Revised scheme and syllabus of Master of Computer Applications

(MCA)

3 YEARS PROGRAMME

CHOICE BASED CREDIT BASED SYSTEM

(70:30)

(w.e.f. session 2015-16)

Department of Computer Science& Engineering GJUS&T HISAR

SCHEME OF EXAMINATION
M C A (Choice Based Credit System)
Semester I

Paper No	Nomenclature of Paper	Total Credits
CSL-611	Computer Fundamentals and Problem Solving Through C	4
CSL-612	Computer Organization	4
CSL-613	Discrete Mathematical Structures	4
CSL-614	Software Engineering	4
CSL-615	Computer Oriented Numerical and Statistical Methods using C	4
CSP-611	Software Laboratory –I Programming in C (Based on CSL-611)	2
CSP-612	Software Laboratory –II Numerical and Statistical Methods implementation in C (Based on CSL-615)	2
CSP-613	Seminar	1
Total		25

Semester –II

Paper No	Nomenclature of Paper	Total Credits
CSL-621	Data Structure and Computer Algorithms	4
CSL-622	Computer Networks	4
CSL-623	System Simulation	4
CSL-624	Computer Oriented Optimization Techniques	4
CSL-625	Object-Oriented Systems and C++	4
CSP-621	Software Laboratory –III Data Structure implemented in C/C++ (Based on CSL-621)	2
CSP-622	Software Laboratory –IV Programming in C++ (Based on CSL-625)	2
CSP-623	Seminar	1
Total		25

Semester III

Paper No	Nomenclature of Paper	Total Credits
CSL-631	Data Base Systems	4
CSL-632	Visual Programming using VB	4
CSL-633	Artificial Intelligence	4
CSL-634	Operating Systems	4
CSL- 635	Programme Elective-I	4
CSP-631	Software Laboratory –V Oracle and SQL Programming. (Based on CSL-631)	2
CSP-632	Software Laboratory –VI Programming in VB (Based on CSL-632)	2
CSP-633	Seminar	1
Total		25

List of Elective Papers (3rd Semester)

Programme Elective- I

i. System Programming
ii. High Speed Networks
iii. Theory of Computation
iv. Computer Architecture and Parallel Processing

Semester IV

Paper No	Nomenclature of Paper	Total Credits
CSL-641	Computer Graphics and Multimedia	4
CSL-642	Data Warehousing and Data Mining	4
CSL-643	Linux and Shell Programming	4
CSL-644	Programme Elective II	4
CSL-645	Programme Elective III	4
CSP-641	Software Laboratory –VII Graphics Programming in C/C++ (Based on 641)	2
CSP-642	Software Laboratory –VIII LINUX and Shell Programming in C/C++ (Based on CSL-643)	2
CSP-643	Seminar	1
Total		25

List of Elective Papers (4th Semester)

Programme Elective – II

i. Microprocessor and Interfaces
ii. Software Project Management
iii. Management Information Systems
iv. Principles of Programming Languages
v. Advanced Database Systems

Programme Elective - III

i. .NET using C#
ii. Compiler Construction
iii. Neural Network
iv. Security of Information System
v. Digital Image Processing

Semester V

Paper No	Nomenclature of Paper	Total Credits
CSL-651	Java Programming and Internet Applications	4
CSL-652	Software Testing and Quality Assurance	4
CSL-653	Web Engineering	4
Open Elective		3
CSP-651	Software Laboratory –IX Java Programming (Based on CSL-651)	3
CSP-652	Software Laboratory –X HTML/ CGI using PERL / JSP/ XML (Based on CSL-653)	2
CSP-653	Seminar	1
Total		21

List of Open Electives Papers (5th Semester):

i. BME – 700 Biomedical Instrumentation
ii. ECE – 700 Advancements in Communication Systems
iii. ME – 700 Computer Aided Design & Manufacturing
iv. MTPT – 700 Advanced Printing Technology
v. MBA701 E-Commerce Applications
vi. MBA702 E-Business Information System Management
vii. MBA703 E-CRM

Semester VI

Paper No	Nomenclature of Paper	Credits
CSD-601	Major Project	14

To be carried out in industry/company under the supervision of official of industry/company where he/she is doing the project. Evaluation and viva-voce is to be done jointly by the two examiners.

Grand total of Credits (from semester I to VI)	135

Note:

1) One credit in theory paper is equivalent to one hour classroom teaching per week.
2) One credit in practical/lab course is equivalent to 2 hours practical/lab work per week
3) A teacher will conduct practical class in a group of 15-20 students.

CSL-611: Computer Fundamentals & Problem Solving Through C

General Course Information:

Course Code: CSL-611 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected to have the basic knowledge of computer fundamentals.

About the Course and its Objectives & Outcomes:

The objectives of this course are to make students to understand programming language, concepts of structured programming, Control structures, Stepwise refinement, Functions, Arrays, and Pointers etc. After completion of this course the student is expected to analyze the real life problem and write a program in 'C' language to solve the problem. The main emphasis of the course will be on problem solving aspect i.e. developing proper algorithms.

By the end of the course a student is expected to:

- Be able to develop efficient algorithms for solving a problem.
- Use the various constructs of a programming language.
- Implement the algorithms in "C" language.
- Handle Files in "C".

Syllabus

Unit - 1

Computer Fundamentals: Computer components, characteristics & classification of computers, hardware & software, peripheral devices.
Algorithmic Development: Techniques of problem solving, Flowcharting, decision table, structured programming concepts, Modular Programming, Algorithms for searching, sorting and merging. Programming methodologies: top-down and bottom-up programming.

Unit-2

Elements of C: C character set, identifiers and keywords, Data types: declaration and definition.
Operators: Arithmetic, relational, logical, bitwise, unary, assignment and conditional operators and their hierarchy & associatively.
Data input/output.

Unit-3

Control statements: Sequencing, Selection: if and switch statement; alternation, Repetition: for, while, and do-while loop; break, continue, goto. Functions: Definition, prototype, passing parameters, recursion.

Unit-4

Data Structures: arrays, structure, union, string, data files. Pointers: Declaration, operations on pointers, array of pointers, pointers to arrays.

Text and References Books:

- Computer Programming and Problem Solving Through C by Dharminder Kumar, Varun Kumar, Excel books, New Delhi.
- Yashwant Kanetker, Let us C, BPB Publications.
- Jeri R. Hanly& Elliot P. Koffman, Problem Solving and Program Design in C, 3rd Ed., Addison Wesley.
- AK Sharma, Fundamental of Computer & Programming with C, Dhanpat Rai Publications.
- Gottfried, Programming with C, Tata McGraw Hill.

Sample Assignments:

Every student is required to do at least one problem assignment based on the concepts computer fundamental and programming language. Here is the indicative list but not limited to the topic give below:

- Write an algorithm and draw flowchart to read a three digit number produce the following output (assuming that the input is 539) 5 hundreds 3 tens 9 units.
- Write an algorithm and draw flowchart to print given three integers in ascending order using IF-ELSE ladder etc.

Other then it, students are supposed to solve unsolved exercises given at the end of each chapter of their text and reference books.

CSL-612: Computer Organization

General Course Information:

Course Code: CSL612 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Prerequisites:

Students are expected have the elementary knowledge about computers.

About the course objectives and outcomes:

The objectives of this course are to:

- Basic understanding of computer organization: roles of processors, main memory, and input/output devices.
- Understanding the concept of programs as sequences of machine instructions.
- Understanding arithmetic and logical operations with integer operands.
- Understanding simple data path and control designs for processors.

By the end of the course a student is expected to be able:

- To solve basic binary math operations using the computer.
- To demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target computer.
- To apply knowledge of the processor's internal registers.

Syllabus

Unit - 1

Information Representation & Binary Logic: Number Systems, BCD, Binary Arithmetic Operations, Truth Tables, Simplification of Boolean Functions, Digital Logic Gates.

Unit -2

Combinational Logic: Design Procedure, Adders, Subtractors, Encoders, Decoders, Multiplexers and De-multiplexers. Sequential Logic: Flip-flops, Shift Registers and Counters.

Unit – 3

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-output and interrupt, Complete Computer Description. CPU organization: General Register Organization, Stack Organization, Addressing Modes.

Unit – 4

I/O Organization: I/O Interface, Interrupt Handler, Transfer of Information between CPU, Memory and I/O devices, DMA. Memory System: Memory Parameters, RAMs, ROMs, Magnetic and Optical Storage Devices.

Text and References Books:

- Mano, M. Morris Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
- Computer Architecture and Organization, An Integrated Approach, Milles J. Murdocca, Vincent P. Heuring, John Wiley & Sons Inc.
- Computer Organization & Architecture, 7-th edition, William Stallings, Prentice Hall.
- Heuring, V.P., Jordan, H.F., Computer Systems Design and Architecture, Addison Wesley.

Sample Assignments:

Every student is required to do at least one problem assignment based on the concepts computer fundamental and programming language. Here is the indicative list but not limited to the topic give below:

- A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers.
  How many selection inputs are there in each multiplexer ?
  What size of multiplexers are needed ?
  How many multiplexers are there in the bus ?
- The following transfer statements specify a memory. Explain the memory operation in each case.
  R2 ←M[AR]
  M[AR] ←R3
  R5 ←M[R5]

Other then it, students are supposed to solve unsolved exercises given at the end of each chapter of their text and reference books.

CSL-613: Discrete Mathematical Structures

General Course Information:

Course Code: CSL613 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge of Pre-calculus, Algebra and Trigonometry.

About the Course and its Objectives & Outcomes:

The purpose of this course is to understand and use discrete structures that are backbones of computer science. Introduction to Discrete Mathematics is a course designed for students interested in information technology and programming that includes topics in set theory, algebraic structures, Boolean algebra, and graph theory. On the completion of this course, the students will be able to explain and apply the basic methods of discrete mathematics in Computer Science.

By the end of the course a student is expected to be able to:

- Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers.
- Draw and apply venn diagrams.
- Classify types of graphs, find paths, circuits.
- Apply graph theory model.

Syllabus

Unit - I

Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets. Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation. Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.

Unit - 2

Group and Subgroup: Group axioms, Semi-groups, Subgroups, Abelian group, Cosets, Normal subgroups, cyclic groups, Permutation Groups, Rings and Fields: definition and standard results, Representation of special languages and grammars, finite state machines.

Unit - 3

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, and complemented lattices. Boolean Algebra: Basic definitions, Sum of Products and Product of Sums, Form in Boolean Algebra, Logic gates and Karnaugh maps, Applications(Switching circuits, Gate circuits).

Unit - 4

Graphs: Simple graph, multi graph, Directed and undirected graphs, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph coloring, chromatic number, isomorphism and Homomorphism of graphs.

T**ext and Reference Books:**

- Kenneth H. Rosen, "Discrete Mathematics and its Applications", Mc.GrawHll.
- C. L. Liu, "Elements of Discrete Mathematics", Mc.GrawHll.
- Kolman, Busby Ross, "Discrete Mathematical Structures", Prentice Hall International.
- Schaums Outline series: Theory and problems of Probability by S. Lipshutz, McGraw-Hill Singapore.
- Discrete Mathematics by Johnson Bough R., 5th Edition, PEA.
- Discrete Mathematical Structures, B. Kolman and R.C. Busby, PHI.
- Discrete Mathematical Structures with Applications to Computers by Tembley& Manohar, McGraw Hill.

Sample Assignments:

Every student is required to do at least one problem assignment based on discrete mathematics concepts. Here is the indicative list but not limited to the topic give below:

Problems like determination of graph components, Hamiltonian path, Euler's circuit etc.

Unsolved exercise given at the end of each chapter in their text or reference books.

CSL-614: Software Engineering

General Course Information:

Course Code: CSL614 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected to have knowledge of algorithms, flow charts and at least one programming language.

About the Course and its Objectives & Outcomes:

The objectives of this course are to:

- Introduce students to software development life cycle and models for developing and effective and efficient software
- Identify software requirements for manual or automated real-world systems
- Compare and contrast software process models and software development methodologies
- Provide the student with the opportunity to practice software development skills
- Provide students with opportunities to develop basic computing skills with respect to preparation of documents and also to be able to check the correctness of a software design.
- Moreover, student will learn the skill of software requirement specification and software quality assurance techniques

By the end of the course a student is expected to:

- Describe the software development life cycle as well as describing the various software development model and understand the advantages and disadvantages of each model;
- Illustrate the software requirement specification, and system design
- Understand the purpose and functionality of case tools;
- Understand the use of model checking and be able to use it effectively.

Syllabus

Unit-1

Introduction to Software and Software Engineering, Software characteristics, Software crisis, Software Engineering paradigms. Planning a software project - Software cost estimation, project scheduling, personnel planning, team structure.

Unit-2

Software configuration management, quality assurance, project monitoring, risk management. Software requirement analysis - structured analysis, object oriented analysis and data modeling, software requirement specification, validation.

Unit-3

Design and implementation of software - software design fundamentals, design methodology (structured design and object oriented design), design verification, monitoring and control, coding. Software reliability - metric and specification, fault avoidance and tolerance, exception handling, defensive programming.

Unit-4

Testing - Testing fundamentals, white box and black box testing, software testing strategies: unit testing, integration testing, Validation testing, System testing, debugging. Software maintenance - maintenance characteristics, maintainability, maintenance tasks, maintenance side effects. CASE tools.

Text and Reference Books:

- Pressman S. Roger, Software Engineering, Tata McGraw-Hill.
- Jalote Pankaj, An integrated Approach to Software, Engineering, Narosa Publishing House
- Sommerville Ian, Software Engineering, 5th ed., Addison Wesley
- Fairley Richard, Software Engineering Concepts, Tata McGraw Hill

CSL-615: Computer Oriented Numerical and Statistical Methods Using C

General Course Information:

Course Code: CSL615 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge of probability and statistics along with mathematical foundation of computer science.

About the Course and its Objectives & Outcomes:

Due to advancement of computer technology and tools, it is very important to develop efficient algorithms for problem solving. The objective of this course is to make students familiar with numerical methods so that they are able to do numerical analysis and to solve based problems as well as to provide the practical knowledge through the implementation of these methods using computer system. This course is also helpful to the students in order to clear their concept regarding error analysis, prediction and correction. This course on Computer Oriented Numerical and Statistical Methods is going to cover Floating point arithmetic, Iterative method, Interpolation, Simultaneous linear equations, Hypothesis testing for sampling.

By the end of the course a student is expected to:

- be able to recognize the error in the number generated by the solution
- be able to provide computer solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.
- Recognize elements and variable in statistics and summarize qualitative and quantitative data.

Syllabus

Unit - 1

Numerical approximation, Representation of integers and real numbers in computers, fixed and floating point arithmetic, normalized floating point numbers, Round off and truncation errors, relative and absolute errors. Iterative methods: Zeros of single transcendental equations and zeros of polynomials using bisections, false position, Newton Raphson methods. Convergence of solutions.

Unit - 2

Interpolation : Forward, backward, central (Striplings) and divided difference formulas, Lagrangie's interpolation, Inverse interpolation for equal and unequal intervals. Numerical Integration: Newton Cote's formula, Simpson's 1/3rd and 3/8th rule. Gauss Legendre (two and three points) integration formula.

Unit - 3

Simultaneous linear equations: Solutions of simultaneous linear equations – Gauss elimination method and pivoting, ill conditioned equations and refinement of solutions, Gauss-seidal iterative methods. Solution of differential equation: Runge-Kutta fourth order method. Euler's method, Picard's, Taylor's series.

Unit - 4

Hypothesis testing for sampling: Small samples, t, z and f tests. Chi-square test, Large sample:Comparison of large samples, testing the significance of the difference between the means of two large samples. Analysis of Variance: Definition, Assumptions, One-way classification, ANOVA Table, Two-way classification (with one observation per cell).

T**ext and Reference Books:**

- Gupta & Kapoor, Introduction to Statistics, Chand & Co.
- Rajaraman V., Computer Oriented Numerical Methods, Prentice Hall, India.
- E. Balaguruswamy "Numerical Methods", TMH.
- Iyengyr M.K. Jain & R.K. Jain "Numerical Methods for scientific and engineering computation", Wiley Eastern (New Age).
- Miller "Mathematical Statistics with applications" 7 ed, Pearson.
- Miller & Freund's "Probability and Statistics for Engineers".
- B.S. Grewal "Numerical Methods in Engineering & Science"

Sample Assignments:

Every student is required to do at least one problem assignment by applying numerical and statistical techniques given by the associated teacher. For reference students can follow the unsolved exercises given at the end of each chapter in their text and reference books.

CSP- 611: Software Laboratory –I
Programming in C
(Based on CSL-611)

General Course Information:

Course Code: CSP-611 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

Students are expected to have the strong theoretical concepts and computer fundamentals as well as capability to develop logic, to write algorithm and draw flowchart.

The objectives of this lab. course are to:

- Provide a way to interact and understand the way a computer works.
- Learn how to input data for a given problem from keyboard and obtain outputs from monitor.

By the end of the course a student is expected to be able:

- To write code for a given problem in 'C' language.
- To present results in an informative way.

Students are given eight to ten laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

CSP- 612: Software Laboratory –II
Numerical and Statistical Methods implementation in C
(Based on CSL-615)

General Course Information:

Course Code: CSP-612 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

Knowledge of programming in C.

The objectives of this lab. course are to:

- Make the students able to implement numerical and statistical methods on computer systemto obtain more accurate results.
- Learn how to input a numerical problem from keyboard and obtain outputs from monitor.

By the end of the course a student is expected to be able:

- To write code for numerical problems.
- To write efficient, well-documented ‘c’ code and present numerical results in an informative way.

Students are given eight to ten laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

CSP-613: Seminar

General Course Information:

Course Code: CSP-613 *Course Credits: 1 Type: Compulsory Contact Hours: 2 hours/week Mode: Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 100)** An internal examination is conducted by the assigned teacher on regular basis in lab and based evaluation is done by the teacher.

The objectives of this Seminar course are to:

- Understanding of the basics of the application of the various models of verbal and non-verbal communication in the social and professional sphere
- Develop the following skills in the students-
  - Communication Skills
  - Presentation Skills
  - Active Listening etc.

By the end of the course a student is expected to be able:

- To understanding the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
- To establish a repo with the audience.
- To present his/her ideas clearly and confidently.
- To address the queries from the audience.

General Guidelines:

- Students are required to prepare a presentation.
- The content of presentation can be on any topic from the core subject.
- Students are required to submit hard as well as soft copy of the presentation to the concerned teacher.

CSL-621: Data Structures and Computer Algorithms

General Course Information:

Course Code: CSL621 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected to be proficient in programming in a standard programming language like C.

About the Course and its Objectives & Outcomes:

The objectives of this course are

- To achieve an understanding of fundamental data structures, which allow one to store collections of data with fast updates and queries
- To study theoretical analysis, implementation and application of data structures, and
- To learn tradeoffs between different implementations of these abstractions.

By the end of the course a student is expected to:

- Design algorithms for various computing problems.
- Analyze the time and space complexity of algorithms.
- Efficiently implement your solution using programming language C.

Syllabus

Unit - 1

Data Structures: Definition and its types, Abstract Data Types, Review of strings: String representation and manipulation, Static and dynamic memory storage, Arrays, matrices, sparse matrices, multi-dimensional arrays, operations on arrays, Linear search, Binary search, Insertion sort, selection sort, Bubble sort, Merge sort.
Linked Lists, List Types (singly, doubly, singly circular, header, doubly circular,), Operations on Lists – create, insert, delete, search, Applications of linked list

Unit - 2

Stacks: Definition, Array implementation of stacks, Linked implementation of stacks, Applications of Stacks: Infix, Postfix and prefix expression, conversions and evaluation of expressions, Recursion, Quick Sort.
Queues: Definition, Array implementation of queues, Linked implementation of queues, Circular queues, Priority queues, Double-ended queues

Unit - 3

Trees: Binary Trees and their properties, Linked and static Representation of binary trees, Complete Binary Tree, Threaded Binary tree, Different tree traversal algorithms, Binary Search Tree (create, delete, search, insert, display), Heap Sort and its complexity analysis, AVL Trees, Balanced multi-way search trees.

Unit - 4

Graphs: Definition, Array and linked representation of graphs, Graph Traversal (BFS and DFS), Adjacency matrix and adjacency lists, path matrix, Finding Shortest Path - Warshall's Algorithm, Hashing, Hash table, Hash functions.

Text and Reference Books:

- Tenenbaum, Langsam, Augenstein,Data Structures using 'C', Pearson Education.
- BalaGuruswamy, Data Structures Using 'C', TMH..
- Weiss, Data Structures Using 'C , Pearson Education.
- A.V. Aho, J.E. Hopcroft and T.D. Ullman,Data Structures and Algorithms, Original edition, Addison-Wesley, Low Priced Edition.
- D.Robert Kruse, Data Structures and Program Design in C, PHI,
- Jr. SymourLipschetz, Theory & Problems of Data Structures by, Schaum's outline by TMH

CSL-622: Computer Networks

General Course Information:

Course Code: CSL622 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Prerequisite

Student is required to have the knowledge of Data representation, Digital and Control Logic, Memory Hierarchy, Input/ output devices and overall system design.

About the Course and its Objectives & Outcomes:

The objective of study of Computer Networks is to introduce to various types of Networks. Networks relates to the Communication among various Gadgets and Networking devices. Valuable assets are made to share over a communication channel to enhance the utilization of idle resources. The OSI and TCP/IP models for Networks define collection of protocols for the related communication. Study relates to various protocols at all layers along with frame format and packet header and payload formats to be transmitted along various intermediate devices to the final destination. To study Medium Access Control protocols and different kinds of routing.

By the end of the course a student is expected to:

A student should be able to identify the type of Network in the work environment, identify the protocols at various layers, perform error detection and correction at bit level, classification of Networks as ATM Networks and ISDN Networks, define Network Architecture and Data link layer protocols, Comparatively study medium access control protocols for efficiency, delay and throughput, Analyze routing and congestion control algorithms.

Syllabus

Unit - 1

Network Concepts: Goals and applications of Computer Networks; Topologies; Categories of Networks - LAN, MAN, WAN, Inter-networks; point-to-point and broadcast networks; Introduction to SMDS, X.25 Networks, ISDN, frame relay and ATM networks, Network architecture : Concept of protocols & services; OSI model and functions of its layers; TCP/IP reference model.

Unit - 2

Data communication concepts: Components of a data communication system; transmission modes; transmission media - guided and wireless media; introduction to switching (circuit, message and packet) and multiplexing (frequency division and time division); concept of Modems, Framing and Error control : Framing techniques; Error control- error detection &correction, Data Link Control : Acknowledgments; Elementary data-link protocols, Automatic Repeat Request; Sliding Window protocols.

Unit 3

Medium Access Control and LANs: Multiple Access protocols of MAC sub layer - ALOHA, 1-persistent, p-persistent and non-persistent CSMA, CSMA/CD, Collision free protocols, Limited contention protocols, Wavelength Division Multiple Access, MACA, GSM, CDPD, CDMA; IEEE Standard 802 for LANs and MANs- Ethernet, token bus, token ring, DQDB, Logical Link Control.

Unit 4

Routing: Deterministic and Adaptive routing; Centralized and distributed routing; shortest-path; flooding; flow based; optimal; distance vector, link-state, hierarchical; routing for mobile hosts; broadcast and multicast routing, Congestion control : Principles of congestion control; Traffic shaping; choke packets; load shedding; RSVP,TCP/IP: Elements of Transport Protocols; transmission control protocol(TCP);user datagram protocol(UDP); Internet protocol(IP).

Text and Reference Books:

- Computer Networks - Andrew s. Tanenbaum, PHI.
- Data Communications, Computer Networks and Open Systems, fourth edition-Fred Halsall, Addison Wesley.
- Introduction to Data communications and Networking- Behrouz, Forouzan, Tata Mc-Graw Hill.
- Data and Computer Communications, fifth edition-William Stallings, PHI.

CSL-623: System Simulation

General Course Information:

Course Code: CSL623 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge of system and what is simulation.

About the Course and its Objectives & Outcomes:

The objectives of this course are to make the students:

- Appreciate the key concepts and principles of system models and system simulation
- Understand the key concepts of gpss and simscript and other simulation languages
- Develop the ability to create a system which is not real but a simulation of real system.

By the end of the course a student is expected to:

- Able to create model of real system and implement probability concepts and queuing theory in simulation.
- Analyze the real system problems by model.

Syllabus

Unit – 1

Introduction: Concept of System, stochastic activities, continuous and discrete systems, system modeling, principals used in modeling.

Unit – 2

Simulation of System: Concepts of simulation of continuous system with the help of examples; use of integration formulas; concepts of discrete system simulation with the help of examples. Generation of random numbers, Generation of non-uniformly distributed random numbers.

Unit – 3

Simulation of Queuing Systems: Basic concepts of queuing theory, Simulation of single - server, two-server and general queuing systems.
Simulation in Inventory Control And Forecasting: Elements of inventory theory, inventory models, Generation of Poison and Erlang variants, forecasting and aggression analysis.

Unit – 4

Design and Evaluation of Simulation Experiments: Experiment layout and Validation.
Simulation Languages: Continuous and discrete simulation languages, Black-Structured continuous simulation languages, Expression based languages, Discrete system simulation languages: GPSS, SIMCRIPT, SIMULA, Factors in selection of discrete system simulation languages.

Text and Reference Books:

- Gordon G. :"System Simulation" , Prentice-Hall of India Pvt. Ltd. New Delhi.
- Narsingh Deo : "System Simulation with Digital Computer", PHI, New Delhi.
- Payne, James A. : Introduction to Simulation: Programming Techniques and Methods of Analysis. Mcgraw-Hill International Editions, Computer Science Series, New York.

CSL-624: Computer Oriented Optimization Techniques

General Course Information:

Course Code: **CSL-624** Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions are to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting at least one from each of the remaining four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge mathematical tools like graph.

About the Course and its Objectives & Outcomes:

The objectives of this course are to

- Develop proficiency in business study and decide the fusibility of system
- To carry out the profitable solution for an industries.

By the end of the course a student is expected to able to:

- Make the decision about business system
- Find the Maximum profit and Minimum lose for the business

Syllabus

Unit - 1

Introduction: The Historical development, Nature, Meaning and Management Application of Operations research. Modeling, It's Principal and Approximation of O.R.Models, Main characteristic and phases, General Methods of solving models, Scientific Methods, Scope, Rule on Decision Making and development of Operation Research in India.

Unit - 2

Linear Programming : Formulation, Graphical solution, standard and matrix forms of linear programming problems, Simplex method and its flow chart, Two phase Simplex method, Degeneracy.

Unit - 3

Dualily : Introduction, Definition, General Rule for converting any primary into its Dual, Dual Simplex method and its flow chart.
Queuing Models : Introduction, Applications, Characteristic Waiting and Ideal time costs, Transient and Steady states, Kendall's Notations, M/M/1, M/M/C, M/Ek/1 and Deterministic Models. (No Mathematical derivations included).

Unit - 4

Integer Programming: Importance and Applications, Gomorg's all integer programming problem technique, Branch and Bound Method.
PERT and CPM : Basic steps in PERT and CPM, Forward and Backward computation, Representation in Tabular form, Slack and Critical path, Difference between CPM and PERT, Float.

Text and Reference Books:

- Gupta P.K., Hira and D.S., Operation Research, Sultan Chand & Sons, New Delhi.
- Kanti Swarup, Gupta P.K. & Man Mohan, Operation Research, Sultan Chand & sons, New Delhi.
- Mittal, K.V., Optimization Methods in Operations Research and System Analysis, New Age International (P) Ltd., New Delhi.
- Rao S.S., Optimization Theory and Applications, Wiley Eastern Ltd. New Delhi.
- Sharma, S.D., Operations Research, Kedar Nath and Ram Nath, Meerut.
- Taha, H.A., Operation Research - An Introduction, McMillan Publishing Co, New York.
- Bazara, Operation Research & Networking, Wiley.

CSL-625: Object Oriented Systems and C++

General Course Information:

Course Code: CSL 625 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge of C language concepts like Data-Types, Loops, Array, Structure etc.

About the Course and its Objectives & Outcomes:

The objectives of this course are:

- To understand the advanced programming concepts of OOPS.
- To be able to develop efficient applications with greater ease using the concepts like Abstraction, Encapsulation, Polymorphism and Inheritance.

By the end of the course a student is expected to:

- Design and Develop different computer software applications.
- Implementation of various algorithms in programming languages for research purpose.

Syllabus

Unit - 1

Object-Oriented Concepts: Data abstraction, encapsulation, Classes and objects, modularity, hierarchy, typing, concurrency, persistence, Polymorphism, Inheritance.

Unit - 2

Object-Oriented Methodology: Advantages and disadvantages of OO methodologies. Modeling, Domain analysis. OMT Methodology- Object Model, links and associations, multiplicity, link attributes, role names, ordering qualification, aggregation, generalization and inheritance, abstract class, meta data, object diagram. Dynamic Model-events, states, scenarios, event traces, state diagram. Functional Model-data flow diagrams. Analysis, System design and Object design.

Unit - 3

Programming in C++ (I): Data Types, struct vs classes, static data & member function, constant parameters & member functions, friend functions & friend classes, role of constructors & destructors, dynamic objects, operator overloading, function overloading, virtual functions, abstract class, virtual class.

Unit - 4

Programming in C++ (II): Inheritance, Template functions & template classes, exception handling, file stream classes, ASCII & Binary files, sequential & random access to a file.

Text and Reference Books:

- Rumbaugh, J. et. al., Object-Oriented Modeling and Design, Prentice Hall of India.
- Booch, Grady, Object Oriented Analysis & Design, Addison Wesley.
- Stroustrup, B., The C++ Programming Language, Addison-Wesley.
- Lippman, C++ Primer, Addison-Wesley
- Balaguruswami, E., Object Oriented Programming in C++, Tata McGraw-Hill.
- Schildt, Herbert, C++ : The Complete Reference, Tata McGraw-Hill.

CSP- 621: Software Laboratory –III
Data structure implemented in C/C++
(Based on CSL-621)

General Course Information:

Course Code: CSP-621 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

Students are expected to have the strong theoretical concepts and computer fundamentals as well as are expected to be proficient in programming language like 'C'.

The objectives of this lab. course are to:

- Learn how to implement data structure in a programming language.
- Make the students familiar with various operations on data.
- Learn the students how to deal with memory management.

By the end of the course a student is expected to be able:

- To make a differentiation in abstract data type and dynamic data type.
- To model real world data aggregations using different data structures.

Students are given eight to ten laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

CSP- 622: Software Laboratory –IV
Programming in C++
(Based on CSL-625)

General Course Information:

Course Code: CSP-622 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

Students are expected to have basic concepts (theoretical) of object oriented language.

The objectives of this lab. course are to:

- Extend the programming capability of students using object oriented language.
- Learn the students how to calculate the time and space complexity through algorithm analysis.

By the end of the course a student is expected to be able:

- To understand how an algorithm performs its actions.
- To understand the importance of concepts of object oriented approaches in software development.

Students are given eight to ten laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

CSP-623: Seminar

General Course Information:

Course Code: CSP-623 *Course Credits: 1 Type: Compulsory Contact Hours: 2 hours/week Mode: Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 100)** An internal examination is conducted by the assigned teacher on regular basis in lab and based evaluation is done by the teacher.

The objectives of this Seminar course are to:

- Understanding of the basics of the application of the various models of verbal and non-verbal communication in the social and professional sphere
- Develop the following skills in the students-
  - Communication Skills
  - Presentation Skills
  - Active Listening etc.

By the end of the course a student is expected to be able:

- To understanding the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
- To establish a repo with the audience.
- To present his/her ideas clearly and confidently.
- To address the queries from the audience.

General Guidelines:

- Students are required to prepare a presentation.
- The content of presentation can be on any topic other than the core subjects. However, it should be recent and relevant.
- Students are required to submit hard as well as soft copy of the presentation to the concerned teacher.

CSL-631: Database Systems

General Course Information:

Course Code: CSL631 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Prerequisite:

Elementary knowledge about computers including some experience of using Unix or Windows. It is beneficial have the knowledge about programming in some common programming language and knowledge about data structures and algorithms, corresponding to the basic course on Data Structures and Algorithms.

About the Course and its Objectives & Outcomes:

The objectives of this course are

- To provide comprehensive coverage of the problems involved in database design, in-depth coverage of data models and database languages, and a survey of implementation techniques applied in modern DBMS.
- To provide practical skills of conceptual/logical database design and general familiarity with the problems and issues of database management.
- To develop skills that is appropriate for Database Administrators, Database Application Developers, Database Specialists, and DBMS developers.

By the end of the course a student is expected to be familiar with:

- The basic concepts and appreciate the applications of database systems.
- The basics of SQL and construct queries using SQL.
- A relational database system theory and be able to write relational algebra expressions for queries by writing SQL using the system.
- Design principles for logical design of databases, including the e-r method and normalization approach.

Syllabus

Unit - 1

Overview: File Systems vs. DBMS, Characteristics of the Data Base Approach, Database users, Advantages and Disadvantages of a DBMS, Responsibility of Database Administrator.
Data Base Systems Concepts and Architecture: Data Models, Schemas and Instances, DBMS architecture and various views of Data, Data Independence, Database languages.

Unit - 2

Entity Relationship Model: Entity Types, Entity Sets, Attributes & Keys, Relationships, Roles and Structural Constraints, E-R Diagrams, Reduction of an E-R Diagram to Tables.
Relational Data Model: Relational Algebra & various operations.

Unit - 3

SQL: Data Definition, Constraints, Insert, Delete & Update statements in SQL, view in SQL, Queries in SQL.
Relational Database Design: Functional Dependencies, Integrity Constraints, Decomposition, Normalization (1 NF, 2 NF, 3 NF and BC NF).

Unit - 4

DDBMS Design: Replication and Fragmentation Techniques
Concurrency Control Techniques: ACID properties of a Transaction, Locking Techniques, Time-stamp ordering, Multi-version Techniques, Recovery Techniques in centralized DBMS.

Text and Reference Books:

- Elmasri&Navathe: Fundamentals of Database systems, 3rd Edition, Addison Wesley, New Delhi.
- Database Management Systems - R.Pannerselvam - PHI Learning Pvt Ltd, New Delhi - Second Edition, 2011
- BipinC.Desai : An Introduction to Database System, Galgotia Publication, New Delhi
- Essentials of Data Base Management System - Alexis Leon and Mathews Leon - Vikas Publishing Limited, Chennai First Edition, 2009
- Database Management Systems - Ramon a.Mato-Toledo, Pauline K.Cushman - Schaums'Outline series, TMH, New Delhi Special Indian Edition 2007
- Database Management Systems - Sharad Maheswari, Ruchin Jain - Firewall Media, New Delhi - Second Edition Reprint 2010

CSL-632: Visual Programming using Visual Basic

General Course Information:

Course Code: CSL-632 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected to have the basic knowledge of visual interfaces.

About the Course and its Objectives & Outcomes:

The objectives of this course are to make students to understand visual programming language, Concepts of Object based Event Driven / Oriented Languages, Visual Architecture: Method, Statement, Properties and Event; Basic concept of Visual Program Design and comparison with Non-Visuals. After completion of this course the student is expected to design applications based on different events and linking the codes with back end databases to satisfy the real world requirement.

By the end of the course a student is expected to be able to:

- Develop Visual Interfaces like Buttons, List, Menu bar, Forms etc
- Attach codes for visual interfaces and events associated with them.
- Use dlls in VB applications, building activex clients, activex servers, activex controls, activex documents, and web-enabled applications, Multiple Document Interface, Graphics Programming.
- Perform database connectivity using DAODC and ADODC

Syllabus

Unit - 1

Concepts of Object based Event Oriented Languages, Visual Architecture: Method, Statement, Properties and Event; Basic concept of Visual Program Design and comparison with Non-Visuals.

Unit - 2

The VB Integrated Development Environment and its elements: Menu bar, tool bars, project explorer, tool box, properties window, form designer, form layout, etc.

Unit - 3

Designing a VB application: Working with VB forms, form properties, adding, deleting, and managing forms at run time, coding event procedures, implementing drag and drop operations, menu designing, adding menu interface to forms, attaching code to events, dynamic menu appearance.

Unit – 4

The VB language and its elements: Variables, constants, arrays, collections, subroutines, functions, arguments, and control structures. Implementing user interface controls, common controls and their properties, dynamic controls, custom controls, control arrays, using variable, subroutines, function and control structures, accessing data through code and data controls, using DLLs in VB applications, building ActiveX clients, activeX servers, ActiveX controls, ActiveX documents, and web-enabled applications, Multiple Document Interface, Graphics Programming, Database programming(DAODC,ADODC) and Object Oriented programming with VB.

Text and References Books:

- Visual Basic - 6 by Howard Hawee PHI
- Teach yourself Visual Basic by Warner TMH
- Mastering VB-6 by Evangelos Petroutsos TMH
- Programming in VB-6 by J C Bradley TMH
- VB-6 The Complete Reference by Jerke TMH
- Visual Basic by Gery Corner.

CSL-633: Artificial Intelligence

General Course Information:

Course Code: CSL633 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Expected to have basic knowledge of Fundamental Algorithms for problem solving, familiarity with probability theory and statistics and have good programming skills.

About the Course and its Objectives & Outcomes:

The objectives of this course are

- To study the idea of Intelligent agents and search methods
- To study about representing knowledge.
- To study the reasoning & decision making in uncertain world.
- To construct plan & methods for generating knowledge.
- To study the concept of expert system

By the end of the course a student is expected to:

- Understand what the AI is.
- Take hold of basic theoretical techniques for analyzing computer algorithms.
- Have ability to identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.

Syllabus

Unit - 1

Introduction: Background and History, Overview of AI applications areas.
Problem solving: Search space control, Depth first search, Breadth First Search, Hill climbing, Branch and bound, Best First Search, A* algorithm, AND / OR Graphs, Problem Reduction, Means End Analysis.
Production system: Types of production system, Control of search in production system.

Unit - 2

Knowledge Representation: Propositional & Predicate Logic; First Order Predicate Calculus; Skolemnisation; Resolution; Inference, Semantic Networks; Frame Systems; Scripts; Conceptual Dependency.
Rule Based Systems: Inference Rules, Conflict Resolution, Forward & Backward Reasoning.

Unit - 3

Fuzzy logic: Definition, Difference between Boolean and Fuzzy logic, fuzzy subset, fuzzy expert system.
Learning: Types of learning, genetic algorithms, learning by induction, learning by explanation. Programming with Prolog.

Unit - 4

Expert System: Expert system development life cycle: Problem selection, Prototype construction, Formalization, Implementation, Knowledge acquisition: Knowledge engineer, Acquisition techniques. Case Study of MYCIN.
Applications of AI: Game Playing, techniques, Mini-max search procedure, Natural Language and its links with AI, Speech Synthesis and its recognition, Syntactic and semantic analysis with AI, Bio-medical application of AI in context of Fuzzy Sets, Image Processing with AI.

Text and References Books:

- Rich Elaine and : Artificial Intelligence, 2nd edition, Tata McGraw Hill, Knight Kevin
- Stuart Russel and Peter Norvig, 'Artificial Intelligence A Modern Approach', Second Edition, Pearson Education, PHI.
- Foundation Artificial Intelligence & Expert Systems by VS Janakiraman K, Sarukesi P Gopalakrishnan Macmillan series in computer science
- George F. Luger, William A. Stubblefield Artificial Intelligence, The Benjamin/Cummings Publishing Company, Inc.
- Balagurusamy: Artificial Intelligence & Technology.

CSL-634: Operating Systems

General Course Information:

Course Code: CSL634 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected to be proficient in programming in a standard programming language like C.

About the Course and its Objectives & Outcomes:

The objective of this course is to help students become familiar with the fundamental concepts of operating systems and provide students with sufficient understanding of operating system design.

By the end of the course a student is expected to:

- Exhibit familiarity with the fundamental concepts of operating systems.
- Exhibit competence in recognizing operating systems features and issues.
- Apply a mature understanding of operating system design and its impact on application systems design and performance.

Syllabus

Unit - 1

Introductory Concepts: Operating systems functions and characteristics, operating system services and systems calls, system programs, operating system structure. operating systems generation, operating system services and systems calls. Types of Operating systems: Batch operating system, Time-sharing OS, Distributed operating system, Real time systems.
File Systems: Types of Files and their access methods, File allocation methods, Directory Systems: Structured Organizations, directory and file protection mechanisms, disk scheduling and its associated algorithms.

Unit - 2

Processes: Process concept, Process Control Block, Operations on processes, Cooperating processes.
CPU scheduling: Levels of Scheduling , scheduling criteria, Comparative study of scheduling algorithms, Algorithm evaluation, Multiple processor scheduling.

Unit - 3

Process Synchronization: Critical-section problem, Synchronization hardware, Semaphores, Classic problems of synchronization and their solutions, critical regions, Monitors, Interprocess communication.
Deadlock: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock

Unit - 4

Storage Management: Storage allocation methods: Single contiguous allocation, Multiple contiguous allocation, Paging; Segmentation combination of Paging and Segmentation, Virtual memory concepts, Demand Paging, Page replacement Algorithms, Thrashing.
Case Studies: Comparative study of WINDOW, UNIX & LINUX system.

Text and References Books:

- Operating systems- A Concept based Approach-D.M.Dhamdhere. 2nd Edition. TMH
- Silberschatz, Galvin, and Gagne, "Operating System Concepts", Sixth Edition, Wiley India Pvt Ltd.
- Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Pearson Education.
- Gary Nutt, "Operating Systems", Third Edition, Pearson Education.
- Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education.

CSL-635: System Programming
(Programme Elective-I)

General Course Information:

Course Code: CSL635 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

- Problem Solving and Object Oriented Programming
- Programming in C
- Foundations of Computer Science
- Data Structures and Algorithms
- Computer Architecture

About the Course and its Objectives & Outcomes:

The objectives of this course are:

- The System Programming course concentrates on how programs run in user space and how the interact with the OS.
- It solidifies the programming skills by having the students write large programs

By the end of the course a student is expected to:

- Be able to use tools like IDEs, debuggers, profilers, and source control to help them write good and maintainable code.
- Use Scripting Languages.
- Write multi-process and multi-threaded programs.

Syllabus

Unit – 1

Introduction to System Software and Assemblers: Definition, Components of System Software, Evolution of System Software. Assemblers: Elements of Assembly language programming, overview of assembly process, design options- one pass assembler &multi pass assembler.

Unit – 2

Macroprocessors: Basic functions, Design options-Recursive macro expansion, General purpose macro processors, Macroprocessing within language translators.

Unit – 3

Compilers : Overview of Compilation process, Programming Language Grammar, Scanning, Parsing, Storage allocation, Compilation of expressions, Compilation of Control Structures, Code optimization, Design options-Compiler-Compilers, P-code compilers, Interpreters.

Unit – 4

Loaders & Linkage Editors: Loading, Linking & Relocation, Program Relocatibility, Overview of Linkage editing, Linking for program overlays. Software Tools: Spectrum of Software tools, Text editors, Program generators, Debug monitors, Programming environments.

Text and Reference Books:

- BeckL. Leland, System Software, Addison Wesley.
- Donovan J. John, System Programming, Tata McGraw Hill.
- Dhamdhere D.M, System programming and operating system, Tata Mc-Graw-Hill.

CSL-635: High Speed Networks
(Programme Elective-I)

General Course Information:

Course Code: CSL635 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge of computer networks, layers of OSI reference model, protocols at different layers of OSI reference model.

About the Course and its Objectives & Outcomes:

Today we have seen sufficient growth in terms of computing power but a lot of work is required to be done to improve communication speed of computers. This course has been designed with an aim that student should learn about different high speed communication technologies like 10 G Ethernet, WiFi, WiMAX, Fiber Channel, GSM, CDMA, ATM, ISDN and Frame Relay.

By the end of the course a student is expected to have knowledge of different high speed communication technologies like 10 G Ethernet, WiFi, WiMAX, Fiber Channel, GSM, CDMA, ATM, ISDN and Frame Relay.

Syllabus

Unit - 1

High Speed LAN

- **Gigabit Ethernet**: Overview of fast Ethernet, Gigabit Ethernet – overview, specifications, layered protocol architecture, network design using Gigabit Ethernet, applications, 10GB Ethernet – overview, layered protocol architecture, applications.
- **Fibre Channel**: Fibre channel physical characteristics – topologies & ports, layered protocol architecture, class of service, technology comparison, SAN overview and architecture.

Unit - 2

High Speed WAN

- **Frame Relay** : Protocol architecture, frame format, routing.
- **ISDN & B-ISDN** : Channels, interfaces, addressing, protocol architecture, services.
- **ATM** : Virtual circuits, cell switching, reference model, traffic management.

Unit – 3

Wireless LAN

- **Wireless Networks:** Existing and emerging standards, Wireless LAN(802.11), Broadband Wireless(802.16), Bluetooth(802.15) their layered protocol architecture and security. Mobile Networks – GSM, CDMA and GPRS

Unit - 4

Internet Suite of Protocols

- **Internet Layer** : IPV4 and IPV6, IP addressing, ARP, IP routing(OSPF & BGP), internet multicasting, mobile IP.
- **Transport Layer** : UDP/TCP protocols & architecture, TCP connection management, wireless TCP.
- **Application Layer** : DNS, FTP, Voice over IP, audio & video compression.

Text and Reference Books:

1. Andrew S Tanenbaum, "Computer Networks", 5th Edition, Pearson 2010
2. Jochen Schiller," **Mobile Communication**" , 2nd Edition, Pearson,2003.
3. Lee, **" Mobile Cellular Telecommunications**" McGRAW- WILL, 2nd Edition.

Sample Assignments:

Students are required to write assignments on different networking protocols. Student is also expected to design networking protocols/algorithms using C/C++/Java programming. Here is the indicative list but not limited to the topic give below:

Problems like Carrier Sense Multiple Access with Collision Detection, Carrier Sense Multiple Access with Collision Avoidance, Routing protocols, Congestion control algorithms, traffic control methods, Security algorithms, flow control methods, connection management, channel assignment techniques, handoff techniques.

CSL-635: Theory of Computation
(Programme Elective-I)

General Course Information:

Course Code: CSL635 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge of set theory, logic & predicates, mathematical induction.

About the Course and its Objectives & Outcomes:

The objectives of this course are to:

- Provide the basic knowledge to the students to understand the relationship b/w the automata and regular expressions.
- make aware the students regarding the role of context free grammar, simplification of grammar and parsing.

By the end of the course a student is expected to:

- be capable to understand the theoretical development of computer science.
- be able to distinguish between different types of grammars.
- be able to understand the abstract model of computer with the help of Turing machine.

Syllabus

Unit - 1

Theory of Computation: Formal Language, Need for formal computational models, Non-computational problems, diagonal argument and Russel's paradox. Deterministic Finite Automaton (DFA), Non-deterministic Finite Automaton (NFA), Regular Languages and regular sets, Equivalence of DFA and NFA, Kleen's characterization theory for sets accepted by finite automata, Minimizing the number of states of a DFA, Non-regular languages and pumping lemma.

Unit - 2

Pushdown Automaton (PDA), Deterministic Pushdown Automaton (DPDA), Non-equivalence of PDA and DPDA. Linear Bounded Automata (LBA): Power of LBA, Closure properties.

Unit - 3

Context Free Grammars: Greibach Normal Form (GNF) and Chomsky Normal Form (CNF), Ambiguity, Parse Tree Representation of Derivations, Equivalence of PDA's and CFG's, Parsing techniques for parsing of general CFG's-Early's, Cook-Kassami-Younger (CKY), and Tomita's parsing.

Unit - 4

Turing Machine (TM), One tape, multitape, the notion of time and space complexity in terms of TM, construction of TM for simple problems, Computational complexity. Chomsky Hierarchy of languages: Recursive and recursive-enumerable languages.

T**ext and Reference Books:**

- Lewis, H.R. & Papadimitrious, C.H. Elements of the theory of computation. PHI.
- Salomma, A.K. Formal languages. Academic press.
- Hopcroft, J. E. & Ullman, J. D. Formal languages and their relation to Automata. Addison-Wiley.
- E. V. Krishnamurthy, Introductory theory of computer science. East-West press Pvt. Ltd.
- Zoha Mauna, Mathematical theory of computation, Wiley inter-science.
- John Minsky, Theory of computation, PHI.
- Greenberg M., Introduction to Automata Theory, Addison Wesley .

Sample Assignments:

Every student is required to do at least one problem assignment by applying the concepts of Theory of Computation given by the associated teacher. For reference students can follow the unsolved exercises given at the end of each chapter in their text and reference books.

CSL-635: Computer Architecture and Parallel Processing

(Programme Elective-I)

General Course Information:

Course Code: CSL635 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge of computer networks, layers of OSI reference model, protocols at different layers of OSI reference model.

About the Course and its Objectives & Outcomes:

The objectives of this course are to make students

- Learn about the evolution of computer systems, various attributes on which performance of system is measured
- Understand various level and types of parallelism
- Study detailed memory architecture including cache memory and interleaved memory
- Classification of computers on their ability to perform multiprocessing and various trends towards parallel processing

By the end of the course a student is expected to:

- Relate the knowledge of performance metrics to find the performance of systems.
- Use the knowledge of micro programming to design hardware efficiently.
- Apply knowledge of parallelism to process level, thread level and instructions to maximize performance of hardware.
- Application of memory architecture to design efficient system
- Application of shared memory architecture to application like distributed computing and cloud computing

Syllabus

Unit - 1

Fundamental: Computational model. Evolution of computer architecture, process, thread, concurrent and parallel execution, types and levels of parallelism, classifications of parallel architectures. Relationships between languages and parallel architectures. Architecture And Machines: Some definition and terms, interpretation and microprogramming

Unit - 2

Instruction-Level-Parallel Processors : Dependencies between instruction. Principles of Pipelining. Pipelined instruction processing. Synchronous & asynchronous pipeline. Linear Pipeline-clocking & timing control, speedup, efficiency & throughput. Non linear pipeline- reservation table, latency analysis, collision free scheduling, internal data forwarding. Superscalar pipeline design- structure, data dependencies, pipeline stalling, in-order issue, out of order issue.

Unit - 3

Memory Hierarchy Technology : inclusion, coherence and locality, virtual memory models, TLB, paging and segmentation, memory replacement policies, cache addressing models, cache performance issues, interleaved memory organization.

Unit - 4

Shared-Memory MIMD architectures: Dynamic interconnection networks- shared path, switching networks-crossbar & multistage networks. Cache coherence problem, Hardware based cache coherence protocol-Snoopy cache protocol, directory scheme, scalable coherent interface, hierarchical cache coherence protocol.

Text and Reference Books:

- Sima, D. et al., Advanced Computer Architecture, Addison Wesley.
- Hwang, Kai, Advanced Computer Architecture, McGraw Hill, International Ed.
- Pipelined and Parallel processor design by Michael J. Fiynn, Narosa.
- Hwang Kai, Briggs Faye A., Computer Architecture and Parallel Processing, McGraw Hill, International Ed.
- Kain, Richard Y., Advanced Computer Architecture, PHI.

CSP-631: Software Laboratory –V
Oracle and SQL Programming
(Based on CSL-631)

General Course Information:

Course Code: CSP-731 *Course Credits: 3 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

Student should have sound knowledge of database systems and their entities like tuple, relation, join operation, select operation, project operation etc. Knowledge of MS- Access will be added advantage.

The objectives of this lab. course are to:

- To develop proficiency in execution of commands of the different types of database languages, and
- To teach the database design, query and PL/SQL.

By the end of the course a student is expected to be able:

- Create database objects
- Modify database objects
- Manipulate the data
- Retrieving the data from the database server
- Performing database operations in a procedural manner using PL/SQL.
- Design and Develop applications like banking, reservation system, etc.,

Syllabus

Create a database and write the programs to carry out the following operation:

- Create a database
- Alter the structure of an existing database
- Add a record in the database
- Delete a record in the database
- Modify the record in the database
- Generate queries
- Generate the report
- List all the records of database in ascending / descending order
- Execute various set operations such as Union, Subtraction and Intersection
- Execute of Aggregate functions as Sum, Count, Avg, Max, Min etc.
- Implement various Outer Join operations.

Text and References Books:

- Database System Concepts by A. Silberschatz, H. F. Korth and S. Sudarshan, 3rd edition, McGraw-Hill, International Edition.
- Bayross, oracle Teach Your Self SQL/PLSQL using oracle 8i and 9i with SQLJ, BPB.
- An Introduction to database Systems C. J. Date, 7th edition, Low Priced edition.
- Abbey, oracle 8i-A beginners guide, TMH.
- A Guide to SQL Standard, Date, C. and Darwen, H. 3rd edition, Reading, MA:, Addison-Wesley.

CSP-632: Software Laboratory –VI
Programming in VB
(Based on CSL-632)

General Course Information:

Course Code: CSP-632 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

A windows system with Visual Studio and MSDN library.

The objectives of this lab. course are develop skills to:

- Create VB interfaces and programs.

By the end of the course a student is expected to be able:

- Find and resolve a common data involving parameter passing.
- Convert a serial application to a threaded version by encapsulating computations into a function that is executed by threads, create applications using Visual Basic.

A student will be required to write 10 applications using Visual Basic.

CSP-633: Seminar

General Course Information:

Course Code: CSP-633 *Course Credits: 1 Type: Compulsory Contact Hours: 2 hours/week Mode: Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 100)** An internal examination is conducted by the assigned teacher on regular basis in lab and based evaluation is done by the teacher.

The objectives of this Seminar course are to:

- Understanding of the basics of the application of the various models of verbal and non-verbal communication in the social and professional sphere
- Develop the following skills in the students-
  - Communication Skills
  - Presentation Skills
  - Active Listening etc.

By the end of the course a student is expected to be able:

- To understanding the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
- To establish a repo with the audience.
- To present his/her ideas clearly and confidently.
- To address the queries from the audience.

General Guidelines:

- Students are required to prepare a presentation.
- Presentation should be on any FOSS (Free and Open Source Software).
- Students are required to submit hard and soft copy of the presentation to the concerned teacher.

CSL-641: Computer Graphics and Multimedia

General Course Information:

Course Code: CSL641 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Programming skills in C/C++ and Data Structures.

About the Course and its Objectives & Outcomes:

The objectives of this course are to:

- Study the graphics techniques and algorithms.
- Study the multimedia concepts and various I/O technologies
- Enable the students to develop their creativity

By the end of the course a student is expected to have:

- Familiarity of the principles of graphical user interfaces, system support for graphical, window-based systems, and introductory concepts in computer graphics and multimedia processing.
- Ease to use techniques which will allow them to create user-friendly interfaces for computer applications.

Syllabus

Unit - 1

Introduction: Survey of computer Graphics and its applications; Interactive and passive graphics; Introduction to GKS primitives; display processors;
Graphic Devices : Display systems-refresh CRTs, raster scan and random scan monitors, Grey shades, Interlacing, beam penetration shadow mask monitors, look up tables, plasma panel, LED and LCD monitors, VGA and SVGA resolutions; Hard copy Devices-printers, plotters; Interactive Input Devices-mouse, digitizing tablet, light pen, touch panels, image scanners, voice systems, joy stick, track ball.

Unit - 2

Drawing Geometry : Coordinate system; resolution; use of homogeneous coordinate system; scan conversion: symmetrical DDA, simple DDA, Bresenhams line drawing algorithm, Circle drawing using DDA and polar coordinates, Bresenhams circle drawing algorithm, generation of ellipse.

Unit - 3

2-D Transformations : Translation; rotation; scaling; mirror reflection; shearing; zooming; panning; input techniques-pointing, positioning, rubber band methods and dragging; tweening.
Graphic operations : Clipping-line clipping using Sutherland-Cohen and midpoint sub-division algorithm, polygon clipping; window and viewport; windowing transformation; Filling-stack based fill algorithm, scan-line seed fill algorithm

Unit - 4

3-D Graphics : 3D modeling of objects; 3D display techniques; coordinate system; 3D transformation matrices for translation, scaling and rotation; parallel projection; perspective projection; Hidden-surface removal - Z-buffer, back face, scan-line, depth-sorting, area subdivision; Shading - modeling light intensities, gouraud shading, phong shading.
Multimedia: Concepts of Hypertext/Hypermedia; multimedia applications; multimedia authoring; multimedia hardware; images; bitmaps; windows paint brush.

Text and Reference Books:

- Computer Graphics - Donald Hearn, M.Pauline Baker, PHI
- Computer Graphics-Pradeep K.Bhatia, 3rd Edition, IK International
- Principles of Interactive Computer Graphics - Newman &Sproull, McGraw Hill
- Multimedia Systems - John F. Koegel Buford, Addison Wesley
- Computer Graphics Principles & Practice - Foley etc. Addison Wesley
- Procedural elements of Computer Graphics – Rogers McGraw Hill
- Fundamentals of Computer Graphics and Multimedia - D.P. Mukherjee, PHI

CSL-642: Data Warehousing and Data Mining

General Course Information:

Course Code: CSL642 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students should have knowledge of information theory, database systems and its various types

About the Course and its Objectives & Outcomes:

The course will be taught with a database as well as machine learning perspectives. The objective of the course is to provide a comprehensive understanding of data pre-processing, data mining tasks and evaluation of results obtained out of data mining processes. The course will enable students to develop understanding of the strength and limitations of popular data mining techniques.

By the end of the course a student is expected to:

- Have in-depth knowledge and understanding of data mining process and tasks
- Design and compare data mining techniques.
- Have understanding of different kinds of data and its handling
- Implement data mining techniques using appropriate tools and interpret results.

Syllabus

Unit - 1

Data Mining: Introduction, Kind of data to be mined, Data Mining Functionalities, Technologies used in Data Mining, Applications of data Mining, Major Issues in Data Mining.
Data Warehouse: Introduction, Data Warehouse and Database Systems, Data Warehouse Architecture, Data Warehouse Models, Data Cube and OLAP, Multidimensional data Model, Concept Hierarchies, OLAP operations, Data Warehouse Implementation.

Unit- 2

Data Pre-Processing: Introduction, Need of preprocessing, Data Objects and Attribute type, Statistical description of data, Data Visualization, Measuring similarity and dissimilarity of data, data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

Unit - 3

Mining Frequent Patterns, Associations and Correlations: Introduction, Frequent Itemset Mining using Apriori Algorithm and generate Association Rule. Improving efficiency of Apriori, Pattern Growth Approach for mining Frequent Itemsets, Pattern evaluation

Unit - 4

Classification: Introduction, Classification using Decision Tree Induction, Bayesian Classification Methods, Rule Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy.
Cluster Analysis: Introduction, Basic Clustering Methods, Partitioning Methods, Hierarchical Methods, Evaluation of Clustering.

Text and Reference Books:

- Jiawei Han and Micheline Kamber, "Data Mining Concepts And Techniques", Third Edition, Elsevier.
- AlexBerson And Stephen J. Smith, "Data Warehousing, Data Mining & Olap", Tata Mcgraw – Hill Edition, Tenth Reprint.
- Pang-Ning Tan, Michael Steinbach AndVipin Kumar, "Introduction To Data Mining", Pearson Education.
- K.P. Soman, Shyam Diwakar and V. Ajay ", Insight Into Data Mining Theory And Practice", Easter Economy Edition, Prentice Hall Of India.
- G. K. Gupta, "Introduction To Data Mining With Case Studies", Easter Economy Edition, Prentice Hall Of India.
- Daniel T. Larose, "Data Mining Methods And Models", Wile-Interscience
- W.H. Inmon "Building The Data Warehouse", 3rd, Wiley India

CSL-643: Linux and Shell Programming

General Course Information:

Course Code: CSL643 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected to be proficient in programming in a standard programming language like C.

About the Course and its Objectives & Outcomes:

The objective of study of Linux and Shell programming is to introduce the various kinds of shells, their login and logout methods, utilities and simple commands of linux, email clients. The syntax of shell programming through control constructs and loops, creation of functions is revealed in detail. Inode structure of file system and directory structure and its difference from windows system is an important comparison. Regular expressions and Filters are a unique feature of Linux operating systems. An introduction to editors, Awk and Perl is given. C compiler is inbuilt in linux, commands to execute a c program is to be studied along with Linkers and loaders as part of compiler. Process management and Linux I/O are major functions of this operating system.

By the end of the course a student is expected to:

A student should be able to login and logout of the linux system, create file system using mkfs, create directory structure, have an elementary knowledge about shell programming constructs and how to apply those constructs in various environments, create awk and perl scripts, make use of regular expressions in perl scripts, write subroutines, make use of C library, create static and dynamic libraries, use debugger gdb, schedule jobs using at and batch, write signal handlers, have an elementary knowledge of Linux I/O.

Syllabus

Unit - 1

Linux Startup User accounts, accessing Linux - starting and shutting processes, Logging in and Logging out, Command line, simple commands, Linux Utilities, Shell as an interface to user, user to user communication, E-mail

Unit - 2

Shell Programming: Unix file system: Linux/Unix files, inodes and structure and file system related commands, Shell as command processor, shell variables, creating command substitution, scripts, functions, conditionals, loops, customizing environment. Regular Expressions and Filters: Introducing regular expressions patterns, syntax, character classes, quantifiers, introduction to egrep, sed, programming with awk and perl.

Unit - 3

The C Environment: The C compiler, vi editor, compiler options, managing projects, memory management, use of makefiles, dependency calculations, memory management - dynamic and static memory, building and using static and dynamic libraries, using ldd, soname, dynamic loader, debugging with gdb.

Unit - 4

Processes in Linux: Processes, starting and stopping processes, initialization Processes, rc and init files, job control - at, batch, cron, time, network files, security, privileges, authentication, Password administration, archiving, Signals and signal handlers, Linux I/O system.

Text and Reference Books:

- John Goerzen: Linux Programming Bible, IDG Books, New Delhi.
- Sumitabha Das: Your Unix - The Ultimate Guide, TMH.
- Aho, Hopcroft and Ullman: The Design and Analysis of Computer Algorithms, Addison Wesley.

CSL-644: Microprocessors and Interfaces
(Programme Elective-II)

General Course Information:

Course Code: CSL644 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge of computer networks, layers of OSI reference model, protocols at different layers of OSI reference model.

About the Course and its Objectives & Outcomes:

The objectives of this course are to develop the

- Understanding of architecture of microprocessors
- Understanding of memory, i/o and peripheral interfacing

By the end of the course a student is expected to be able to:

- Explain the architecture of 8/16/32-bit microprocessors.
- Design the microprocessor based system.

Syllabus

Unit - 1

Introduction to Microprocessor and Microcomputer: Historical background, modern microprocessors and microcomputers, architecture of pentium processor, real and protected modes of operations, addressing modes and instruction set of pentium processor, concept of RISC and CISC microprocessors.

Unit - 2

Memory Interface: Memory devices, address decoding, 8/16/32/64 - bit memory interfaces.
Input-Output Interfaces: Introduction to I/O interfaces, I/O mapped I/O and memory mapped I/O, basic input interface and basic output interface, I/O port address decoding, 8/16/32 - bit wide I/O ports, 82C55 PPI.

Unit - 3

Interrupt Structure : Basic interrupt processing, interrupt instructions of pentium, operations of real and protected mode interrupts, 8259 PIC and its programming, expanding interrupt structure by cascading 8259's.

Unit - 4

Direct Memory Access: DMA data transfer and basic DMA operations, 8237 DMA controller, its programming.
Bus Interface : The 8/16 - bit ISA bus and its interfacing with input & output ports, EISA 32 - bit bus and its interfacing, VESA and VL busses, PCI and PCMCIA busses.

Text and Reference Books:

- The Intel Microprocessors : Architecture, Programming, and Interface. By Berry B. Brey (PHI).
- Microcomputer Systems : Architecture, Programming, and Design. By Liu and Gibson (PHI).
- Microprocessors By DV Hall.

CSL-644: Software Project Management
(Programme Elective-II 4th)

General Course Information:

Course Code: CSL644 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Basic knowledge of Databases, Preliminary knowledge of Software Engineering

About the Course Objectives & Outcomes:

The objectives of this course are to

- To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals.

By the end of the course a student is expected to:

- Match organizational needs to the most effective software development model
- Understand the basic concepts and issues of software project management
- Effectively planning the software projects
- Implement the project plans through managing people, communications and change
- Conduct activities necessary to successfully complete and close the software projects
- Develop the skills for tracking and controlling software deliverables
- Create project plans that address real-world management challenges

Syllabus

Unit - 1

Introduction to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.
Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

Unit-2

Project Evaluation & Estimation: Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques. Selection of an appropriate project report; Choosing technologies, choice of process model, rapid application development, water fall model, V process model, spiral model. Albrecht function point analysis.
Activity planning: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, shortening project, precedence networks.

Unit - 3

Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values.
Resource allocation: Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence.

Unit - 4

Managing contracts and people: Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises..
Software quality: Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, external standards, techniques to help enhance software quality.

Text and Reference Books:

- Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, TMH
- Software Project Management, Walker Royce, Addison Wesley
- Software Project Management in Practice, Pankaj Jalote, Pearson
- Software Project Management, Sanjay Mohapatra, Cengage Learning
- Managing Global software Projects, Ramesh, TMH.

CSL-644: Management Information Systems
(Programme Elective-II)

General Course Information:

Course Code: CSL644 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Knowledge of computer terminologies and programming language(s) will help in understanding the given concepts very easily.

About the Course Objectives & Outcomes:

The objectives of this course are to

- Study of people, technology, organizations, and the relationships among them.
- Recognize the basic needs of an organization required to design and develop an efficient and effective MIS.
- Understand various control and security issues to be taken care at the time of development of an MIS
- Learn various tools and methods required to develop an effective and efficient MIS.

By the end of the course a student is expected to:

- Match organizational needs to the most effective software development model
- Understand the basic concepts and issues of software project management
- Effectively planning the software projects
- Implement the project plans through managing people, communications and change
- Conduct activities necessary to successfully complete and close the software projects
- Develop the skills for tracking and controlling software deliverables
- Create project plans that address real-world management challenges

Syllabus

Unit - 1

Background Meaning, Nature, Need, Role, Importance, Evolution of management through information system; Relatedness of MIS with management process. Management functions and decision making. Concept of balance MIS effectiveness and efficiency criteria.

Unit - 2

Development of Management Information System: Introduction, Information system planning, Motivational forces behind development of information system, Principles for information system development, SDLC for MIS development process.

Unit - 3

Development of MIS: Methodology and Tools techniques for systematic identification, implementation, evaluation, and maintenance of MIS.
Control and Security Issues in Management Information Systems: Control, Why need to Control MIS, Types of Control, Audit in MIS, Security Hazards, Security Techniques.

Unit - 4

Case studies: To introduce business problems and to discuss various stages for understanding the systems development process.

Text and Reference Books:

- Management Information Systems: A Computer oriented approach for business applications by Dharminder Kumar, Sangeeta Gupta, Excel books, 2006, New Delhi.
- James A.O'Brien, Management Information Systems.
- Kenneth C. Laudon, Jane P. Laudon, Ahmed Elragal, Management Information Systems: Managing The Digital Firm, Pearson.
- S. Sadagopan, Management Information Systems, PHI Learning Pvt. Ltd.; Second edition (2014)
- Avdhesh Gupta, Anurag Malik, Management Information Systems: A Computerized approach for Managerial Aspects;FireWall Media
- IndrajitChatterjee,Management Information Systems, PHI Learning Pvt. Ltd.;(2010)
- Davendranath G. Jha, Computer Concepts And Management Information Systems, PHI Learning Pvt. Ltd.;(2013)

CSL-644: Principles of Programming Languages
(Programme Elective-II)

General Course Information:

Course Code: CSL644 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Knowledge of computer terminologies and programming language(s) will help in understanding the given concepts very easily.

About the Course Objectives & Outcomes:

The objectives of this course are to make the student

- Understand the differences between data and control.
- Understand and appreciate the different paradigms of programming languages.
- Understand data typing and control structures.

By the end of the course a student is expected to have the:

- Ability to apply principles of language design towards requirements.
- Ability to write the formal syntax for a specification.

Syllabus

Unit - 1

Preliminaries - Role of programming languages, characteristics of a good programming languages, Introduction to various programming paradigms: Procedural, object-oriented, logic and functional programming, Parallel Programming, Concurrent Programming. Language criteria, language design trade-offs, influences on language design, bindings, type checking, and scopes, variables and data types: primitive data types, variables, structured data types. Abstraction: data abstraction, control abstraction, procedural abstraction.

Unit - 2

Formal languages and automata - The Chomsky hierarchy of formal languages, regular grammars, regular expressions, finite automata, Context-free grammars: pushdown automata, ambiguous grammars. Imperative programming - structured programming, procedure activations: parameter passing methods, scope rules, Expression Evaluation and activation records.

Unit - 3

Object oriented programming - messages, methods and encapsulation, classes and polymorphism, Objects Naming, Bindings, Memory management, inheritance, template and object orientation, design issues for object oriented languages. Functional programming - Features of functional languages, implementing functional languages, applications of functional languages. Storage Management: Elements Requiring Storage, Programmer- and System - Controlled Storage, Static Storage Management, Heap Storage Management

Unit - 4

Program Testing and Debugging- Definition of Testing & Debugging; Difference between Testing and Debugging; Types of Program Errors; Testing a Program; Debugging a Program for Syntax Errors; Debugging a Program for Logic Errors, Concept of APIs/Libraries.

Logic programming- Formal logical systems, implementations and applications. Languages for databases - manipulating relational databases using SQL. Language constructs for parallel processing - the paradigm, multiple processes, synchronization of cooperating processes.

Text and Reference Books:

- Pratt E. Terrence & Zelkowitz V. Marvin, Programming Languages – Design & Implementation, Prentice Hall of India.
- Appleby Doris & Vande Kopple J. Julius, Programming languages-Paradigm and practice 2nd ed., Tata McGraw Hill
- Sebesta W. Robert, Concepts of programming languages 4th ed., Addison Wesley
- Sethi Ravi, Programming languages 2nd ed., Addison Wesley

CSL-644: Advanced Database Systems

(Programme Elective-II)

General Course Information:

Course Code: CSL 644 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Knowledge of the basic concepts of DBMS

About the Course and its Objectives & Outcomes:

The objectives of this course are to

- Understand the advanced concepts of database system.
- Be able to design efficient database with greater ease and maintain the database as well.

By the end of the course a student is expected to:

- Design and Develop efficient database to reduce time taken to retrieve the data.
- Use database in real world like web services for banking, universities and other sectors.

Syllabus

Unit - 1

Extended E-R Model: Subclasses, Superclasses and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization. Object-Oriented Data Model : Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods and Persistence, Type Hierarchies and Inheritance, Complex Objects, Polymorphism, Multiple Inheritance, Versions and Configurations. Object Relational Databases : Basic Concepts of Object-Relational Systems, Object-Relational features of Oracle, An Overview of SQL3, Object-Relational support in SQL3, Nested Relational Data Model.

Unit - 2

Further Normalization: Higher Normal Forms, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Forms, Domain-Key Normal Form.
Database System Architectures : Centralized Systems, Client-Server Systems, Server System Architecture, Parallel Systems, Distributed Systems.

Unit - 3

Distributed Databases and Client-Server Architecture: Distributed Database Concepts, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design, Types of Distributed Database Systems, Overview of Concurrency Control and recovery in Distributed Databases. An Overview of Client-Server Architecture, Distributed Databases in Oracle.

Unit - 4

Web Interfaces to Databases: Web Fundamentals, Databases and the Web, Web Servers and Sessions, Providing access to Database on WWW. The Oracle Web server. Performance Tuning, Performance Benchmarks.
Enhanced Data Models for Advanced Applications : An overview of Active Databases, Spatial Databases, Deductive Databases and Multimedia Databases.

Text and Reference Books:

- Elmasri & Navathe: Fundamentals of Database systems, 3rd Edition, Addison Wesley, New Delhi.
- Korth & Silberschatz : Database System Concept, 4th Edition McGraw Hill International Edition.
- Raghu Ramakrishnan& Johannes Gehrke: Database Management Systems, 2nd Edition, Mcgraw Hill International Edition.
- C.J.Date : An Introduction to Data bases Systems 7th Edition, Addison Wesley, New Delhi.
- Bipin C. Desai : An Introduction to Database System, Galgotia Publication, New Delhi
- Abbey, Abramson &Corey : Oracle 8i-A Beginner's Guide Tata McGraw Hill Publishing Company Ltd.
- Ivan Bayross : SQL, PL/SQL-The Program Language of ORACLE, BPB Publication, New Delhi.

CSL-645: .NET Using C#

(Programme Elective-III)

General Course Information:

Course Code: CSL645 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students must have familiarity and comfort with basic operating system functions such as file manipulation, understanding of the basics of structured programming, including concepts such as flow control, variables and parameters, and function calls

About the Course and its Objectives & Outcomes:

The objectives of this course are to make students

- Understand the .NET platform.
- Configure and use Visual Studio .NET.
- Write program in C#.
- Implement methods.
- Put into practice encapsulation, inheritance, and polymorphism in C#.
- Use C# within the .NET Framework.
- Use Microsoft ADO.NET to access and manipulate data in a database.
- Create feature-rich Windows-based applications.
- Create a Web application by using Web Forms.
- Use XML Web services in a C# application.
- Experiment with more advanced features of C#.

By the end of the course a student is expected to able to:

- Display proficiency in C# by building stand-alone applications in the .NET framework using C#.
- Create distributed data-driven applications using the .NET Framework, C#, SQL Server and ADO.NET.
- Create web-based distributed applications using C#, ASP.NET, SQL Server and ADO.NET.
- Utilize directx libraries in the .NET environment to implement 2D and 3D animations and game-related graphic displays and audio.
- Utilize XML in the .NET environment to create Web Service-based applications and components.

Syllabus

Unit - 1

.NET Framework: Origin of NET Technology, overview of .NET Framework , The .NET Framework Class Library , NET Programming Languages, NET types and NET Namespaces.
Understanding Common Language Runtime (CLR) – The Common Type Specification (CTS) – The Common Language Specifications (CLS) – Assemblies - .NET Base Classes – CLR Debugger.
Visual Studio NET: Familiarization with visual studio .NET IDE , Design Window, Code Window, Server , Explorer, Toolbox, Docking Windows, Properties Explorer, Solution Explorer, Object Browser, Dynamic Help, Task List Explorer, Features of VS.NET, Creating a Project, Add Reference, Build the Project, Debugging a Project. Developing C# Applications Using Visual Studio NET.

Unit - 2

Evolution of C#: Overview of C#, C# and .NET, similarities & differences from JAVA, Structure of C# program. Language features: Type system, Data Types, Identifiers, variables & constants, Flow Control and Iteration, Object-Oriented Programming in C# - Encapsulation, Inheritance , and Polymorphism, Object and Classes, Basics of C# Classes, Arrays and Strings, Boxing and Unboxing, – Exception Handling in C#, Garbage Collection, Files and Streams, Delegates and their usefulness and Events, Attributes, I/O in C# and Windows Applications.

Unit - 3

Architecture of ADO.NET : Database Connection, Connected and Disconnected Environment, Create Connection using ADO.NET Object Model, Connection Class, Command Class, Data Adapter Class, Dataset Class. Display data on data bound Controls and Data Grid. Database Accessing on web applications: Data Binding concept with web, creating data grid, Binding standard web server controls. Display data on web form using Data bound controls.

Unit – 4

Databases in C#: Database Connections, Data adapters and datasets class, Data Reader, Data binding with controls like Text Boxes, List Boxes, Data grid etc. Navigating data source, Data Grid View, Data form wizard, Connection Objects, Command Objects.
ASP.NET: Overview of ASP.NET framework, Understanding ASP.NET Controls, Applications Web servers, installation of IIS. Web forms, web form controls -server controls, client controls, web forms & HTML, Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box, etc. Running a web Application, creating a multiform web project.

Text and Reference Books:

- Francesco Balena, Programming Microsoft Visual Basic.NET
- Jefrey R. Shapiro, The Complete Reference -Visual Basic .NET
- Steven Holzner ,VB.NET, Black Book, Dreamtech
- C# Programming, Wrox publication
- Matt Telles,C# Programming, Black Book.
- Stephen C. Perry. AtulKahate, Essential of .NET and Related Technologies, Pearson Education

CSL-645: Compiler Construction
(Programme Elective III)

General Course Information:

Course Code: CSL645 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected have the basic knowledge of Discrete Mathematics, Theory of Computation.

About the Course and its Objectives & Outcomes:

The objectives of this course are to

- Introduce the major concept areas of language translation and compiler design.
- Enrich the knowledge in various phases of compiler ant its use, code optimization techniques, machine code generation, and use of symbol table.
- Provide practical programming skills necessary for constructing a compiler.
- Extend the knowledge of parser by parsing LL parser and LR parser.

By the end of the course a student is expected to:

- Apply the knowledge of LEX tool & YACC tool to develop a scanner & parser.
- Design & conduct experiments for Intermediate Code Generation in compiler.
- Design & implement a software system for backend of the compiler.
- Deal with different translators.
- Develop program to solve complex problems in compiler
- Learn the new code optimization techniques to improve the performance of a program in terms of speed & space.
- Acquire the knowledge of modern compiler & its features.
- Learn & use the new tools and technologies used for designing a compiler
- Use the knowledge of patterns, tokens & regular expressions for solving a problem in the field of DM.

Syllabus

Unit - 1

Introduction to Compilation: Compilers and phases of compilation, analysis-synthesis model of translation, compiler construction tools.
Lexical Analysis: Process of lexical analysis, finite state automata, DFA and NFA, recognition of regular expressions, LEX.

Unit - 2

Syntax Analysis: Process of syntax analysis, types of grammar, top-down and bottom-up parsing techniques, parser generator.
Overview of syntax directed translation scheme.

Unit - 3

Intermediate Code Generation: Intermediate languages, generating intermediate code for declarative statement, assignment statement, Boolean expression, and case statement.
Code Optimization: Introduction to code optimization, potential cases of code optimization, optimization of basic blocks, loops in flow graphs, code improving transformation.

Unit - 4

Code Generation : Issues in the design of a code generator, the target machine, dynamic storage management, translating basic blocks, a simple code generator, peephole optimization, directed acyclic graphs and basic blocks, code generation from directed acyclic graphs.

T**ext and Reference Books:**

- Compilers : Principles, Techniques & Tools, By Aho, Ullman, & Sethi (Addison Wesley)
- Principles of Compiler Design, By Aho & Ullman (Narosa Publications)
- Practice & Principles of Compiler Building with C, By Henk Alblas et al. (PHI)
- Principles of Compiler Design, By Trembley & Sorenson (McGraw Hill)
- (PHI)

CSL-645: Neural Networks
(Programme Elective III)

General Course Information:

Course Code: CSL645 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected have the basic knowledge of Discrete Mathematics, Linear Algebra (Matrix), Basic of Artificial Intelligence.

About the Course and its Objectives & Outcomes:

The objectives of this course are to

- Uunderstand the role of neural network and Artificial Intelligence in engineering.
- Provide knowledge of learning techniques in neural network.
- Provide knowledge of Single layer, Back propagation and Multi Layer network.

By the end of the course a student is expected to:

- Uunderstand the role of neural network and Artificial Intelligence in engineering.
- Feed-forward neural networks of increasing complexity, gradient descent learning and extension, learning and generalization theory.
- Be able to apply neural network to particular application, and to know what steps to take to improve performance.
- Deal with different types of neural network.
- Have knowledge of research literature on neural network.

Syllabus

Unit - 1

Fundamental of Neural Networks. Overview of Biological neurons, neuron concept, single layer neural network ,notation and representation of neural networks, training of ANNs.

Unit - 2

Single Layer Neural Network. Representation of preceptron and issues, perceptron learning and training, classification, Linearseperability, structure of Hopfield nets, training, application and stability
Backpropagation: Backpropagation training algorithm, application of back propagation, advance algorithms.

Unit - 3

Counter propagation networks. Kohonen network, Grossberg layer, application of counter propagation, Image classification.

Unit - 4

Multilayer, Neural Networks. BAM structure retrieving a stored association, Encoding the association, memory capacity, ART architecture, ART classification operation, cognitron and neocognitron.

Text and Reference Books:

1. Jock. M.Juroda, "Artificial Neural Systems".
2. Kevin Gurney,"Introduction to Neural Networks: (UCL Press).
3. Philip D. Wasserman,Neural Computing and Practice, ANZA Research Inc.

CSL-645: Security of Information Systems
(Programme Elective III)

General Course Information:

Course Code: CSL645 Course Credits: 4 Type: Elective Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected have the basic knowledge of Number theory, Complexity Theory, Basic programming skills for security problems

About the Course and its Objectives & Outcomes:

The fast growth of interconnections of computer systems and electronic gadgets has increased the dependence of organizations, on information stored and communicated. This has resulted in need to protect data and resources from disclosure to protect systems from network based attacks. This course is meant to provide a practical survey of principles and practice of cryptography and network security. Implementation projects are crucial for clear understanding of cryptography and network security. The projects are platform and language independent. This includes forming problems of number theory and probability theory, various forms of attack evaluation and vulnerabilities in various resources.

By the end of the course a student is expected to:

- Be able to apply Symmetric and Asymmetric Cryptographic Algorithms, Hashing functions, Digital Signatures, Key Management
- To have knowledge of the Intrusion Detection Systems, firewalls, wi-fi networks

Syllabus

Unit - 1

Cryptography- Overview of Information Security, Basic Concepts, Cryptosystems, Cryptoanalysis, Ciphers & Cipher modes, Symmetric Key Cryptography- DES, AES. Asymmetric Key Cryptography- RSA algorithm, Key management protocols,Diffie Hellman Algorithm. Digital Signature-Digital Signatures, Public Key Infrastructure.

Unit - 2

System Security - Program Security-Security problems in Coding, Malicious Logic, Protection.
Database Security-Access Controls, Security & Integrity Threats, Defense Mechanisms.
OS Security-Protection of System Resources, Models for OS security.
.Net Security-User based security, Code access security, Form authentication.

Unit - 3

Network & Internet Security - LAN Security-Threats, Authentication & access control, Secured communication Mechanisms (IPSec, Kerberos, Biometric, PKI), Secured Design for LAN. Firewall & IDS Firewall Techniques, Firewall Architecture, Types of IDS, IDS Tools.
Email & Transaction Security Mechanisms Privacy Enhanced Mail(PEM), S/MIME, SET protocol, Client-Server Security on web.

Unit - 4

Wireless Security - Wi-Fi & IEEE 802.11 Security -Protocol architecture, WEP, Access controls. Wireless Transport Layer- Security Transport Layer Security, SSL, IPSEC, WAP security. Bluetooth Security- Protocol architecture, Attacks, Security architecture.

T**ext and Reference Books:**

- "Security in Computing (Second Edition)", Charles P. Pfleeger, Prentic- Hall International, Inc.
- "Applied Cryptography Protocols, Algorithms, and Source Code in C (Second Edition)", Bruce Schneier, John Wiley & Sons, Inc.
- "Security Technologies for World Wide Web", Rolf Oppliger, Artech House:
- "Cryptography and Network security-Principles and Practices" Pearson Education, Ninth Indian Reprint.
- "Network Security: Private communication in Public World" Charlie Kaufman, Prentice-Hall International, Inc.

CSL-645: Digital Image Processing
(Programme Elective III)

General Course Information:

Course Code: CSL645 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objectives of this course are to

- Know the basics and theoretical foundation of Digital Image Processing Concepts
- Learn to implement algorithms for image analysis

By the end of the course a student is expected to:

- Describe image acquisition, sampling, quantization, enhancement and segmentation
- Design and implement algorithms for image processing

Syllabus

Unit - 1

Digital Image Fundamental: Introduction, Origin, Areas of Image Processing, Steps in Digital Image Processing, Component of Image Processing System, Element of Visual perception, Light & Electromagnetic spectrum, Image sensing and acquisition, Sampling & Quantization, Neighboring Pixel
Morphological Image Processing : Morphological Algorithms- Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening, Skeleton, Pruning, Extension to Gray Scale Images- Dilation, Erosion, Application of Gray Scale Morphology

Unit - 2

Image Enhancement, Restoration and Wavelets: Image Enhancement: Spatial Filtering, Fourier Transform & Frequency Domain, Homomorphic Filtering, Restoration: A Model of image Degradation/ Restoration Process, **Color Image Processing**: Color Processing : Color fundamentals, Color Model- RGB, CMY, CMYK, HSI, Color Transformation and Segmentation,

Unit - 3

Wavelets: Muti-resolution Image Processing, Wavelet Transformation in one & two dimensions, Fast Wavelet Transform, Wavelet packet.
Image Compression & Segmentation: Image Compression- Models, Error free compression, Lossy Compression, Image Compression Standards.

Unit - 4

Image Segmentation – Detection-Point, Line, Edge, Edge Linking & Boundary Detection- Local processing, Global Processing vis the Hough Transform and Graph Theoretic Technique. Thresholding, Region Base Segmentation, Segmentation by Morphological Watersheds

Representation, Descripition & Object Recognition: Description: Component of Decription, Boundary, Regional Descriptors and Relational Descriptors, Object Recognition: Pattern and Pattern Classes, Recognition based on Decision Theoretic Methods, Structural Methods

Text and Reference Books:

- Rafael C. Gonzalez , " Digital Image Processing " , Prentice Hall.
- William K Pratt, "Digital Image Processing " John Willey.
- MillmanSonka, Vaclav hlavac, " Image Processing Analysis and Machine Vision" Thompson Press.
- A.K. Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
- Chanda Dutta Magundar , "Digital Image Processing and Applications" , Prentice Hall of India.

CSP-641: Software Laboratory –VII
Graphics Programming in C/ C++
(Based on CSL-641)

General Course Information:

Course Code: CSP-641 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

Students are expected to have basic concepts (theoretical) of computer graphics as well as programming capability in C/C++.

The objectives of this lab. course are to:

- Learn the students how to represent and manipulate data using computer system.
- Learn the students how images are produced.
- Learn the students methods for digital synthesizing and manipulating visual content.

By the end of the course a student is expected to be able:

- To understand the need and development of the graphic applications.
- To understand the various concepts color generation, transformation of graphical images etc.

Students are given eight to ten laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

CSP-642: Software Laboratory –VIII
LINUX and Shell Programming in C/ C++
(Based on CSL-643)

General Course Information:

Course Code: CSP-642 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

Students are expected to have basic concepts (theoretical) of computer graphics as well as programming capability in C/C++.

The objectives of this lab. course are to:

- Teach students various Linux utilities and shell scripting, sed scripts, awk programming.

By the end of the course a student is expected to be able:

- To use and execute vi editor, Emacs editor, run general commands and utilities, use file system related commands
- To write basic shell scripts, use sed commands, write awk programs, use perl command line, write and execute C programs.

List of problems

- Use vi editor to create a file called myfile.txt which contains some text, correct typing errors during creation, save the file, map a function key to save the file.
- Use the appropriate command to determine your login shell, use the /etc/passw to verify the above result, use who command and redirect the result to a file called myfile1. Use the more command to see the contents of myfile1, Use the date and who commands in sequence (in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile2, Use the more command to check the contents of myfile2..
- Write a sed command that deletes the first character in each line in File, write a sedcommand that deletes the character before the last character in each line in a file, write a sed command that swaps the first and second words in each line in a file.
- Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.
- Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.
- Write a shell script that determines the period for which a specified user is working on the system.

Students are given eight to ten laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

CSP-643: Seminar

General Course Information:

Course Code: CSP-643 *Course Credits: 1 Type: Compulsory Contact Hours: 2 hours/week Mode: Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 100)** An internal examination is conducted by the assigned teacher on regular basis in lab and based evaluation is done by the teacher.

The objectives of this Seminar course are to:

- Understanding of the basics of the application of the various models of verbal and non-verbal communication in the social and professional sphere
- Develop the following skills in the students-
  - Communication Skills
  - Presentation Skills
  - Active Listening etc.

By the end of the course a student is expected to be able:

- To understanding the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
- To establish a repo with the audience.
- To present his/her ideas clearly and confidently.
- To address the queries from the audience.

General Guidelines:

- Students are required to prepare a presentation.
- Topic of presentation should be industry oriented. It should focus on ways of enhancing one's writing and communication skills to cope up with recent industry trends.
- Students are required to submit hard and soft copy of the presentation to the concerned teacher.

CSL-651: Java Programming and Internet Applications

General Course Information:

Course Code: CSL651 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Knowledge of Object Oriented programming(OOPs) concept, to have some knowledge of C language & Basic knowledge of network architecture.

About the Course and its Objectives & Outcomes:

The objective of this course are to understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. and to understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. It aims at enabling students to use the Java SDK environment to create, debug and run simple Java programs.

By the end of the course a student is expected to:

- Have the understanding of several internet applications.
- Be aware of the concept of OOPs as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
- Identify classes, objects, members of a class and the relationships among them needed for a specific problem.
- Create Java application programs using sound OOPs practices (e.g., interfaces and APIs) and
- Do proper program structuring (e.g., by using access control identifies, automatic documentation through comments, error exception handling)

Syllabus

Unit - 1

Internet Applications : Introduction to internet; E-Mail- Architecture & services, user agent, message format & transfer, SMTP; World Wide Web(WWW) - Domain Name System, The Client side, The Server side, Creating and locating information on the web, search engines, URL's, HTTP, FTP, Telnet; Web Browsers, Chat & Bulletin Board, USENET & NNTP (Network News Transfer Protocol).
JAVA and The Internet : The JAVA programming language and its characteristics; Java run- time environment; Java compiler; Java developers kit; running Java applications and Java applets.

Unit - 2

JAVA programming : Elements of Java: Data types, scalar data types, operators & expressions, control structures. Class, objects & methods, constructors, finalizer, visibility controls, array, string & vectors, inheritance, interfaces, packages multithreading, applet programming.

Unit - 3

Exception Handling- defining and throwing exceptions, creating your own exceptions.

Unit - 4

Input/Output: streams, byte and character stream, the class Printstream, data streams, String Tokenizer class, stream tokenizers.
Delegation Event Model. AWT classes, AWT controls, Layout managers & menus.

Text and Reference Books:

- Computer Networks and Internets, second edition - Douglas E. Comer, Addison-Wesley.
- Programming the Internet with Java, revised edition - Darrel Ince & Adam Freeman, Addison-Wesley.
- Programming with Java - E. Balaguruswami, Second Edition, TMH.
- The Complete Refernce Java 2, Fourth edition - Herbert Schildt (TMH).
- A Programmer's Guide to Java Certification, Mughal K.A., Rasmussen R.W., Addison-Wesley.

CSL-652: Software Testing and Quality Assurance

General Course Information:

Course Code: CSL652 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected to have knowledge in Software Engineering Life Cycle, General Software Engineering Practices and Procedures

About the Course and its Objectives & Outcomes:

The objectives of this course are to:

- Learn the concepts of software verification and validation
- Understand how to apply various techniques of software testing
- Use appropriate software testing tools and standards
- Learn the concepts of software quality and plan for quality software
- Enable the student to work as an individual, a team member or team leader

By the end of the course a student is expected to:

- Conduct effective and efficient inspections.
- Apply a wide variety of testing techniques in an effective and efficient manner.
- Demonstrate knowledge of key techniques, tools, and standards in software testing.
- Assess software and evaluate software quality.
- Design and implement comprehensive test plans.
- Work as a team leader/member of a software testing team.

Syllabus

Unit - 1

Introduction: What is software testing and why it is so hard? Error, Fault, Failure, Incident, Test Cases, Testing Process and its Methodology, Limitations of Testing.
Software Testing Strategies: Unit, Integration, System, Alpha and Beta Testing, Load and Stress Testing, Ticking Box Testing, Configuration and Compatibility Testing, Regression Testing.
Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.
Structural Testing: Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.
Reducing the number of test cases: Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing, Slice based testing
Object Oriented Testing: Issues in Object Oriented Testing, Class Testing, GUI Testing, Object Oriented Integration and System Testing.

Unit - 2

Testing Tools: Static Testing Tools, Dynamic Testing Tools, Characteristics of Modern Tools.
Software Testing: Meaning, scope and ; Functional and structural testing, Ticking Box testing; mutation testing, software testing strategies, alpha, Beta testing etc. Object Oriented Testing: Class Testing, GUI Testing, Object Oriented Integration and System Testing.

Unit - 3

Software Quality concepts: Meaning and scope, software quality factors, software quality metrics, relationship between quality factors and quality metrics, quality management system,
Concepts of Quality Control, Quality Assurance, Quality Management - Total Quality Management; Cost of Quality; QC tools, Business Process Re-engineering - Zero Defect, Six Sigma, Quality Function Deployment, Benchmarking, Statistical process control.
Software measurement: Fundamentals of measurement, Measurements in Software Engineering, Measurement of internal product attributes - size and structure, External product attributes - measurement of quality, Software quality metrics - Software Process, Project and Product Metrics, metrics for software maintenance.

Unit - 4

Quality assurance models: ISO-9000 Series and SEI-CMM standards of software quality assurance. People Capability Maturity Model, Capability Maturity Model Integration, Malcolm Baldrige Award,FCMM.
Software Quality Assurance related topics
Software Process - Definition and implementation; internal Auditing and Assessments; Software testing - Concepts, Tools, software reviews, formal technical reviews, Inspections & Walkthroughs; correctness proof, statistical quality assurance, clean room software engineering.

Text and Reference Books:

- Roger S. Pressman, Software Engineering – A Practitioner's Approach, Fifth Edition, McGraw-Hill International Edition, New Delhi.
- Boris Beizer, Black-Box Testing – Techniques for Functional Testing of Software and Systems, John Wiley & Sons Inc., New York.
- Yogesh Singh, Software Testing, Cambridge Press Book.
- Boris Beizer, Software System Testing and Quality Assurance, Van Nostrand Reinhold, New York.
- Boris Beizer, Software Testing Techniques, Second Volume, Second Edition, Van Nostrand Reinhold, New York.
- Aditya P Mathur, "Fundamentals of Software Testing", Pearson Education

CSL-653: Web Engineering

General Course Information:

Course Code: CSL653 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration:3hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:

Students are expected to have basic knowledge of HTML, XML, JSP and Web Designing.

About the Course and its Objectives & Outcomes:

The objectives of this course are to

- Learn HTML, XML and design various web pages.
- Learn JSP and its uses in web designing process with HTML.

By the end of the course a student is expected to:

- Become skilled at Web Designing Complete Process.
- Make Web Pages using HTML and XML.
- Use JSP with HTML in web design..
- Get proficient in using HTML and XML.

Syllabus

Unit - 1

Information Architecture The Role of Information Architect, Collaboration and Communication, Organizing information, Organizational challenges, Organizing Web Sites and Intranets, Creating Cohesive Organization Systems, Designing Navigation Systems, Types of navigation Systems, Integrated Navigation Elements, Remote Navigation Elements, Designing Elegant Navigation Systems, Searching your Web Site, Designing the Search Interface, Indexing the Right Stuff, To Search or Not To Search, Grouping Content, Conceptual Design; High-Level Architecture Blueprints, Architectural Page Mockups, Design Sketches.

Unit - 2

Dynamic HTML and Web Designing HTML Basic Concepts, Good Web Design, Process of Web Publishing, Phases of Web Site development, Structure of HTML documents, HTML Elements - Core attributes, Language attributes, Core Events, Block Level Events. Text Level Events, Linking Basics, Linking in HTML, Images and Anchors, Anchor Attributes, Image Maps, Semantic Linking Meta Information, Image Preliminaries, Image Download issues, Images as Buttons, Introduction to Layout: Backgrounds, Colors and Text, Fonts, Layout with Tables, Advanced Layout : Frames and layers, HTML and other media types. Audio Support in Browsers, Video Support, Other binary Formats. Style Sheets, Positioning with Style sheets. Basic Interactivity and HTML: FORMS, Forms Control, New and emerging Form Elements.

Unit - 3

CGI using PERL Introduction to CGI, Alternative Technologies, The Hypertext Transport Protocol, URLs, HTTP, Browser Requests, Server Responses, Proxies, Content Negotiation, the Common Gateway Interface, The CGI Environment, Environment Variables. CGI Output, Forms and CGI, Sending Data to the Server, Form Tags, Decoding Form Input, Architectural Guidelines, Coding Guidelines, Efficiency and Optimization.

Java Server Pages Basics, Integrating Scripts in JSPs, JSP Objects and Components, configuring and troubleshooting, JSP: Request and response objects, Retrieving the Contents of a an HTML form, Retrieving a Query String, Working with Beans. Cookies, Creating and Reading Cookies. Using Application Objects and Events.

Unit - 4

XML Relationship between HTML, SGML, and XML, Basic XML, Valid Documents. Ways to use XML, XML for Data Files, Embedding XML into HTML documents, Converting XML to HTML for DISPLAY, Displaying XML using CSS and XSL, Rewriting HTML as XML, The future of XML.

T**ext and Reference Books:**

1. Thomas A Powell, HTML-The Complete Reference, Tata McGraw Hill.
2. Scott Guelich, Shishir Gundavaram, Gunther Birzniek; CGI Programming with Perl 2/e. O'Reilly.
3. Doug Tidwell, James Snell, Pavel Kulchenko; Programming Web Services with SOAP, O'Reilly.
4. Pardi, XML in Action, Web Technology, PHI.
5. Yong, XML Step by Step, PHI.
6. Aaron Weiss, Rebecca Taply, Kim Daniels, Stuven Mulder, Jeff Kaneshki, Web Authoring Desk Reference, Techmedia Publications.

BME–700: Biomedical Instrumentation

(Open Elective)

General Course Information:

Course Code: BME 700 Course Credits: 3 Type: Open Elective Contact Hours: 3 hours/week Mode: Lectures Examination Duration: 3 hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objective of this course is

- To learn about the basics, design and operation of biomedical instruments, and their role in medical science and health sector.
- To encourage the students of various branches for their possible contribution in biomedical engineering.

By the end of the course:

- Learners are expected to get acquainted with the construction and operation of biomedical equipment and their significance in health care sector.
- Stimulation among the students to start research and development in biomedical instrumentation and engineering.

Syllabus

Unit - 1

Biomedical Instrumentation- Man-Instrument System, Origin of Biosignals, Classification of Biomedical Instruments, Performance Parameters of Instruments, Physiological Systems

Bio-Potential Electrodes- Electrode-Electrolyte Interface, Half-cells and Their Potentials, Biomedical Recording Electrodes, Equivalent circuit model of Electrode, Bioelectric Amplifiers

Physiological Sensors and Transducers- Classification and Characteristics, Transducers for Displacement, Position and Motion, Pressure and Temperature, Photoelectric Transducers, Pulse Sensors, Biosensors

Unit - 2

Biomedical Equipment and Measurements

Cardiovascular Measurements- Blood Pressure Measurement, Blood Flowmeters, Electrocardiograph (ECG), Vectorcardiography (VCG), Phonocardiograph (PCG)

Neuromuscular and Nervous Measurements- Electroencephalograph (EEG), Electromyography (EMG)

Sensory and Behavioral Measurements- Audiometer, Skin Resistance Measurement, Biofeedback Instrumentation

Respiratory System Measurements- Spirometry, Measurement of Functional Residual Volume

Unit - 3

Analytical Instruments- Blood Gas Analyzers, Blood-Cell Counters, Auto-Analyzers, Colorimeter, Spectrophotometer, Flame Photometer, Electrophoresis

Medical Imaging System- X-ray Machine and Digital Radiography, Computed Tomography (CT) Scan, Magnetic Resonance Imaging System, Ultrasonic Imaging System, Thermal Imaging System

Unit - 4

Therapeutic Equipment- Cardiac Pacemakers, Need and Types of Pacemakers, Defibrillation, Need and Types of Defibrillators, Need and Types of Diathermy, Hemodialysis, Dialyzer and Its Need, Ventilators and Their Types, Endoscopes

Patient Safety and Ethical Issues- Physiological Effects of Electricity, Shock Hazards, Safety Standards, Accident Prevention Methods, Biomedical Safety Standards and Ethical Issues

Text Books

1. Khanpur R.S. Handbook of Biomedical Instrumentation, TMH
2. Cormwell L., Biomedical Instrumentation & Measurements, PHI
3. John G Webster, Bioinstrumentation, John Wiley and Sons, New York
4. Enderle John, Blanchard Susan and Bronzino Joseph, Introduction to Biomedical Engineering, Academic Press (Elsevier)

ECE–700: Advancements in Communication Systems

(Open Elective)

General Course Information:

Course Code: ECE 700 Course Credits: 3 Type: Open Elective Contact Hours: 3 hours/week Mode: Lectures Examination Duration: 3 hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objective of this course is

- The objective of this course is to study about the advancement in communication systems.
- Study about the digital communication & basic concepts of mobile communication.
- Study of optical communication & multiplexing techniques.
- To understand basics of navigation devices like Radar, Sonar.

By the end of the course:

- Ability to understand about the advanced communication systems.
- Students get introduction about navigational techniques.
- Satellite is the core of modern communication. Students get the introduction about satellite by this subject.

Syllabus

Unit - 1

The essentials of a Communication system, Amplitude modulation, Phase modulation (PM) & frequency modulation (FM),Demodulation, ASK, FSK, BPSK, QPSK, Introduction to GSM, CDMA, Architecture of GSM,CDMA, Frequency Reuse concept, ISDN (Integrated Services digital Networks)

Unit - 2

Introduction to optical communication system: Electromagnetic spectrum used for optical communication, block diagram of optical communication system, Advantages of optical fiber communication, Optical fibers structures and their types, fiber characteristics, Basic principles of light propagation, Total internal reflection, Acceptance angle, Numerical aperture, Optical sources, Optical Detectors, Principles of optical detection, Optical Networks, why optical Networks? , SONET/SDH, WDM optical networks.

Unit - 3

Communication signal multiplexing, Time division multiplexing, Frequency division multiplexing, Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access

Unit - 4

Block Diagram and operation of RADAR, SONAR, Simple form of Radar Equation, Pulse Repetition frequency, VSAT(data broadband satellite), MSAT(Mobile Satellite Communication technique), Sarsat (Search & Rescue satellite) & LEOs (Lower earth orbit satellite), Satellite communication with respect to Fiber Optic Communication, LANDSAT, Defense satellite Beam Acquisition, Tracking & Positioning.

Text and Reference Books:

- Communication systems (4th edn.): Simon Haykins; John wiley& sons.
- Electronic Communication systems: Kennedy; TMH.
- Optical Fiber Communications: John M Senior; PHI.
- Wireless Communications: Theodore S. Rappaport; Pearsons.
- Introduction to Radar Systems: Merrill I. Skolnik, ; MGH
- Satellite Communication: D.C. Aggarwal; Khanna.

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ME–700: Computer Aided Design & Manufacturing
(Open Elective)

General Course Information:

Course Code: ME 700 Course Credits: 3 Type: Open Elective Contact Hours: 3 hours/week Mode: Lectures Examination Duration: 3 hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objective of this course is

- To understand the basic parametric fundamentals that are used to create and manipulate geometric models.
- To learn about the concepts of surface modeling and solid modeling.
- To implement CNC programs for milling and Turning machining operations,
- To create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system

By the end of the course:

- Students would learn about the concepts of surface modeling, physically based modeling and surface visualization.
- Students would be able Implement CNC programs for milling and turning machining operations

Syllabus

Unit - 1

Introduction: Introduction to CAD/CAM, Historical developments, Industrial look at CAD/CAM, Introduction to CIM; Basics of geometric and solid modeling, explicit, implicit, intrinsic and parametric equations, coordinate systems.
Transformations: Introduction, transformation of points and line, 2-D rotation, reflection, scaling and combined transformation, homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, orthographic and perspective projections, reconstruction of 3-D objects.

Unit - 2

Curves: Algebraic and geometric forms, tangents and normal, blending functions reparametrization, straight lines, conics, cubic splines, Bezier curves and B-spline curves.
Surfaces: Algebraic and geometric forms, tangents and normal, blending functions, reparametrization, sixteen point form, four curve form, plane surface, ruled surface, surface of revolution, tabulated cylinder, bi-cubic surface, Bezier surface, B-spline surface.
Solids: Solid models and representation scheme, boundary representation, constructive solid geometry, sweep representation, cell decomposition, spatial occupancy enumeration.

Unit - 3

Automation and Numerical Control: Introduction, fixed, programmable and flexible automation, types of NC systems, MCU and other components, NC manual part programming, coordinate systems, G & M codes, Part program for simple parts, computer assisted part programming.

Unit - 4

Group Technology: Part families, part classification and coding, production flow analysis, Machine cell design, Advantages of GT
Flexible Manufacturing Systems & Computer aided process planning: Introduction, FMS components, types of FMS, FMS layouts, planning for FMS, advantages and applications Conventional process planning, types of CAPP, Steps in variant process planning, planning for CAPP.

Text and Reference Books:

- CAD/ CAM by Groover and Zimmer, Prantice Hall.
- CAD/ CAM Theory and Practice by Zeid, McGraw Hill
- CAD/CAM (Principles, Practice & Manufacturing Management) by Chirs Mc Mohan & Jimmie Browne, Published by Addison- Wesley.
- Numerical Control and Computer Aided Manufacturing by Kundra, Rao & Tiwari, TMH.
- Automation, Production Systems and Computer Integrated Manufacturing, Groover M.P, Prentice Hall of India.

MTPT–700: Advanced Printing Technology
(Open Elective)

General Course Information:

Course Code: MTPT 700 Course Credits: 3 Type: Open Elective Contact Hours: 3 hours/week Mode: Lectures Examination Duration: 3 hours	Course Assessment Methods (internal: 30; external: 70) Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objective of this course is to impart the basis knowledge of different printing processes along with their role, importance and applications.

By the end of the course:

The learning outcome of this course is expected that after completion of this course the students will be having the detail knowledge of various printing processes and the recent development in this industry and they will implement their knowledge for print production operations.

Syllabus

Unit - 1

Historical development in Printing Technology. Recent trends in the field of printing and allied technologies.
Pre-Press, Press and Post press operations

Unit-2

Letterpress Printing Process; Characteristics, role, importance and applications.
Offset Printing Process; Characteristics, role, importance and applications.

Unit-3

Flexography Printing Process; Characteristics, role, importance and applications.
Gravure Printing Process; Characteristics, role, importance and applications.

Unit-4

Screen Printing Process; Characteristics, role, importance and applications.
Digital Printing Process; Characteristics, role, importance and applications.

Text and References Books:

- Sheet-Fed Offset Technology, By Sh. Anjan Kumar Baral
- Letterpress Printing, By C.S. Mishra
- On demand printing, By Havoed M Fenton, Frank J. Romao
- Printing Technology, By Adams Fox

CSP-651: Software Laboratory –IX
JAVA Programming
(Based on CSL-651)

General Course Information:

Course Code: CSP-651 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

Fundamentals of object oriented programming language.

The objectives of this lab course are to:

- Learn the students' step by step Java programming.
- Learn the students Java Virtual Machine specification

By the end of the course a student is expected to be able:

- To write code in Java programming language.
- To install and use Java Development Kit.

Students are given eight to ten laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

CSP-652: Software Laboratory –X
HTML/ CGI using PERL / JSP/ XML
(Based on CSL-653)

General Course Information:

Course Code: CSP-652 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 30; external: 70)** An internal evaluation is done by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:

Knowledge of HTML language

The objectives of this laboratory course are to:

- Make students expertise in HTML Language.
- Learn PERL/XML/JSP along with HTML Language.
- Understand various uses of HTML/CGI.

By the end of the course a student is expected to:

- Be able to develop the HTML programs.
- Describe the use of HTML/CGI and Get expertise in use of XML/JSP/PERL along with HTML/CGI.
- Be able to write code HTML/CGI using XML/JSP/PERL.

Students are given eight to ten laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. The assignments may include a mini project. Every student is required to prepare a file of laboratory experiments done.

Software and Tools to be learnt: Simple Notepad and PERL Language.

CSP-653: Seminar

General Course Information:

Course Code: CSP-653 *Course Credits: 1 Type: Compulsory Contact Hours: 2 hours/week Mode: Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 100)** An internal examination is conducted by the assigned teacher on regular basis in lab and based evaluation is done by the teacher.

The objectives of this Seminar course are to:

- Understanding of the basics of the application of the various models of verbal and non-verbal communication in the social and professional sphere
- Develop the following skills in the students-
  - Communication Skills
  - Presentation Skills
  - Active Listening etc.

By the end of the course a student is expected to be able:

- To understanding the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
- To establish a repo with the audience.
- To present his/her ideas clearly and confidently.
- To address the queries from the audience.

General Guidelines:

- Students are required to prepare a presentation.
- Topic of presentation should be in concern with their major project, i.e. project selection, execution report writing etc.
- Students are required to submit hard and soft copy of the presentation to the concerned teacher.