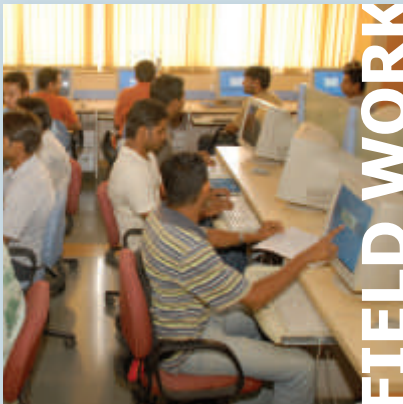# BHARATI VIDYAPEETH UNIVERSITY, Pune.

(Established under Section 3 of UGC ACT 1956)

PRACTICAL

C O U R S E S T R U C T U R E AND SYLLABUS

B. Tech. (IT)
(Sem. III & IV)

FIELD WORK

CLASS WORK

COURSE STRUCTURE & SYLLABUS

BHARATI VIDYAPEETH UNIVERSITY, PUNE

B. Tech. (IT) (Sem. III & IV)

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 as 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

B. Tech. - IT

Semester III					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	
K70201	Engineering Mathematics III	04	-	-	80	20	-	-	100
K70202	Industrial Management	04	-	-	80	20	-	-	100
K30203	Discrete Mathematics	04	02	-	80	20	-	50	150
K30204	Data Structures & Files	04	02	-	80	20	50	-	150
K30205	Object Oriented Programming	04	02	-	80	20	50	-	150
K30206	IT Lab 1	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 IV					Total Duration : 32 Hrs/Week Total Marks : 750				
Subject Code	Subject	Teaching Scheme			Examination Scheme				Total
		L	P	T	Theory	Unit Test	TW & Pr	TW & Or	
K30207	Theory of Automata & Formal Languages	04	-	-	80	20	-	-	100
K30208	Computer Communications & Networks	04	-	-	80	20	-	-	100
K30209	Database Management Systems	04	02	-	80	20	50	-	150
K30210	Microprocessor Architecture & Programming	04	02	-	80	20	50	-	150
K30211	Signals & Systems	04	02	-	80	20	-	50	150
K30212	IT Lab 2	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

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 - III

K70201: ENGINEERING MATHEMATICS – III

TEACHING SCHEME

Lectures : 04 Hrs/Week

EXAMINATION SCHEME

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

Unit-I   (09 Hours)
Differential Equations:

Solution Of Linear Differential Equation Of Nth Order With Constant Coefficients, Method Of Variation Of Parameters, Cauchy's and Legendre's Linear Equation, Simultaneous Liner Differential Equations, Total Differential Equations, Symmetrical Simultaneous Differential Equations. Applications to Electrical Circuits.

Unit-II   (08 Hours)
Complex Variables:

Function Of Complex Variables, Analytic Function, Cauchy-Riemann Equations. Conformal Mapping, Bilinear Transformation, Residue theorem, Cauchy's Integral Theorem and Cauchy's Integral Formula.

Unit-III   (09 Hours)
Transforms:

<u>Fourier transforms</u>: Fourier Integral Theorem, Fourier Sine And Cosine Integrals. Fourier Transform, Fourier Sine And Cosine Transforms, Inverse Fourier Transforms, Discrete Fourier Transform And Its Applications.

<u>Z – Transform</u>: Definition, Properties, Inverse Z- Transform. Applications to difference equation, Relationship between Z- Transform and Fourier Transform.

Unit-IV   (09 Hours)
Laplace Transform:

Definition, Properties and Theorems, Inverse Laplace Transform, Methods of Finding Inverse Laplace Transforms, Laplace Transform of Unit-step Function. Dirac-Delta Functions, Periodic Functions, Ramp Functions, Error Function, First order Bessel's function, Si(t), Ci(t), Ei(t).

Applications to Solution of Linear Differential Equations.

Unit-V   (09 Hours)
Vector Differentiation:

Vector Differentiation, Gradient, Divergence and Curl, Directional Derivative, Vector Identities, Irrotational and Solenoidal Vector Fields.

Unit-VI   (09 Hours)
Vector Integration:

Line Integral, Surface Integral and Volume integral, Workdone, Gauss-Divergence Theorem, Stoke's theorem and Green's Lemma, Applications to Electromagnetic fields.

Text Books/References

Peter V. O'Neil, Advanced Engineering Mathematics, 5e, Thomson Learning

Erwin Kreyszing, Advanced Engineering Mathematics, Wiley Eastern Ltd.

Wylie C.R. and Barrett L.C., Advanced Engineering Mathematics, McGraw-Hill

M.D. Greenberg, Advanced Engineering Mathematics, 2e, Person Education

 B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, Delhi

P. N. Wartikar and J. N. Wartikar, Applied Mathematics (Volume I & II), Pune Vidyarthi Griha Prakashan

Murray R. Spiegel, Laplace Transforms, Schaum's Outline Series – International Edition

Syllabus for Unit Test

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

K70202: INDUSTRIAL MANAGEMENT

TEACHING SCHEME

Lectures : 04 Hrs/Week

EXAMINATION SCHEME

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

Unit –I   (09 Hours)
Management and Organization:

Conceptual difference between terms Management, Administration and Organization, Evolution of Management Science up to Modern times, contributions of Taylor, Fayol, Gilbreth, Management as an Art, Science, Profession, Functions and Principles of Management, Levels of Management. Factors deciding selection of type of business organization, sole proprietorship, partnership, joint stock company, cooperative enterprise, public sector undertakings (PSU's). Organization structures – Line, functional, line and staff, committee, matrix, project.

Unit-II   (09 Hours)
Plant Location and Economics:

Factors governing plant location, process of plant locations, plant layouts – Types, principals of good plant layout, cellular. Basic economic concepts- Human wants, economic goods, utility, Value, price, cost, profit revenue. Laws of demand and supply, exceptions to these laws, concept of elasticity of demand, Scales of production, National and International Trade.

Unit-III   (08 Hours)
Personnel Management:

Evolution, definitions, functions (Scope). Manpower Planning – definition, procedure, advantages, factors affecting MPP. Recruitment – Definition, Sources of recruitment, Factors deciding sources selection. Selection – Definition, procedure, methods of selection. Training – Definition, benefits, methods and types of training. Job Evolution - Administration – Methods of wage payments (Time Rate, Piece Rate, Industrial Bonus. Group Incentive Schemes), Employee Motivators.

Unit-IV (09 Hours)

Financial Management:

Definition, Scope and Objective of financial management. Capital, Types of capital, Sources of industrial finance, Elements of cost, Types of overheads. Financial Accounting – definitions, Scope, Objectives. Breakeven analysis, Capital Budgeting Methods (Pay Back, Accounting rate of return (NPV). Types of budget, Financial statements, purpose, Interpretation. Credit Rating of software projects.

Unit-V (09 Hours)

Marketing Management:

Evolution, Marketing and selling concepts, Definitions, Concept of Marketing Mix, Market Segmentation – Objectives, Bases, Benefits, Distribution channels, Advertising, Sales promotion, Sales forecasting. Marketing research, Service sector – growth, types of services, service tax, Service mix. Recent Trends in Retailing, Emerging changes in global marketing.

Unit-VI (08 Hours)

Entrepreneurship Development and Environment Management:

Entrepreneurship-concept, characteristics of successful entrepreneurship, functions of entrepreneur, Institutions supporting small business enterprise, project report contents. Pollutions and (EMS), EMS Standards, ISO 14000, E-Commerce, E-Governance, E-Business, Patents, Copyright, Trade Marks.

Text Books/References

O.P. Khanna, Industrial Engineering and Management

Banga and Sharma, Industrial Origination and Engineering Economics

Philip Kotler, Marketing Management

I. M. Pandey, Financial Management

Jayant Oak, Management Information System

S. M. Jawadekar, Management Information System

G. N. Pandey, Environmental Management

K. K. Dewett, Elementary Economic Theory

Horold and Heinz Weinrich, Essentials of Management

Venu Gopal Rao, Serivces Marketing

P. Narayanan, Intellectual Property Laws

M. C. Shukla, Business Organisation and Management

Dr. P. C. Shejawalkar, Dr. Anjali Ghanekar, Principles and Practice of Management

Poornims Charantimath, Entrepreneurship Development – Small business Enterprises

David Hotts, Entrepreneurship

C. B. Mamoria, Personnel Management

<u>Syllabus for Unit Test</u>

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

K30203: DISCRETE MATHEMATICS

TEACHING SCHEME
Lectures : 04 Hrs/Week
Practical : 02 Hrs/Week

EXAMINATION SCHEME
Theory	: 80 Marks
Duration	: 03 Hours
Unit Test	: 20 Marks
T. W. & Or	: 50 Marks

Unit -I (08 Hours)
Fundamental structures and Basic Logic:

Sets, Venn diagram, Completeness, Cartesian Product, Power Sets, Pigeonhole Principle, Cardinality and Count-ability. Propositional Logic, Logical Connectives, Truth Tables, Normal Forms, Validity, Predicate Logic, Limitations of Predicate Logic, Universal and Existential Quantification, Modus Ponens and Modus Tollens.

Unit –II (08 Hours)
Functions and Relations:

Subjective, Injective, Bijective and Inverse Functions, Composition of Function. Reflexivity, Symmetry, Transitivity, and Equivalence Relations, Poset & Recurrence Relation.

Unit-III (08 Hours)
Proof Techniques:

Notions of Implication, Converse, Inverse, Contra-positive, Negation and Contradiction, Structure of Formal Proofs, Directs Proofs, Proof by Counter Example, Proof by Contradiction, Mathematical Induction, Strong Induction, Recursive Mathematical Definitions, Well Orderings

Unit-IV (09 Hours)
Graph Theory:

Basic Terminology, Multi Graphs and Weighted Graphs, Paths and Circuits, Shortest Path Problems, Euler and Hamiltonian paths, Representation of Graph, Factors of Graph, Isomorphic Graphs, Planar Graphs, Directed graphs.

Unit-V (04 Hours)

Trees:

Trees, Rooted Trees, Path Length in Rooted Tree, Binary Search Trees, Spanning Trees And Cut set, Minimal Spanning Trees, Kruskal's and Prim's Algorithms for Minimal Spanning Tree.

Unit-VI (11 Hours)

Algebraic Systems:

Algebraic Systems, Groups, Semi Group, Monoid, Subgroup, Isomorphism and Homomorphism, Rings and Fields, Lattices, Boolean lattices and Boolean Algebra, Group Codes.

Practical Assignments Scheme

Concerned staff member is directed to frame Two to Three Assignments on each Unit.

Text Books/References

C. L. Liu, Elements of Discrete Mathematics, 2nd Edition, McGraw Hill Pub

Kenneth H. Rosen, Discrete Mathematics, 5th Edition, McGraw Hill Pub

Tremblay Manohar, Discrete Mathematical Structures in Computer Science Applications

Lipschutz Lipson, Discrete Mathematics, 2nd Edition, TMH

V. K. Balakrishna, Graph Theory, TMH (Recommended for Graph)

Syllabus for Unit Test

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

K30204: DATA STRUCTURES & FILES

TEACHING SCHEME
Lectures : 04Hrs/week
Practical : 02Hrs/week

EXAMINATION SCHEME

Theory	: 80 Marks
Duration	: 03 Hours
Unit Test	: 20 Marks
T. W. & Pr.	: 50 Marks

Unit -I   (08 Hours)

Introduction And Algorithm Analysis:

Introduction to C, Pointers, Pointer to Structure: Concept of data, Data Types, Data Objects, Data Structure, Abstract Data Types (ADT) Using C and C++, Implementation of Data Structure (Static and Dynamic Implementation). Algorithm Analysis: Definition and Characteristics of Algorithm, Analyzing Programs, Time and Space Complexity, Big 'O' Notation, Graphical Representation of Time Complexity, best, Average and Worst Case of Complexity.

Unit –II   (10 Hours)

Linear Data Structure Using Sequential Organization And Stacks And Queues:

Sequential Organization: Concept of Sequential organization, Concept of linear and non linear data structure, array as ADT, Storage representation, Concept of ordered list and polynomial representation using array, representation of Sparse matrix using array, algorithm and, Time and Space complexity for Sparse matrix.

Stacks and Queues: Fundamental of stack and queue, Data structure and basic operations for stack and queue, concept as ADT, disadvantages and application. Circular queue using sequential organization, Multi-stack and queue, Priority queue.

Application of Stack: Polish notation (infix, prefix, postfix expressions), Evaluation of prefix and postfix expressions, conversion of infix, prefix and post fix by using user definer functions and recursive functions.

Unit-III   (06 Hours)

Linear Data Structure Using Linked Organization:

Link List: Concept of linked organization, Basic operation of single linked list, Double linked list, Circular linked list (Insertion, Deletion, Creation, Traversal), Representation and Manipulation using linked list,

Generalized Linked list, Polynomial representation, dynamic memory Allocation, Garbage Collection.

Unit-IV   (08 Hours)
Non-Linear Data Structure:

Trees and Binary Trees: Basic terminology, Data structure and representation of binary tree, Binary tree traversal (recursive and non recursive method for traversal) and algorithm, Basic operation of Binary tree, threaded Binary tree (1 way and 2 way), Insertion and Deletion of nodes in Inorder threaded Binary tree, Inorder, Preorder, Postorder Traversal for Threaded Binary Tree, Concepts of Binary Search Tree (Weighted BST), Traversal BST, AVL Tree, CONCEPT of B tree.

Unit-V   (10 Hours)
Graphs, Searching And Sorting:

Searching: Implementation of Searching, Sequential, Binary and Fibonacci Search (Algorithm and Complexity for all Searches).
Sorting: Algorithm, Time and Space Complexity for Bubble Sort, Selection sort, Insertion Sort, Quick Sort, Merge Sort, heap Sort, Radix Sort (Best, average and Worst Complexity for All). Graphs: Concept. Representation and Terminology for Graph using adjacency Matrix, List and Multilist, graph Traversal (DFS ABD BFS), Spanning tree. Minimum weight Spanning tree, Kruskal's and Prim's Algorithm for MST, Dijkstra's algorithm for shortest Path.

Unit-VI   (06 Hours)
File Organization And Hashing Techniques:

File Organization: Sequential and Index files Organization. Hashing Techniques: Hashing functions, Hash tables, Overflow Handling, Collision, Methods for Overflow Handling and Collisions, Linear Hashing Probing techniques.

Practical Assignment Scheme

Concerned Staff member is directed to frame Minimum two Assignments per Unit.

Text Books/References

S. Lipschutz, Data Structures, McGraw Hill Pub.

Y. Langsm, M. Augentin, A. Tanenbaum, Data Structure Using C and C++, Pearson Education Asia Pub.

Trembley & Soreson, Introduction to Data Structure, PHI Pub.

Thomson Corman, Algorithms, PHI Pub.

Syllabus for Unit Test

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

K30205: OBJECT ORIENTED PROGRAMMING

TEACHING SCHEME
Lectures : 04 Hrs/Week
Practical : 02 Hrs/Week

EXAMINATION SCHEME
Theory   : 80 Marks
Duration   : 03 Hours
Unit Test   : 20 Marks
T. W. & Pr. : 50 Marks

Unit -I   (10 Hours)
Introduction To Object Oriented Programming:

Limitations of procedural oriented language, general object oriented philosophy, difference between procedural & OOP language advantages of object oriented programming, basic concepts in OOP, software usability, code sharing, rapid prototyping, information hiding.

Unit –II   (06 Hours)
Classes And Objects:

Classes, attributes and method, message passing between objects, constructor and destructor – theme behind this, types of constructors.

Unit-III   (06 Hours)
Functions:

Prototype, parameter passing, overloading, inline, static function, concept of friend, operators and operator overloading.

Unit-IV   (08 Hours)
Inheritance:

Concept and need, base class, friend class, static class, class scope, types of inheritance. Abstract class, virtual function, virtual base class, polymorphism, static and dynamic binding.

Unit-V   (08 Hours)
Input/Output And file Management:

Formatting and manipulating I/O, overloading I/O, file operations, file pointer and manipulation. Exception handling and templates: Concept and method.

Unit-VI (10 Hours)

Object Oriented Design:

> Class identification, defining inheritance, visibility and dependency coupling, object oriented notations and graphs, steps in designing object oriented system.

List of Practical Assignments

Write a class complex as follows: data members of the class complex are real, imaginary numbers and member functions are read, print, add, subtract, multiply, and divide.

Write a class string to handle character array. The data member is array of characters and the member functions are read, print, contact, substring, less, greater, equal. Also use constructors so that one can define like – string s1, s2 ("abcd"), etc, use destructor also.

Write a class matrix to handle two dimensional array of numbers. The data member is dynamically growing two dimensional array and member functions are- Transpose of matrix, inverse of matrix, multiplication of matrices & checking of whether a matrix is symmetric, magic square or skew.

Modify the complex class in assignment number 1 to tackle operator overloading.

Modify the string class in assignment number 2 tackle operator overloading and w r i t e a main program to sort array of strings.

Write a class date with members as dd, mm, yy, and the member functions as read the date, write the date.

Write a class person as a Container class which contains class date. Data members of person are name of person and date of birth. Member functions are reading information about person and writing information about person.

Write a class employee who is in turn a person. Data members and member functions are derived from class person. Addition to which is has, data members company name, designation, department & salary. Member functions - read information of employee and print information of employee. Write a class student who is a person. Data members and member functions are derived from class person. Addition to which it has, data members - branch of student, percentage   marks and members functions - read information about student, print information   about student.

Text Books / References

Bindu R. Rao, C++ and Paradigm, McGraw Hill

Ravi Sethi, Programming language concepts and constructs, Addison Wesley

Balaguruswamy, Object Oriented Programming, McGraw Hill

Bjarne Stroustrup, C++ Programming Language, Addison Wesley

Syllabus for Unit Test

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

Unit -I   (08 Hours)

An Introduction to Java:

> History, Features of Java language, Object oriented features of Java, Benefits of using OOP, Applications of OOP, Virtual Machine and Java Programming Environment, Fundamental Programming Structures in Java. Java and Internet, Hardware and Software requirement, JDK, JVM, JRE.

Unit –II   (06 Hours)

Constant, Variables, Data types:

> Declaration of variable, Scope of variable, Symbolic constant, Type Casting Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment, Decrement, Conditional, Bitwise, Special operator, Dot operator.
>
> Expressions: Arithmetic, Evaluation of expressions, Type conversion in expressions.

Unit-III   (06 Hours)

Decision making, branching, looping:

> Branching: Introduction, If statement, If…Else statement, Nesting of If…Else statement, The Else If ladder, The Switch statement, The ? : Operator.
>
> Looping: The while statement, The do statement, The for statement, Jumps in Loop, Labeled Loop.

Unit-IV   (06 Hours)

Classes, Objects and Methods:

> Introduction, Defining a Class, Methods, Objects, Accessing class members, Constructors, Methods overloading, Static members, Nesting of methods, Inheritance: Extending a class, Defining a subclass,

Multilevel and hierarchical Inheritance. Overriding methods, Final variables, methods, Final Classes, Abstract methods and classes. Visibility and control.

Unit-V   (06 Hours)
Arrays, Strings and Vectors:

One dimensional arrays, Two-dimensional arrays, <u>Strings</u>: Strings arrays, String methods. Vectors, Wrapper classes.

Unit-VI   (06 Hours)
Interfaces:

Introduction, Defining interfaces, Extending Interfaces, Implementing Interfaces, Accessing interface available.

Practical Assignment Schemes

Concerned Staff is directed to frame 2-3 Assignments on each Unit.

Text Books/References

E. Balagurusamy, Programming with Java
Herbert Schildt, Java 2 Complete Reference – 5th Edition, Tata MGra Hill
Dietel & Dietel, Java How to Program

SEMESTER - IV

K30207: THEORY OF AUTOMATA & FORMAL LANGUAGES

TEACHING SCHEME

Lectures : 04 Hrs/Week

EXAMINATION SCHEME

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

Unit -I (10 Hours)

Introduction Mathematical Preliminaries & Notation:

Sets, functions and relations Basic Machine Concepts- Symbols, alphabets, string/word. Language, Abstract Machine, Acceptance of language by machine. Finite Automata (FA)- Definition, Types of FA-NFA and DFA, Language accepted by NFA and DFA, Making of finite state machines. Equivalence between DFA and NFA, Conversion of NFA to DFA, Minimization of FSM, Machines with Output- Moore and Melay machines, Designing, Interco version of Moore and Melay, Application. Two way Finite Automata- Definition, Language acceptance, Uses.

Unit –II (06 Hours)

Regular Expression:

Definition, Regular sets- properties and closure properties, Uses of Regular Expression, NFA with Epsilon moves- Definition, Uses, NFA without Epsilon moves. Pumping Lemma for Regular Sets- Statement, Application

Unit-III (08 Hours)

Grammars:

Definition, Production rules, Derivation trees, Ambiguous Grammar, Removal of Ambiguity, Regular Grammar, Interconversion of RE to Grammar, Reduced form grammar- Removal of unit production, Removal of useless symbols, ,Removal of epsilon symbol.

Linear grammar left & right linear grammar Chomsky Hierarchy of Languages, Context Free Grammar- Definition, Context free language (CFL) - definition, Inherently ambiguous CFL. Normal Forms- Chomsky Normal Form(CNF), Griebach Normal Form(GNF)

Unit-IV

Push Down Automata (PDA) :

> Definition, Uses, Designing of PDA, Deterministic Push Down Automata and Non-Deterministic Push Down Automata- Definition, Language accepted by PDA, Equivalence of CFL and PDA, Properties of CFL, Pumping Lemma for CFL. Limitations of PDA, Application of PDA.

Unit-V (08 Hours)

Turing Machine(TM) :

> Definition, Model, Comparison of TM, FSM, PDA, Design of TM, Examples of TM- Combinational TM, Iterative TM, Recursive TM, Universal TM, TM as a language acceptor, Some Problems that can not be solved by Turning Machines, Language accepted by TM, Recursive sets, partially Recursive functions, recursively enumerable sets. Church's Turing hypothesis, multitask TM, TM limitations, halting problem. Incompleteness and Undesirability.

Unit-VI (10 Hours)

Applications of RE- Lexical Analyzer:

> Text editor and searching using RE. Application of PDA- Expression conversion, Application of CFG - syntax analysis, language definition. Power OS: TM, PDA, FA, FSM, NFA ,DFA, FA, TM.

Text Books/References

Hopcroft, Ullman, Introduction to Automata Theory, Language and Computation, erosa Publishing House

K. L. P. Mishra and N.Chandrasekaran, Theory of Computer Science(Automata, Languages and Computation), PHI

Martin J. C., Introduction to Languages and Theory of Computations, TMH

Papadimitrou, C. and Lewis, C. L., Elements of theory of Computations, PHI

Cohen D. I. A., Introduction to Computer theory, John Wiley & Sons

E. V. Krishnamurthi, Theory of Computer Science, EWP publications

Syllabus for Unit Test

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

K30208: COMPUTER COMMUNICATIONS AND NETWORKS

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

Unit -I   (08 Hours)

Digital Transmission Fundamentals:

Digital signals, Analog versus digital, Limits of achievable data rate in digital communication, Transmission impairment, Attenuation and attenuation distortion, delay distortion, Thermal noise, Inter modulation noise, Impulse Noise, Cross talk, Channel capacity, Point to Point, Multidrop Configuration, Simplex, Half Duplex, Duplex transmission.

Unit –II   (10 Hours)

Modulation Techniques:

Amplitude Modulation: Amplitude Modulation Principles, Modulation Index and Percentage of Modulation, Sidebands and Frequency Domain, Amplitude Modulation Power Distribution, Single Sideband Communications. Frequency Modulation Principles, Phase Modulation, Sideband and Modulation Index, AM Vs FM, FM with Binary Signals.

Digital Modulation: Modems, Digital continuous wave modulation techniques for Modem e.g. ASK, FSK, PSK, Baud rate, QAM, Modern constellation patterns, Interface control for typical modem, EIA 232/V.24 interface.

Unit-III   (08 Hours)

Multiplexing:

Introduction, Frequency Division Multiplexing, Time Division Multiplexing, Wave division multiplexing, Pulse Code Modulation. Multiplexing Applications: The Telephone System. Error Detection and Correction: LRC, VRC, CRC, Checksum, Hamming code.

Unit-IV   (10 Hours)

Transmission Media:

Guided Transmission Media (Physical description, Application,

Transmission Characteristics) Twisted pair (Unshielded and shielded twisted pair), Category 3, Category 5 UTP, Coaxial cable. Wireless transmission unguided media (Terrestrial microwave, Satellite microwave) Fiber optic Communication: Principle of light transmission, types and modes of fiber, Losses and dispersion in fiber, sources (light) and detectors. Satellite communication: Kepler's laws, Orbital aspects, Geostationary satellite and frequency plans, Frequency plans and polarization, transponders, Multiple access methods.

(06 Hours)

Unit-V
Network Fundamentals:

Need of networks/advantages of network, Structure of communication network (DTE, DCE, Application Process, Logical and Physical Connection), Network architectures(OSI model), TCP-IP protocol stack overview, Network interface hardware and network hardware components-connectors, transceivers and media converters, NICs , RS-232 and RS-449, PCI, USB Protocols

(06 Hours)

Unit-VI
Network Types:

Local Area Network: LAN applications, LAN architecture, LAN topologies [Bus, Star, Ring, And Tree], Medium access control [RR, Reservation, And Contention], MAC frame format. Devices used for extending LANs - Repeaters, Bridges, Routers, Gateway, Switches, MAN. Wide Area Networks: Different switching techniques, Circuit switching and telephone networks, Packet switching networks.

Text Books/References

Behrouz A. Forouzan, Data Communications and Networking, Tata McGraw Hill, 2"d Edition

Stallings W., Data and Computer Communications, Sixth Edition, Prentice Hall of India

Dennis Roddy, John Coolen, Electronic Communication, PHI

Frenzel, Communication Electronics Principles and Applications, Third Edition, Tata McGraw Hill Publication.

Kennedy, Principles of Communication Systems, McGraw Hill

<u>Syllabus for Unit Test</u>

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

K30209: DATABASE MANAGEMENT SYSTEMS

TEACHING SCHEME

Lectures : 04 Hrs/Week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 80 Marks
Duration	: 03 Hours
Unit Test	: 20 Marks
T. W. & Pr.	: 50 Marks

Unit-I (08 Hours)

Introduction to DBMS:

Basic concepts, Advantages of a DBMS over file-processing

Systems, Data abstraction, Data Models and Data Independence, Components of a DBMS and overall structure of a DBMS, Life Cycle of a DBMS application. Database terminology, Role of database administrator.

Data Modeling: Basic Concepts, Types of data models, E-R data model and Object- Oriented data model. Relational, Network and Hierarchical data models and their comparison. Entity, attributes, relationships, constraints, keys, E-R and EER diagrams: Components of E-R Model, conventions, converting E-R diagram into tables, EER Model components, converting EER diagram into tables, normalization.

Unit –II (06 Hours)

Relational Model:

Basic concepts. Attributes and domains. Intention and extensions of a relation, concept of integrity and referential constraints. Relational Query Languages (Relational algebra and relational calculus). Concepts of View and triggers. Updation using views, indexes, nulls.

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependencies, The Process of Normalization: INF, 2NF, 3NF, BCNF, 4NF, 5NF.

Unit-III (08 Hours)

SQL:

Structure of a SQL query, DDL and DML, SQL queries. Set Operations, predicates and Joins, Set Membership, Tuple variables. Set comparison. Ordering of tuples, aggregate functions, and nested queries. Database modification using SQL, Dynamic and Embedded SQL and concept of

stored procedures and Triggers. Characteristics and advantages, SQL Data Types and Literals, DDL, DML, SQL Operators, <u>Tables</u>: Creating, Modifying, Deleting,

<u>Views</u>: Creating, Dropping,Updation using Views, Indexes, Nulls, JDBC, ODBC, Cursors Database Analysis and Design Techniques: Information Systems Lifecycle, Application Lifecycle, Planning, System Definition, Requirement Analysis, Design, DBMS Selection, Application Design: Transaction and User-Interface Design, Prototyping, Implementation, Data Conversion and Loading, Testing, Data and Database Administration, Fact-Finding Techniques

Unit-IV   (08 Hours)
Storage and File Systems:

Secondary Storage, RAID, File Organization, Indices, Static and Dynamic Hashing, B-trees and B+ Trees.

<u>Database Administration Issues</u>: Overview, Measures of query cost, Selection and join operations, Evaluation of Expressions, Introduction to Query Optimization, Estimation, Transformation of Relational Expressions, DBA role, indexes, data dictionary, Security, Backups, replication, SQL support for DBA. Commercial RDBMS selection.

Unit-V   (10 Hours)
Transaction Management:

Basic concept of a Transaction, Properties of Transactions, Database Architecture, Concept of Schedule, Serial Schedule, <u>Serializability</u>: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking Methods, Deadlocks, Time stamping Methods, Optimistic Techniques, Multi-Version Concurrency Control, Different Crash Recovery methods such as Shadow-Paging and Log-Based Recovery: Deferred and Immediate, Checkpoints.

<u>Object-Oriented Databases</u>: Need of OODBMS, Storing Objects in Relational Database, Introduction to OO Data Models, Persistent Programming Languages, Pointer Swizzling Techniques, Persistence, Object Management Group, Object Database Standard ODMG, differences between relational & object oriented database, inheritance.

Unit-VI

Database Architectures:

Centralized and Client-Server Architectures, Introduction to Distributed Database systems.

New Applications: Need for data analysis. Decision support systems, Data Warehouse, On-line Analytical Processing (OLAP), Data mining concepts, Spatial and Geographic databases, Multimedia databases, Data mart.

List of Practical Assignments

Creating a sample Database application using conventional file processing mechanisms and C language. The program should provide facilities for retrieving, adding, deleting and modifying records.

Prepare an E-R diagram for the given problem definition. Prepare and verify a relational database design using concepts of normalization techniques in appropriate normal form.

Creating a sample database files and indexes (for the design made in experiment no. 2) using any client server RDBMS (Oracle/Sybase) package using SQL DDL queries. This will include constraints (key referential etc) to be used while creating tables.

SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment no. 3. The queries should include all SQL features such as aggregate functions, group by, having, order by, subqueries and various SQL operators.

Screen design and Report Generation: Sample forms and report should be generated using their Developer 2000 (in case of Oracle) or through Power-Builder or Visual Basic front end roots or any prototyping software engineering tool.

Case study of a MIS.

Text Books/References

Silberschatz A., Korth H., Sudarshan S., Database System Concepts, 4th Edition, McGraw Hill Publishers

Rab P. Coronel C., Database Systems Design, Implementation and Management, 5th Edition, Thomson Course Technology

Date C. J., An Introduction to Database Systems, 7th Edition, Pearson Education

Elmasri R., Navathe S., Fundamentals of Database Systems, 4th Edition, Pearson Education

Ramkrishna R., Gehrke J., Database Management Systems, 3rd Edition, McGraw-Hill

Bipin Desai, Introduction to Database Management Systems

Groff James R., Paul Weinberg, LAN times guide to SQL

Syllabus for Unit Test

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

K30210: MICROPROCESSOR ARCHITECTURE AND PROGRAMMING

TEACHING SCHEME

Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory   : 80 Marks
Duration   : 03 Hours
Unit Test   : 20 Marks
T. W. & Pr. : 50 Marks

Unit -I   (08 Hours)
Introduction To Microprocessor:

8 bit processor architecture, 8085 microprocessor Architecture, Memory Interfacing, Memory Map and Address Decoding Logic. Introduction to 16 bit processor- 8086/8088 architecture, minimum and maximum mode Configurations, Supporting Chips 8284, 8286, 8288.

Unit –II   (08 Hours)
8086 Interrupt Structure:

Interrupt Service Routine, Interrupt Vector Table (IVT) - location of IVT in the memory, contents of IVT, Hardware interrupts and Software interrupts - INTR, NMI and INT N. Interrupt response, Execution of an ISR, priority of 8086 interrupts. 8259A priority interrupt controller.

Unit-III   (08 Hours)
I/O Interface:

Serial Communication Interface Asynchronous & Synchronous Communication, Physical Communication Standards, 8251A PCI, Parallel Communication, 8255A PPI, Interfacing and Programming, 4x4 Key Matrix Interfacing, Seven Segment Display Interfacing. 8257/8237 DMA Controller. 8253/8254 Programmable Timer.

Unit-IV   (08 Hours)
Multiprocessor Configurations:

Queue status & LOCK facilities, 8086/8088 based multiprocessing systems, Co-processor configurations, closely & loosely coupled configuration, Microcomputer networks, 8087 NDP coprocessor, Processor Architecture, 8089 I/O processor, IOP architecture, Communication between IOP & CPU.

Unit-V (08 Hours)

8086 Programming :

Instruction set , Assembler directives, Assembling, Linking & Relocation, Stacks, Procedures, Interrupts & Interrupt routines, Macros, String Manipulation.

Unit-VI (08 Hours)

DOS:

Internals of DOS, DOS loading, DOS Memory map, Internal & external commands, command interpreter POST Sequence, PSP Structure, Exe & Com file Structures and Conversion, Use of BIOS and DOS calls. INT 1 0 H calls, DOS Calls, INT 21H Calls.

Difference Between DOS & BIOS, TSRs: Types , Structures, Details of TSR Types, Structures, Writing TSRs in Assembly language.

List of Practical Assignments

Write 8086 Assembly language program (ALP) to add array of N numbers stored in the memory

Write 8086 ALP to perform non-overlapped and overlapped block transfer

Write 8086 ALP to find and count negative numbers from the array of signed numbers stored in memory

Program to check the entered password is correct or not

Write 8086 ALP for the following operations on the string entered by the user

Calculate Length of the string

Reverse the string

Check whether the string is palindrome or not.

Write 8086 ALP to perform string manipulation. The strings to be accepted from the user is to be stored in code segment Module_l and write FAR PROCEDURES in code segment Module_2 for following operations on the string:

Concatenation of two strings

Compare two strings

Number of occurrences of a sub-string in the given string

Find number of words, characters, number of lines and number of capital letters from the given text in the data segment

Note: Use PUBLIC and EXTERN directive. Create .OBJ files of both the modules and link them to create an EXE file.

Program for 32 bit hex multiplication

Write a program to arrange given set of numbers in Ascending/Descending order

Write assembly language program for BCD to Hex conversion

Write assembly language program for computing factorial of a numbers from 0 to 9

Text Books/References

Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085 - Penram International.

Douglas Hall , Microprocessor & Interfacing Programming & Hardware Tata McGraw Hill.

Liu Gibson, Microcomputer Systems 8086/8088 family PHI

Peter Abel, Assembly Language Programming.

Ray Denkon, DOS Programmers Manual.

Syllabus for Unit Test

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

K30211: SIGNALS AND SYSTEMS

TEACHING SCHEME
Lectures   : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME
Theory   : 80 Marks
Duration   : 03 Hours
Unit Test   : 20 Marks
T. W. & Or.   : 50 Marks

Unit -I   (06 Hours)
Introduction:

Signals, systems, classification of signals, elementary signals, analog and discrete signals, basic operation of signals.

Unit –II   (10 Hours)
Time Domain Representation for linear time invariant systems (Analog):

Convolution, series and parallel connection of systems , casual, non-casual,   memory less, with memory, stable invertible systems, deconvolution, impulse, step and differential equation representation for continuous time linear time invariant.(CT LTI) systems.

Unit-III   (08 Hours)
Time Domain Representation for linear time invariant systems (Discrete):

Convolution, series and parallel connection of systems , casual, non-casual, memory less, with memory, stable invertible systems, deconvolution, impulse, step and differential equation representation for discrete time linear time invariant.(DT LTI) systems.

Unit-IV   (08 Hours)
Fourier Representation for Continuous time signals:

Representation of signals in terms of orthogonal functions, orthonormal signals, Fourier series, discrete time Fourier series , Fourier transform, discrete time Fourier transform, their properties, Fourier transform representation of periodic signals,inverse fouriertransformfor cts.

Unit-V   (06 Hours)
Laplace Transform:

Introduction to Laplace Transform and its properties, LT of elementary signals, unilateral LT , inversion of LT, using LT with or without   initial

conditions, transfer function of systems, state variable descriptions, advantages & uses of LT.

Unit-VI (06 Hours)
Z-Transform:

Introduction, Z-Transform of elementary signals, region of convergence (ROC), properties of Z-Transform, inversion of z-transform, system function solution of difference equation unilateral Z-Transform, advantages & uses of Z transform.

Note: Minimum two case studies of biomedical signals (ECG, EMG, EEG) using Above mathematical tools.

Practical Assignment Scheme

Concerned staff member is directed to frame two assignments on each Unit.

Text Books / References

Alan V. Oppenheim, Alan S. Willsky, Signal and systems, PHI

John G. Proakis, Digital signal processing, PHI

Rodger E. Ziemer, William H. Tranter, Signals and Systems, Continuous and discrete, MGH

Syllabus for Test

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

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TEACHING SCHEME
Lectures   : 02 Hrs/week
Practical : 02 Hrs/week
Tutorials : 02 Hrs/week

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EXAMINATION SCHEME
Duration   : 03 Hrs (Pr/Or)
T. W. & Or.   : 50 Marks
T. W. & Pr.   : 50 Marks

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Unit -I (06 Hours)
Introduction:

> Visual studio Visual Basic-Flavors, Installation Issues, Event Driven Programming, <u>VB Design Environment</u>: Integrated Design Environment, MDI vs. SDI, <u>Getting Started</u>: Introductions, Adding a Project Standard <u>Controls & Common Properties</u>: Property, Standard Properties, Standard Controls, Placing Controls on a Form

Unit –II (10 Hours)
Controls:

> <u>Text Box Control</u>: Text Box Properties, Text Box Events, Methods, Creating Text Boxes
> <u>Additional Controls</u>: List Box and Combo Box, Frames and Option Buttons Check Boxes, Scroll Bars, Timer, Common Dialog
> <u>Graphics Controls &Techniques</u>: Picture Control,
> <u>Image Control</u>: Shape Control, Creating Graphics
> <u>Variables and Constants</u>: Basics, Types of Variables, Variable Names Variable Creation, Constants, Creating user defined data types with Type

Unit-III (08 Hours)
Message boxes and input boxes:

> Use of msg box & Input Box for input & output Returning values, Formatting the boxes,
> <u>Conditional statements</u>: If-Then-Else, Case Statement, Creating condition
> <u>Loops</u>: Types of loops, Do…loop, For…Next
> <u>Arrays</u>: Declaration of arrays, Types of arrays

Unit-IV (08 Hours)
String Manipulation:

> Types of string Manipulation, Implementation

Procedure and function: Creating Procedures, Sub Routines, Creating Function, Built in functions (Numeric, string, Date-time, data conversion, formatting)

Variable & Procedure Scope: Declaring a Variable, Procedure & function Scopes.

Unit-V   (08 Hours)
Debugging:

Debugging techniques, Setting breakpoints, Immediate window.

Using Menus and Toolbars: Menu Editor, From Pop-up Menu, Adding Menus, Adding a Pop-up Menu, Creating a toolbars, Using toolbars

ActiveX & OLE: Building ActiveX documents, Building OLE.

Unit-VI   (06 Hours)
File I/O:

Working with Files, Retrieving Data, Free file Function, Open Statement/Input Statement, Print Statement,

Database Access: Data Controls, Bound Controls Additional Data Control Properties , Data Reports ,Creating a Database Access Application.

List of Practical Assignments

Use of dynamic arrays and multidimensional arrays (Matrix operations)

Program to print student merit list

Develop a scientific calculator using control array

Application to change color, type, style, size of font using list box and combo box.

Use of scroll bars to change the RGB colors and size of shape object

Develop a screen saver using timer control

Develop an application which create mark sheet using standard module

Develop a paint brush application

Develop a notepad application

Create a menu on MDI form and call different forms

Create a database application using ADO and generate data reports

Develop an application for file handling

<u>Text Books/References</u>

Gary Cornell , Visual Basic 6 from the Ground up - Tata McGraw Hill

Greg Peter, Sams Teach Yourself Visual Basic 6 in 21 Days – Sams Pub

Peter Norton, Michael Groh, Peter Norton's Guide to Visual Basic 6 - Sams

Noel Jerke, Visual Basic 6 (The Complete Reference) - Tata McGraw Hill

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 of 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 semesters 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 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