution characteristics, Register file concept, Compiler based register optimization, RICS architecture, RISC pipelining, RISC v/s CISC, Case study SPARC, superscalar overview, Design issues in instruction level parallelism and machine parallelism, Case study of PowerPC.

Unit-V (07 Hours)

Control unit operation: Micro-operations, control of the processor, Hardwired implementation. Micro-programmed control: Concepts, microinstruction sequencing and execution, Applications of microprogramming.

Unit-VI (08 Hours)

Multiple processor organizations, Symmetric processors, Mainframe SMP, Cache coherence and MESI protocol, clusters, Non-uniform Memory access, vector computation. Parallel Computing Architecture.

List of Practicals

- Design and implementation of 4 bit multiplier
- Design and implementation of 4 bit divider
- Design of 4 / 8 bit CPU
- Reading a boot record and displaying its contents
- Use FAT to read a file and determine number of bad sectors, file under DOS, use of file handlers
- Device driver in- assembly language (printer I / O). Under DOS, in Windows 95
- TSR in assembly for Alarm, Printing in background, screen saver
- Floating point calculation using co-processor instruction
- Write an assembly language program to implement COPY, TYPE etc., commands
- Partitioning of Hard Disk and making a system partition

Practical will be based on above assignments & syllabus.

Text Books / References

- C. Hamacher and R. Zaky, "Computer Organization", 5th ed., McGraw Hill (ISE)
- J. P. Hayes, "Computer Architecture & Organization", 4th ed., McGraw Hill
- M. Mano & C. Kime, "Logic & Computer Design Fundamentals", 2nd ed., Pearson Education
- William Stallings, "Computer Organization & Architecture", 5th ed., Pearson Education
- A. S. Tanenbaum, "Structured Computer Organization", 4th ed., McGraw Hill

- Peter Abel, "IBM-PC & Assembly Language & Programming", 4th ed., PHI

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K30304: PROCEDURAL ELEMENTS OF COMPUTER GRAPHICS

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04 Hrs / Week	Theory	: 80 Marks
Practical	: 02 Hrs / Week	Duration	: 03 Hours
		Unit Test	: 20 Marks
		T. W. & Or.	: 50 Marks

Unit-I (08 Hours)

Introduction to Computer Graphics:

Overview of Computer Graphics, Computer Graphics Application, Description of graphics devices, Input Devices for Operator Interaction, Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan), Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays .

Line and Circle Generation:

Lines, line segments, vectors, pixels and frame buffers, vector generation, DDA and Bresenham's line and circle drawing algorithms, antialiasing, thick lines, character generation: Stroke Principle, Starburst Principle, Bit map method, display of frame buffer, Normalized Device Co-ordinates.

Unit-II (08 Hours)

Polygons and Clipping:

Polygon , Types of Polygon, Representation of Polygons, Inside point test of Polygon, Polygon filling algorithms, scanline fill algorithm. flood fill algorithm, boundary fill algorithm, Edgefill. clipping, widowing & viewport cyrus- Beck, Cohen-Sutherland line clipping algorithm, Polygon clipping. Suther land – Hodgeman Polygon clipping , generalized Polygon clipping, circle clipping, Text clipping

Unit-III (08 Hours)

2D Transformations:

Introduction, matrices, Scaling, Rotation, homogeneous coordinates, Translation, Co-ordinate transformation, rotation about an arbitrary point, inverse transforms and shear transforms, Reflections.

3D Transformations:

Introduction, 3-D geometry, primitives, transformations , Rotation about an arbitrary axis, Concept of parallel and perspective projections, Viewing parameters, 3D clipping, 3D viewing transformations

Unit-IV (08 Hours)

Segments:

Introduction, segment table, segment creation, deletion, renaming. Image transformations, raster techniques

Hidden surfaces and lines:

Introduction, Back-face removal algorithm, hidden line methods, Z buffer, Warnock and Painters algorithm, Floating Horizon.

Unit-V (08 Hours)

Curves and Fractals:

Introduction, Curve generation, Interpolation, interpolating algorithms, interpolating polygons, B-Spline and corners, Bezier curves, Hillbert curve, Kochcurve, Fractals, fractal lines and surfaces

Light, Color and Shading:

Introduction, Diffused illumination, point source illumination, shading algorithm, reflections, shadows, ray tracing, Colour models and tables, transparency

Unit-VI (08 Hours)

Graphical User Interface:

Concepts of X-Windows: Client-server model, protocols, message passing (only GUI related concept), Motif-widget, gadget, structure, (only GUI concepts), Concepts of MS window, OpenGL and Animation

Image Manipulation and Storage:

What is an Image? Digital image file formats, Image compression standard – JPEG, Image Processing - Digital image enhancement, contrast stretching, Histogram Equalization, smoothing and median Filtering

List of Practical

- Line / Circle drawing
- Polygon filling
- 3-D transformation
- Segmentation
- Projections
- Animation
- Windowing and clipping algorithms
- Polygon clipping algorithm
- Hidden line and surfaces
- Curves and fractals
- Study assignments on any GUI application

Text Books / References

- D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, 2001, ISBN 0 - 07 - 047371 - 4
- Newman and Sproll, “Principles of Interactive Computer Graphics”, Tata McGraw Hill, 2nd Edition, 2002
- Rao Prasad, “Graphical user interface (GUI) with x-Window and MOTIF”, New Age International Limited Publisher
- D. Hearn, M. Baker, "Computer Graphics - C Version", 2nd Edition, Pearson Education, 2002, ISBN 81 - 7808 - 794 - 4
- Steven Harrington, “Computer Graphics - A Programming Approach”, Mc-Graw Hill International Editions
- Foley, Vandam, Feiner, Hughes, “Computer Graphics Principles and Practices”, Addison Wesley
- Charles Petzold, “Programming Window 3.1”, Microsoft Publication
- Ron Fonser,” Open GL”

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K30305: SOFTWARE ENGINEERING

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04 Hrs / Week	Theory	: 80 Marks
Practical	: 02 Hrs / Week	Duration	: 03 Hours
		Unit Test	: 20 Marks
		T. W. & Pr.	: 50 Marks

Unit-I (06 Hours)

Software & Software Engineering:

Introduction: Definition of Software Engineering, Evolving role of software, Software -characteristics, Components, Applications, software crisis & myths, Software engineering and software process, Software development phases & software process models. Prototyping & RAD models, Waterfall, Incremental model, Spiral model, 4GT model CASE tools and classifications. Agile methodology, Introduction and types of agile methods.

Unit-II (06 Hours)

Planning & Management of Software Projects:

(Only basic concepts) People, problem & process, Measures, metrics & indicators, Metrics for software quality, Scoping, Software project estimation, Make-buy decisions, Software acquisition, Software risks: identification, Projection, assessment, Monitoring, Project scheduling & tracking tasks, Work breakdown structures, Timeline chart, project plan.

Unit-III (08 Hours)

Systems Engineering:

Computer based systems, System-engineering hierarchy. Information Engineering: Information strategy, Planning, Enterprise modeling, data modeling, Business area analysis, Information flow modeling, product engineering: System analysis, Feasibility study, economic and technical feasibility analysis, Modeling system architecture diagrams, Software quality concepts: Software quality assurance (SQA) & approaches. Software Reliability, SQA plan, ISO 9000 and SEI standards for software, Software configuration management (SCM), Base lines, Scan process, version control, Change control SCM audits.

Unit-IV (08 Hours)

Requirement Analysis:

Communication Techniques, FAST, Quality deployment, Analysis principles, modeling, partitioning, prototyping, specifications, SRS & SRS reviews, Analysis models: data modeling, functional modeling and information flow, Data flow diagrams, Extensions to real-time systems, behavioral models, Mechanics of structured analysis, E-R diagrams, Control modeling, Data dictionary.

Unit-V (10 Hours)

Design and Testing Fundamental:

Software design and software design process, Principles and concepts, Abstraction, Refinement and modularity, Software architecture, Control hierarchy, Partitioning, Data structure, Information hiding, Effective modular design, cohesion, coupling, design module, Design document, Architectural design & design process, Transform & transaction flow, design steps, Interface design, Procedural design: graphical & tabular design notations.

Software Testing & Testing Strategies:

Test case design, White-box, Black-box testing, Control structure testing, strategic approach to testing, Strategic issues, Unit testing, Integrated testing, Validation testing, System testing, Defect / bug like severity and priority, Software bug life cycle.

Unit-VI (08 Hours)

Object Oriented (OO) Software Engineering:

OO Paradigms & Concepts, identifying elements of object model, Object oriented Analysis (OOA) and OOD, Conventional Vs OO, generic components of OO Analysis model, OOA process, Object-relationship model, object-behavior model, Object design process, Introduction to Unified Modeling Language (UML) Different Methods: Rambaugh / Booch / Jackobsons, need for standardization, Diagramming in UML (Use Case, Class, Interaction, State diagrams).

List of Practicals

Practical consists of 8 assignments having following software engineering steps for chosen project using MS-Project, Rational Rose

- Perform requirement analysis and prepare SRS
- Draw Timeline chart using MS-Project
- Draw Data Flow Diagrams write process specifications and prepare data dictionary
- Perform database Designing and Draw E-R model
- Draw Architectural Design For given System
- Design User Interface
- Draw following UML diagrams

  Use Case, class, sequence, Collabration, state, activity, component and deployment (Draw only applicable diagrams)
- Design test cases for chosen system

Text Books / References

- R. S. Pressman, "Software Engineering", 6th ed., McGraw Hill, 2004
- Shari Pfleeger, "Software Engineering", 2nd ed., Pearson Education, 2001
- Ian Sommerville, "Software Engineering", 6th ed, Addison-Wesley, 2000
- Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Pub. House

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K30306: IT LAB 3

TEACHING SCHEME	EXAMINATION SCHEME
Lectures : 02 Hrs / Week	T. W. & Pr. : 50 Marks
Practical : 02 Hrs / Week	T. W. & Or. : 50 Marks
Tutorials : 02 Hrs / Week	

Unit-I (08 Hours)

Windows 98 Programming Overview:

Windows 98 Programming Perspective, The Components of a Window, How Windows 98 and Your Program Interact, Some Windows 98 Application Basics, A Windows 98 Skeleton, The Window Function, Definition Files Handling Errors, Naming Conventions

Processing Messages:

What Are Messages, Responding to a Key press, Device Contexts, Processing the WM PAINT, Message, Responding to Mouse Messages, More Keyboard Messages, Generating a WM PAINT Message, Generating Timer Messages, Positioning a Window, Contents

Unit-II (08 Hours)

Message Boxes and Menus:

Message Boxes, Introducing Menus, Including a Menu in Your Program, Responding to Menu Selections, A Sample Menu Program, Adding Menu Accelerator Keys, Loading the Accelerator Table, Overriding the Class Menu, Some Menu Style Rules

Introducing Dialog Boxes:

Dialog Boxes Interact with the User Through Controls, Modal vs. Modeless Dialog Boxes, Receiving Dialog Box Messages, A First Dialog Box Sample Program, Adding a List Box, The Entire List Box Example, Adding an Edit Box, Using a Modeless Dialog Box, Exploring Edit and List Box Messages, Creating a Modeless Dialog Box

Unit-III (10 Hours)

A Closer Look at Controls:

Using Check Boxes, Check Box Messages, Managing Check Boxes, Adding Static Controls, Adding Radio Buttons, Scroll Bars, A Sample Scroll Bar

Program, The Old Scroll Bar API Functions, Using a Scroll Bar Control, Creating a Scroll Bar Control, Obtaining the Handle of Scroll Bar Control, Demonstrating a Scroll Bar Control

Creating Custom Icons, Cursors, and Bitmaps:

Defining Icons and Cursors, Loading Your Icons and Cursor, A Sample Program that Demonstrates Custom Icons and Cursor, Using a Bitmap, The Complete Bitmap Example Program, XORing an Image to a Window, Using Multiple Bitmaps, Using LoadImage()

Unit-IV (08 Hours)

Microsoft Windows and Visual C++:

The Windows Programming Model, The Visual C++ Components

The Microsoft Foundation Class Library Application Framework:

Why Use the Application Framework? What's an Application Framework? MFC Library Message Mapping, Documents and Views

Unit-V (10 Hours)

Application Wizards:

What's a View? Single Document Interface vs. Multiple Document Interface, Drawing Inside the View Window-The Windows Graphics, Device Interface, A Preview of the Resource Editors, Win32 Debug Target vs. Win32 Release Target

Programming Microsoft Visual C++:

Enabling the Diagnostic Macros, Understanding Precompiled Header, Two Ways to Run a Program

Basic Event Handling, Mapping Modes, and a Scrolling View:

Getting User Input-Message Map Functions, Mapping Modes, A Scrolling View Window, Other Windows Messages

Unit-VI (10 Hours)

The Graphics Device Interface:

Colours, and Fonts, The Device Context Classes, GDI Objects, Windows Colour Mapping, Fonts, Examples

The Modal Dialog and Windows Common Controls:

Modal vs. Modeless Dialogs Resources and Controls, Programming a

Modal Dialog, Identifying Controls: CWnd Pointers and Control Ids, Setting the Colour for the Dialog Background and for Controls, Painting Inside the Dialog Window, Adding Dialog Controls at Runtime, Using Other Control Features, Windows Common Controls

List of Practicals

Practical work will consist of fifteen assignments based on above syllabus. Students are expected to use Windows MFC and SDK programming for these assignments.

Text Books / References

- Charles Petzold, "Programming Windows 95"
- David J. Kruglinski, "Inside Visual C++"
- Michael Goukar, Brian Barnes, Richard Simon, "Windows 95 Win 32 Programming API Bible"
- Jeff Prosise, "Programming Windows 95 with MFC"

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

SEMESTER - VI

K30307: WEB TECHNOLOGIES

TEACHING SCHEME
Lectures : 04 Hrs / Week

EXAMINATION SCHEME
Theory : 80 Marks
Duration : 03 Hours
Unit Test : 20 Marks

Unit-I (08 Hours)

Internet and Standards:

History, ARPANET, Evolution of Internet, WWW, HTTP, Website concepts, Web Server and its deployment, N-Tier Architecture, Services of Web Server – Mail server, News server, Proxy server, Multimedia server, etc. W3C, HTML, XHTML, CSS.

Unit-II (08 Hours)

JavaScript:

Introduction, Creation of interactive web sites by integrating JavaScript into site structure, Documents Object Model, event-driven scripting, coding functions, parameter passing, conditionals, loops and object-oriented principles, Introduction to XML and its applications for websites

Unit-III (08 Hours)

JSP:

JSP overview, JSP language basics, JSP translation and compilation directives, Standard java objects from JSP, JSP configuration and deployment, ASP: Objects and Components, Handling databases, applications of ASP, session management, ASP with .NET

Unit-IV (08 Hours)

The Web as an example of Client Server Computing:

Characteristics of web servers: handling permissions, File Management Capabilities of common server architectures, Role of client Computer, Nature of Client server relationship, Web protocols Support tools for web site creation and management, Developing Internet Information servers, Publishing information and application, Introduction to server side scripting using PHP.

Unit-V (08 Hours)

Web 2.0:

Concept, uses, future, Introduction to AJAX, Deployment of AJAX application, Introduction to Web 3.0 and Semantic web

Unit-VI (08 Hours)

Building Web Applications:

Protocols at the application layer, Principles of Web engineering, Database driven websites, RPC, Lightweight distributed objects, The role of the middleware, Support tools, Security issues in Distributed object systems, Enterprise- wide web base

Text Books / References

- Phil Hanna , "Instant Java Servlets", TMGH
- Bill Brogden, Chris Minnick, "Java Developer's Guide to E-Commerce with XML and ASP", BPB pub.
- Stephen Walther and others, "Active Server Pages Unleashed", SAMS Techmedia
- Rick Leinecker, COM& & XML: ASP.Net on the Edge", IDG
- Forouzen, "TCP / IP protocol suite", TMH
- Hrbert Schildt, " Complete Reference JAVA 2", TMH
- Wynkoop, "Running a perfect website", PHI
- Strebe, Perkins, "Internet Information Server 4 Study guide", BPB pub.
- "Building Rich Web Apps using AJAX", Oreilly Publication

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K30308: MULTIMEDIA COMPUTING

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04 Hrs / Week	Theory	: 80 Marks
Practical	: 02 Hrs / Week	Duration	: 03 Hours
		Unit Test	: 20 Marks
		T. W. & Or.	: 50 Marks

Unit-I (08 Hours)

Introduction to Multimedia:

History, elements of multimedia – text, audio, video, image, animation; Multimedia applications different areas – education, healthcare, manufacturing, Internet; Multimedia OS, Characteristics of MMOS; Linux and Multimedia; CASE STUDY: Effective use of multimedia applications in education and for physically challenge people. Multimedia PC workstation components, Multimedia platform, Multimedia development tools, Authoring tools, Interactivity, High end Multimedia architectures

Unit-II (08 Hours)

Multimedia Operating Systems:

Requirement of MMOS, Characteristics of MMOS, Multimedia Databases; File System (File format: PNG, TIF, BMP, PCX, GIF etc.); Process management, Multimedia communication system, Multimedia database management system

Multimedia Audio:

Basic sound concepts, audio capture, music, speech sound processor, sound recovery technique, VOC4, WAV file formats for sound

Unit-III (08 Hours)

Multimedia Graphics:

2D / 3D animation fundamentals, Color modules.

Digital Imaging: Still and Moving Images:

Video capture, animation, video processing, video recovery techniques. AVO, AVI file formats. NTSC, PAL, SECAM, HDTV system video / audio conferencing techniques and standards, Video streaming, Motion of synchronization.

Unit-IV (08 Hours)

Image Compression Techniques:

Basics of compression, Study of compression like: LZW, DCT, RLE, JPEG, MPEG standards.

Augmented and Virtual Reality and Multimedia:

Concept, VR devices: hand gloves, head mounted tracking system, VR chair, CCD, VCR, 3D sound system, Head mounted Displays and rendering software setup, Virtual Objects, VRML.

Unit-V (08 Hours)

Multimedia Devices:

Mass storage systems for multimedia - requirements, Magnetic devices, Optical Devices, CDROM, DVD, Blue Ray. Scanners: Types and specifications.

Unit-VI (08 Hours)

Windows Support to Multimedia:

Multimedia Databases (in oracle), Multimedia function calls, Windows support for sound, animation, movies, music and midi controls.

Case Studies: Virtual Coffee house, Online Book Library

Text Books / References

- Ralf Steinmetz, Klara Nahrstedt, "Multimedia: Computing, Communication and Applications"
- Judith Jeffcoate, " Multimedia in Technique"
- Durano R. Begault , "Virtual Reality and Multimedia AP Professionals"
- Kis Jama , Phil Schmauder , Nelson Yee , "VRML Programmer's Library", Galgotia
- Joe Gradicki, "Virtual Reality Construction Kit", John Wile and Sons Inc
- Aitken Jarol, "Visual C++ Multimedia Adventure Set ", Coriilis Groups books

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K30309: HIGH PERFORMANCE COMPUTER NETWORKS

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04 Hrs / Week	Theory	: 80 Marks
Practical	: 02 Hrs / Week	Duration	: 03 Hours
		Unit Test	: 20 Marks
		T. W. & Pr.	: 50 Marks

Unit-I (08 Hours)

Introduction to Computer Networks:

Uses of Computer Networks, Types of Network, Network Hardware, Network software, Network design issues, Network design tools. ISO's OSI Reference Model & TCP/IP Reference model, Example Networks: Internet, X.25, Frame Relay, ATM, Ethernet, Wireless LANs, Network standardization, Switching, Buffering and Multicasting, Client server model, web based model, comparison between both models (e.g. IIS, web logic, Apache, tomcat)

Unit-II (08 Hours)

Data Link Layer:

Design issues, Services, framing, error and flow control, elementary data link protocols: Simplex stop & wait protocol, simplex protocol for noisy channel. Sliding window protocols: Using GO back-N ARQ, using selective repeat ARQ, HDLC, Protocol performance, protocol specification & verification, the Data Link Layer in the Internet & ATM

Point-to-Point-Access (PPP):

Frame format, Transition states, PPP Stack: LCP, NCP

Network Hardware Components:

Connectors, Transceivers and Media Converters, Repeaters, NICs, Bridges and Switches

Unit-III (08 Hours)

The Medium Access Control Sublayer:

Static and dynamic channel allocation, multiple access protocol: ALOHA, CSMA/CD; Collision-free protocols; Limited-contention Protocols, WDMA, wireless LAN protocols; Ethernet Cabling, encoding, MAC sub-layer protocol, Switched, fast and Gigabit Ethernet, Logical link control,

Wireless LANs and Digital Cellular Radio, Broadband Wireless, Virtual LANs, Bluetooth, Virtual Circuit Switching: Frame Relay and ATM; IEEE 802.3, 802.4, 802.5 standards; FDDI, fast Ethernet & satellite networks; VPNs (Virtual Private Networks).

Unit-IV (08 Hours)

Network Performance Analysis:

Objectives and requirements for Quality of Service (QoS) in high performance networks. Architecture of high performance networks (HPN), design issues, protocols for HPN, VHF backbone networks, virtual interface architectures, virtual interface for networking, High-speed switching and routing-internet architectures, switching techniques queuing systems:- Multiclass Queues and Networks of Queues, classful and classless queuing discipline algorithms, Comparison among various scheduling Disciplines, Optimal Design of Computer Communication Networks, Models for Broadband Integrated Networks, Traffic Models, Fluid Flow Models, modeling as a graph.

Unit-V (08 Hours)

High speed networks: ISDN:

ISDN overview, interfaces and functions, physical layer, Data link layer, Network layer, ISDN services. Frame relay: Frame relay protocols and services, frame relay congestion control. B-ISDN: Driving forces and need, B-ISDN standards and services, B-ISDN Functional Architecture, B-ISDN Transmission structure, B-ISDN protocol architecture, B-ISDN Physical layer.

Unit-VI (08 Hours)

ATM:

Architecture, ATM protocol, ATM physical layer, ATM layer, AAL, ATM Traffic Control and Congestion Control, Interworking with ATM: ATM Network Interfaces and Architecture, ATM in LAN, classical IP over ATM. Applications of ATM: ATM and MPLS Netwokrs, Voice over ATM, ATM and DSL Networks.

List of Practicals

Concerned Staff member should frame Minimum two Assignments per Unit.

Text Books / References

- William Stalling, "High Speed Networks and Internets", 2nd Edition, Pearson Education
- Tanenbaum A "Computer Networks", 4th Edition, PHI ISBP 81-203-2175-8
- Fourauzan B., "Data Communications and Networking", 3rd edition, Tata McGraw Hill Publications, 2004, ISBN 0-07-058408-7
- William Stalling, ISDN and B-ISDN with Frame Relay and ATM, LPE, Pearson 4th Edition 2000
- Sumit Kasera, "ATM Networks Concepts and Protocols-II Edition", TMH
- Walrand J. Varaiya, High Performance Communication Network, Morgan Kauffman, Harcourt Asia Pvt. Ltd., 2nd Edition, 2000
- Comer D., "Computer Networks and Internet", 2140 Edition, Fieatson Education, ISBN 81-7808-086-9

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K60310: OPERATIONAL RESEARCH

TEACHING SCHEME	EXAMINATION SCHEME	
Lectures : 04 Hrs / Week	Theory	: 80 Marks
	Duration	: 03 Hours
	Unit Test	: 20 Marks

Unit-I (08 Hours)

Introduction:

Operations Research: characteristics, limitations, phases classifications; Development, history, definitions, objectives and applications; Optimization models.

Unit-II (08 Hours)

Linear Programming:

Formulation of LP problem, Basic Solution, Theorems of LP, Graphical method, Simplex method (minimization / maximization cases), Degeneracy in LP, Duality in LP, Sensitivity analysis

Unit-III (08 Hours)

Transportation Problems:

Introduction, Methods for finding initial solution, Test of optimality. Maximization Transportation problem, Transshipment problem, Degeneracy

Assignment Problem:

Introduction, Solution methods, variations of the assignment problem Traveling salesman problem

Unit-IV (08 Hours)

Sequencing Models:

Scheduling and sequencing, Assumptions in sequencing models, processing 'n'; jobs on 'm' machines; Processing of two jobs on machines with each having different processing order;

Inventory Control System (Quantitative Approach):

Introduction, Meaning of Inventory Control, Functional classifications of

Inventories, Advantages of Inventory Control; Costs associated with Inventories;Deterministic Inventory Models, economic lot size with instantaneous replenishment with and without shortage costs, economic lot size with finite replenishment with and without shortage, economic lot size models with quantity discount.

Unit-V (08 Hours)

Decision Analysis:

Decision Environments, Decision-Making under Certainty, Analytical Hierarchy approach, Decision-Making under Risk, Expected Value Criterion, Variations of the Expected value Criterion, Decision under Uncertainty

Deterministic Dynamic Programming:

Introduction, Recursive Nature of Computations in DP, Forward and Backward Recursion, Selected DP Applications, Cargo-Loading Model, Work Force Size Model Equipment Replacement Model, Investment Model, Inventory Models, S Problem of Dimensionality

Queuing Theory:

Queuing systems: Introduction, cost associated with characteristics, operating characteristics and probability distributions, classification of queuing models, Kendall's notations, Models: (M / M / I) : (FSFS), Minimum cost service rate.

Unit-VI (08 Hours)

Theory of Games:

Introduction, two-person zero-sum game, Minimum and Maximum principle, Saddle point, Methods for solving game problems with mixed strategies, Introduction to graphical and iterative models for solving problems

Network Models:

Introduction to PERT / CPM and its importance in project management; Concepts and construction of network diagrams; Critical path and project duration, floats, network crashing, optimum project duration and cost; PERT activity, time estimate, probability of completion of a project on or before specified time; Updating of project; Resource allocation and load smoothening

Text Books / References

- Askhedkar R. D. and Kulkarni R. V., "Operations Research", Dhanpat Rai and Sons
- Basu S. K., Pal D. K. and Bagchi H., "Operations Research for Engineers", Oxford and IBH Publishing Co. Pvt. Ltd.
- Gupta P. K.. and Hira D. S., "Operational Research", S. Chand and Co. Ltd.
- Gupta P. K. and Hira D. S., "Introduction to Optimization", Jain Brothers
- Patel R. C., Dave N. R. & Manglani A. K., " Operations Research", C. Jamnadas and Co.
- Sharma J. K., "Mathematical Models in Operations Research", Tata McGraw Hill Publishing Co. Ltd.

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K30311: OBJECT ORIENTED MODELING AND DESIGN

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04 Hrs / Week	Theory	: 80 Marks
Practical	: 02 Hrs / Week	Duration	: 03 Hours
		Unit Test	: 20 Marks
		T. W. & Pr.	: 50 Marks

Unit-I (10 Hours)

Review of Object Modeling: Structured Modeling

New paradigm, object oriented thinking-rethinking, objects and classes, links and association, Generalization and Specialization, Inheritance, Grouping concepts, Aggregation, Abstract classes, Polymorphism, Metadata, Constraints, Reuse, Dynamic modeling events states, Operating concurrency.

Unit-II (10 Hours)

Importance of Modeling:

Brief overview of object modeling technology(OMT) by Ram Baugh, Booch Methodology, USE CASE drive approach(OOSE) by Jacobson, overview of CRC card method by unigram; Case Study on OMT,OOSE and CFC.

Unit-III (06 Hours)

Overview of UML:

Effort of standardization / integration, OMG approval for UML, scope of UML, conceptual model of UML, architecture-Meta model, mechanisms, Unified software development lifecycle, All UML diagrams. Advanced concepts in UML-2.

UML Diagrams:

Terms and concepts, relationship diagrams.

Unit-IV (06 Hours)

Advanced Class Diagram:

Advanced relationship, interface-types and rules, packages common modeling techniques, modeling groups of elements, modeling architectural views.

Unit-V (08 Hours)

Instances and Objects Diagrams:

Modeling concrete / prototypical instances, links, object interaction; Collaborations, Use Cases, Interaction diagrams, State transition diagrams;

Architectural Modeling:

Component diagrams, Deployment diagrams, Pattern and framework

Unit-VI (08 Hours)

Introduction to component technology, concept of distributed object systems:

COM, DCOM and CORBA, Architecture, Java components, Design Patterns, Active X Components, Design Patterns Architectures; Introduction to object oriented databases

List of Practicals

Laboratory Work in object oriented modeling and design: Considering systems such as college library inventory (or any other Topic of sufficient complexity) for this system define as assignment.

- Class diagram
- Use case
- Interaction or Activity diagram
- State chart diagram Using object analyst
- Also include remaining diagrams

Text Books / References

- Booch, Rambaugh and Jacobson, "UML user guide", Addison Wesley
- Sinon Alhair, "UML- In a nut shell"
- Booch, "Object oriented analysis and design with applications", Addison Wesley
- Rambaugh, "Object oriented modeling and design", PHI
- B. Meyer, "Object oriented software constructions", PHI

Syllabus for Unit Test

Unit Test 1	Units I & II
Unit Test 2	Units III & IV
Unit Test 3	Units V & VI

K30312: IT LAB 4

TEACHING SCHEME	EXAMINATION SCHEME
Lectures : 02 Hrs / Week	T. W. & Pr. : 50 Marks
Practical : 02 Hrs / Week	T. W. & Or. : 50 Marks
Tutorials : 02 Hrs / Week	

Unit-I (08 Hours)

Introduction to Linux:

History, Installation, Linux basics: basic commands, file system commands, device installation, software installation (RPM, bzip2, gzip packages), Moving around the desktop, managing users

Unit-II (08 Hours)

Linux Shell:

Study of Vi editor, Shell as a command line interface, Built in programs, external programs, Shell commands, configuring the Shell, sh command, Shell programming: Printing, Loops, administration automation etc.

Unit-III (08 Hours)

Linux Administration:

Performing basic system administration: su command, recovering from lost password, boot procedure, "inittab" file, run levels, start-up scripts, disk performance and disk usage commands, scheduling recurring and one-time jobs, viewing system information trough the /proc file system. Managing users, managing the file system, managing applications, Managing devices and printers; Upgrading and customizing Linux kernel.

Unit-IV (08 Hours)

Linux Programming in C:

Structure of C program, Declaration and definition of variables, Structures, Unions, and Bit fields, Expressions, Statements: break, case, compound, default, do, while, for, goto, if, if-else etc. Introduction to Network programming in Linux.

Unit-V (08 Hours)

Programming in Perl:

Understanding and getting overview of Perl. Basic Perl syntax, variables, operators and expressions, regular expressions, flow control statements, file access. File with pipe prefix, built-in functions.

Unit-VI (08 Hours)

Linux Kernel:

Introduction to Kernel, How kernel works, versions, naming conventions, compiling kernel, upgrading existing kernel.

List of Practicals

Practical work will consist of 15 assignments based on above syllabus. Students are expected to use LINUX platform for these assignments. Compulsory assignment on Linux installation.

Text Books / References

- Naba Barkakati, "Red Hat Linux 8: The Ultimate Reference", Wiley Publication
- Neil Matthew, "Beginning Linux Programming", 3rd Edition, Wrox Publication
- "Official Red Hat Linux 8 Users Guide" , Red Hat Press, Wiley Publication
- "Official Red Hat Linux Networking & System Administration", Red Hat Press, Wiley Publication

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

A. T. K. T.

- A candidate who is granted term for B.Tech. Semester-I will be allowed to keep term for his / her B.Tech. Semester-II examination even if he / she appears and fails or does not appear at B.Tech. Semester-I examination.

- A candidate who is granted term for B. Tech. Semester - III will be allowed to keep term for his / her B.Tech. Semester-IV examination even if he / she appears and fails or does not appear at B.Tech. Semester-III examination.

- A candidate who is granted term for B.Tech. Semester-V will be allowed to keep term for his / her B.Tech. Semester-VI examination if he / she appear and fails or does not appear at B.Tech. Semester-V examination.

- A candidate who is granted term for B.Tech. Semester-VII will be allowed to keep term for his / her B.Tech. Semester-VIII examination if he / she appears and fails or does not appear at B.Tech. Semester-VII examination.

- A student shall be allowed to keep term for the B.Tech. Semester-III course if he / she has a backlog of not more than 3 Heads of passing out of total number of Heads of passing in theory examination at B.Tch. Semester-I & II taken together.

- A student shall be allowed to keep term for the B.Tech. Semester-V of respective course if he / she has no backlog of B.Tech Semester-I & II and he / she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 heads of passing in termwork and practical examination or termwork and oral examination.

- A student shall be allowed to keep term for the B.Tech. Semester-VII course if he / she has no backlog of B.Tech. Semester-III & IV and he / she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 Heads of passing in termwork and practical examination or termwork and oral examination.

CONTINUOUS ASSESSMENT

- In respect of Term work at B.Tech. Semester-I & II, B.Tech. Semester-III & IV and B.Tech. Semester-V & VI, target date shall be fixed for the completion of each, job, project experiment or assignment as prescribed in the syllabus and the same shall be collected on the target date and assessed immediately at an affiliated college by at least one pair of the concerned teachers for the subject and the marks shall be submitted at the end each term to the Principal of the college.

• Termwork and performance of Practical / Oral examination shall be assessed on the basis of the depth of understanding of the principles involved, correctness of results and not on ornamental or colorful presentation.

• For B.Tech. Semester-VII & VIII, termwork assessment will be done by external and internal examiners jointly during the examination schedule declared by the university. The record of continuous assessment shall be made available to the examiners during Term work and practical and Term work and oral examinations. Examiner shall use this record for overall assessment of the performance of the student. Every practical / termwork assignment shall be assessed on the scale of 20 marks and weightage of 20 marks shall be distributed as follows:

Sr. No.	Activity	Marks
1	Timely Submission	04
2	Presentation	06
3	Understanding	10

Marks obtained out of 20 for all assignments together will be converted on scale of marks assigned to term work of respective subject in the structure of the course.

CLASS

• The class should be awarded to the student on the basis of aggregate marks obtained together in both the semester of the respective year by him. The award of class shall be as follows.

A	Aggregate 66% or more marks	First Class with Distinction
B	Aggregate 60% or more marks but less than 66%	First Class
C	Aggregate 55% or more marks but less than 60%	Higher Second Class
D	Aggregate 50% or more marks but less than 55%	Second Class
E	Aggregate 40% or more marks but less than 50%	Pass Class