1st SEM.

Scheme and syllabus of (MCA/M.Sc.(CS)/PGDCA)

For Program code 15, 14, 26

Directorate of Distance Education
GJUS&T HISAR

The Syallbus of MCA/M.Sc.(CS)/PGDCA approved by the Committee of following constituted by Director (DE) :

1. Chairman CSE
2. Dr Jyoti, Assistant Professor CSE
3. Sh. Vinod (A.P) DDE

Submitted for further consideration and approval please

Vinod (A.P. DDE)

Plz. put up on file

S.I.

For Program code 15, 14, 26

SCHEME OF EXAMINATION
(MCA/M.Sc.(CS)/PGDCA)
Semester I

Paper No	Nomenclature of Paper	Assignments	External Marks	Max. Marks
CSL-611	Computer Fundamentals and Problem Solving Through C	30	70	100
CSL-612	Computer Organization	30	70	100
CSL-613	Discrete Mathematical Structures	30	70	100
CSL-614	Software Engineering	30	70	100
CSL-615	Computer Oriented Numerical and Statistical Methods using C	30	70	100
CSP-611	Software Laboratory –I Programming in C (Based on CSL-611)	—	100	100
CSP-612	Software Laboratory –II Numerical and Statistical Methods implementation in C (Based on CSL-615)	—	100	100
Total		150	550	700

(MCA/M.Sc.(CS)/PGDCA)
Semester –II

Paper No	Nomenclature of Paper	Assignments	External	Max. Marks
CSL-621	Data Structure and Computer Algorithms	30	70	100
CSL-622	Computer Networks	30	70	100
CSL-623	System Simulation	30	70	100
CSL-624	Computer Oriented Optimization Techniques	30	70	100
CSL-625	Object-Oriented Systems and C++	30	70	100
CSP-621	Software Laboratory –III Data Structure implemented in C/C++ (Based on CSL-621)	—	100	100
CSP-622	Software Laboratory –IV Programming in C++ (Based on CSL-625)	—	100	100
Total		150	550	700

CSL-611 Computer Fundamentals & Problem Solving Through C

General Course Information:

Course Code: CSL-611 Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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.
- YashwantKanetker, 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 Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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 Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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.

Text 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 Matheamatical 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 Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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 Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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 problemsolving. 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 courseonComputer 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).

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

General Course Information:

Course Code: CSP-611 Mode: Experimental Lab.	**Course Assessment Methods (External: 100)** The end semester practical examination is conducted by external examiner. 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 in consultation with concerned course coordinator of DDE.

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. The list of lab assignments will be uploaded on university DDE website. Every student is required to prepare a handwritten practical file of lab assignments as uploaded on website.

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

General Course Information:

Course Code: CSP-612 Mode: Experimental Lab.	**Course Assessment Methods (External: 100)** The end semester practical examination is conducted by external examiner. 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 in consultation with concerned course coordinator of DDE.

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. The list of lab assignments will be uploaded on university DDE website. Every student is required to prepare a handwritten practical file of lab assignments as uploaded on website.

CSL-621 Data Structures and Computer Algorithms

General Course Information:

Course Code: CSL621 Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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 Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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 sublayer - 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 Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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 andErlang 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.
- NarsinghDeo : "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** Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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 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 primar 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'sall 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.
- KantiSwarup, 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, KedarNath 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 Exam Duration: 3hours	**Course Assessment Methods (internal: 30; external: 70)** Two handwritten internal assessments each of 15 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 Modelling 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 ProgrammmingIn C++, Tata McGraw-Hill.
- Schildt, Herbert, C++ : The Complete Reference, Tata McGraw-Hill.

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

General Course Information:

Course Code: CSP-621 Mode: Experimental Lab.	**Course Assessment Methods (External: 100)** The end semester practical examination is conducted by external examiner. 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 in consultation with concerned course coordinator of DDE.

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. The list of lab assignments will be uploaded on university DDE website. Every student is required to prepare a handwritten practical file of lab assignments as uploaded on website.

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

General Course Information:

Course Code: CSP-622 Mode: Experimental Lab.	**Course Assessment Methods (External: 100)** The end semester practical examination is conducted by external examiner. 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 in consultation with concerned course coordinator of DDE.

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. The list of lab assignments will be uploaded on university DDE website. Every student is required to prepare a handwritten practical file of lab assignments as uploaded on website.