AMRITSAR GROUP OF COLLEGES

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SYLLABUS

B. Tech. (CSE): 3rd SEM

3rd Semester		AGCS-21301: MATHEMATICS AND STATISTICS			
			L	**T**	**P**
Internal Marks:	40		3	1	0
External Marks:	60				
Total Marks:	100		**Credits**		4

Course Outcomes: After studying the course, students will be able to:	
CO-1	Understand the concept of Fourier series and partial differential equations.
CO-2	Understand linear system of equations, algebraic and transcendental equations.
CO-3	Gain knowledge of differential equations and curve fitting.
CO-4	Gain knowledge about the basic concepts of statistics.
CO-5	Understand the concept of probability distribution.
CO-6	Understand the concept of sampling and analysing different testing methods to solve real world problems.

Part	**Content**	**CO**
I	**Fourier Series:** Applications of Fourier series for continuous and discontinuous functions in periodic form.	CO-1
	Partial Differential Equations: Formation of partial differential equations, solution of homogeneous partial differential equations with constant coefficients.	
II	**Algebraic and Transcendental Equations:** Bisection method, Regula-Falsi method and Newton-Raphson method. **Solution of Linear Systems of Equations:** Gauss-Elimination method, Gauss Jordan method, Gauss-Seidel method, Jacobi iteration method.	CO-2
	Differential Equations: Solution of initial values problems using Euler, modified Euler's method and Runge-Kutta (up to fourth order) methods. **Curve Fitting:** Fitting a straight line, parabola, hyperbola, exponential curve and geometric curve.	CO-3
III	**Basic Statistics:** Meaning, functions and limitations of statistics. **Measures of Central Tendency:** Types of average-arithmetic mean (simple and weighted), median, mode, moments, skewness and kurtosis. **Measures of Dispersion:** Range, quartile deviation, mean deviation, standard deviation and coefficient of variation. **Correlation and Regression:** Correlations-rank correlation, coefficient of correlation Regression analysis.	CO-4
IV	**Probability Distribution:** Binomial, Poisson and Normal distribution, evaluation of statistical parameters for these three distributions.	CO-5
	Sampling & Testing of Significance: Sampling, general concepts of hypothesis, testing a statistical hypothesis, distribution of means and variance, t-distribution, F-distribution, Chi-Square distribution	CO-6

References:
- Higher Engineering Mathematics, B.S. Grewal, Khanna Grewal.
- Advanced Engineering Mathematics, E. Kreyszig, Wiley Eastern.
- A Text Book on Engineering Mathematics, Bali N. P Luxmi Publishers.
- Research Methodology: Methods and Techniques, C.R. Kothari and Gaurav Garg, New Age

3rd Semester		AGCS-21302: DATA STRUCTURES			

			L	**T**	**P**
Internal Marks:	40		3	1	-
External Marks:	60				
Total Marks:	100		**Credits**		4

Course Outcomes: After studying the course, students will be able to:	
CO-1	Understand the concept of Dynamic memory management and complexity in algorithms.
CO-2	Implementation and usage of data structures on searching and sorting techniques.
CO-3	Usage of data structure linked list for implementation of stacks and queues for efficient memory management.
CO-4	Gain knowledge of tree data structure to organize the data.
CO-5	Apply graph data structure to solve computational problems.
CO-6	Understanding the hash function and using it for collision and its resolution.

Part	Content	CO
I	**Introduction:** Concept of data, data types, definition and brief description of various data structures, linear and non-linear data structures, operations on data structures, algorithm complexity, asymptotic notations with examples, calculating time and space complexity of an algorithm.	CO-1
	Arrays: Introduction to linear and multi-dimensional arrays and their representation, operations on arrays, row major and column major, sparse matrices and their storage. Searching & Sorting: Linear search and binary search techniques, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort.	CO-2
II	**Linked List:** Introduction to linear linked list, operations on linear linked list, header and circularlinked list, doubly linked list, operations on doubly linked list, applications of linked lists, comparing arrays with linked lists, advantages and disadvantages of linked lists. Stacks & Queues: Sequential and linked representations, operations on stacks, application of stacks such as evaluation of postfix expressions, conversion from infix to postfix representation,implementing recursive functions, sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, linked representation of a queue and operations on it, deque, priority queue, applications of queues.	CO-3
III	**Trees:** Introduction to tree, basic terminology, sequential and linked representation of a tree, treetraversal algorithms with problem sets, brief introduction to binary search trees with its operationslike searching, insertion, deletion, AVL tree, rotations in AVL tree, operations on AVL tree, B- tree, operations on B-tree, Heap, heap sort, min heap, max heap, operations on a heap.	CO-4
IV	**Graphs:** Basic terminology, representation of graph-adjacency matrix and adjacency list, traversal of a graph-breadth first search and depth first search, Floyd Wars hall's algorithm, Dijkstra's shortest path algorithm.	CO-5
	Hashing & Hash Tables: Introduction to hashing, hash functions, concept of collision, collision resolution techniques-open addressing and separate chaining, double hashing, rehashing.	CO-6

References:
• Data Structures, Seymour Lipschutz, Schaum's Outline Series, Tata McGraw Hill.
• Data Structures and Algorithms made easy, Narasimha Karamunchi by Career Monk.
• Data Structures using C and C++, Tenenbaum, Augenstein&Langsam, Prentice Hall of India.
• Data Structures & Algorithms Using C++, R. S. Salaria, Khanna Book Publishing.

3rd Semester	AGCS-21303: OBJECT-ORIENTED PROGRAMMING USING C++			

			L	T	P
Internal Marks:	40		3	0	0
External Marks:	60				
Total Marks:	100		Credits		3

Course Outcomes: After studying the course, students will be able to:

CO-1	Apply the various data types, operators and user-defined functions in program design.
CO-2	To understand the concept of object-oriented paradigm.
CO-3	To understand the concept of dynamic memory management techniques using pointers, constructors and destructors.
CO-4	To understand the concept of different types of inheritance.
CO-5	To understand the concept of polymorphism and overloading of operators.
CO-6	Analyse and explore various stream classes, I/O operations, exception handling and templates.

Part	Content	CO
I	**Basic Terminologies & Control Structures:** Introduction, applications, different compilers, features of object-oriented programming-abstraction, encapsulation, data-hiding, inheritance, overloading and polymorphism, concepts of an object and a class, class members and methods. **Tokens:** Keywords, identifiers, constants, operators, special characters and strings, data types, manipulators, concept of streams, input/output statements, control statements-selection (various if and switch statements), branch (break, continue and goto statements) and iterative control (for, while, do-while). **Functions:** Types of functions-standard & user-defined, advantages and disadvantages of using functions, call by value and call by reference, inline functions, difference between inline functions and macros, functions with default arguments, function overloading. **Array:** Definition and types, uses, advantages and disadvantages of using array, passing an array to a function, linear and multidimensional arrays. **Structures and Unions:** Defining a structure and a union, role of structures, self-referential structures, using unions for bit level field along with examples.	CO-1
	C++ Classes and Data Abstraction: Specifying a class, creating class objects, accessing class members, access specifiers, empty class, static data members and member functions, use of const keyword, friend functions, nested classes, container classes, difference between a class and structure.	CO-2
II	**Pointers and Dynamic Memory Management:** Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, void pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures. **Constructors and Destructors:** Definition of a constructor and a destructor, characteristics, need for constructors and destructors, types of constructors- default, parameterized and copy constructor, constructor overloading, dynamic constructors, destructors.	CO-3
III	**Inheritance:** Defining a class hierarchy, base and derived class construction, different forms of inheritance, access to the base class members, function overriding, virtual base class, order of execution of constructors and destructors.	CO-4
	Operator Overloading: Need of operator overloading, overloading unary and binary operators. **Virtual Functions and Polymorphism:** Static and dynamic binding, virtual functions, dynamic binding through virtual functions, virtual function call mechanism, pure virtual functions, abstract classes, implications of polymorphic use of classes, virtual destructors.	CO-5

IV	**Templates, File and Exception Handling:** Concept of templates, function templates, class templates with illustrative examples, file streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files, command line arguments, exception handling in C++.	CO-6

References:

- Object Oriented Programming in C++, Lafore R., Waite Group.
- Object Oriented Programming with C++, E. Balagurusamy, Tata McGraw Hill.
- Mastering Object-Oriented Programming with C++, R. S. Salaria, Salaria Publishing House.
- The C++ Programming Language, Bjarne Stroustrup, Addison Wesley.
- Problem solving with C++: The Object of Programming, Walter Savitch, Pearson Education.

3rd Semester		AGCS-21304: COMPUTER NETWORKS			
Internal Marks:	**40**		**L**	**T**	**P**
External Marks:	**60**		**3**	**0**	**0**
Total Marks:	**100**		**Credits**		**3**

Course Outcomes: After studying the course, students will be able to:	
CO-1	Understand the basic concepts of networks and functions of different layers of OSI & TCP/IP reference models.
CO-2	Understand the working of physical layer and various transmission media.
CO-3	Understand data flow control protocols & error control mechanism.
CO-4	Understand routing and congestion in network layer, routing algorithm and addressing.
CO-5	Understand the working of TCP, UDP and Session Management.
CO-6	Explore the various application layer protocols and issues related to network security.

Part	Content	CO
I	**Introduction to Computer Networks:** Data communication system and its components, protocols and standards, line configuration, topologies (Mesh, Star, Tree, Bus, Ring and Hybrid). **Transmission Mode:** Simplex and duplex, categories of computer networks: LAN, MAN, WAN, wireless and wired networks, broadcast and point to point networks. **Network Software:** Concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP Protocol Suite.	CO-1
	Physical Layer: Concept of analog & digital signal, frequency spectrum and bandwidth, bit interval and bit rate, sampling, Nyquist formula, Shannon formula. **Transmission Media and Impairments:** Twisted pair, coaxial cable, fiber optics, wireless transmission (radio, microwave, infrared), attenuation, distortion, noise.	CO-2
II	**Data Link Layer:** Design issues, framing, checksum, error detection and correction Codes (VRC, LRC, and CRC, hamming code). **Flow Control and Error Control:** Stop and wait, sliding window protocol, ARQ, Stop & Wait ARQ, Go-back-N ARQ, selective repeat ARQ. **Data link protocols and Medium Access Sub-Layer:** HDLC and PPP, static and dynamic channel allocation. **Random Access:** ALOHA, CSMA protocols, controlled access, polling, token passing, IEEE 802.3 frame format, Ethernet cabling, collision detection in 802.3, binary exponential back off algorithm, token bus, token ring.	CO-3
III	**Switching:** Circuit switching, message switching, packet switching & their comparisons. **Network Layer:** Network and Internetworking devices, repeaters, bridges, routers and gateways. **Routing Algorithms and Congestion Control:** distance vector and link state routing, design issues, IPv4 classful and classless addressing, ARP, RARP, ICMP, IGMP, subnetting, principles of congestion control, congestion prevention policies, leaky bucket and token bucket algorithms.	CO-4
	Transport Layer: Duties of transport layer, introduction to TCP/UDP protocols and their comparison. **Session Layer:** Session and Transport layer interaction, synchronization points, sessionprotocol data unit. **Network Security:** Introduction to network security, various security techniques, Benefits of security	CO-5

IV	**Presentation Layer:** Translation, encryption and decryption techniques, authentication, data compression. **Application Layer:** WWW, DNS, E-mail, Protocols-FTP, SMTP, TFTP, TELNET, DHCP, HTTP, HTTPs. **Network Security:** Introduction to network security, various security techniques, Benefits of security		CO-6

References:
- Computer Networks, Andrew S. Tanenbaum, Pearson Education.
- Data Communication & Networking, Behrouz A Forouzan, Tata McGraw Hill.
- Computer Networking, James F. Kurose and Keith W. Ross, Pearson Education.

3rd Semester	AGCS-21305: COMPUTER ARCHITECTURE			
Internal Marks:	**40**	**L**	**T**	**P**
External Marks:	**60**	**3**	**1**	**0**
Total Marks:	**100**	**Credits**		**4**

Course Outcomes: After studying the course, students will be able to:	
CO-1	Understand the basics of number system, conversions, concept of k-MAP and combinational circuits.
CO-2	Understand the concept of RTL, bus and memory transfer and the various micro-operations.
CO-3	Computer Organization, instruction formats and the design of control unit.
CO-4	Understand the working of central processing unit, RISC /CISC architecture and Input Output organization.
CO-5	Understand the concept of Input Output organization- DMA, CPU-IOP communication.
CO-6	Understand the concept of different types of memory with hardware, parallel processing and pipelining.

Part	Content	CO
I	**Number System:** Introduction to number system, conversions (binary, octal and hexadecimal),1's compliment & 2's compliment, binary addition and subtraction, Boolean algebra-logic operations, axioms and laws of Boolean algebra- complementation law, AND law, OR law, commutative law, associative law, distributive law, De Morgan's theorem, minimization of K-Map (two variables and three variables) sum of products (SOP) & product of sum (POS), combinational logic design-adders, subtractors and binary parallel adder, multiplexer, demultiplexer, introduction to flip flops, registers and counters.	CO-1
	Register Transfer and Micro operations: Register transfer language, register transfer, bus and memory transfer, arithmetic micro-operations, logic micro-operations, shift micro-operations, arithmetic logic shift unit.	CO-2
II	**Basic Computer Organisation and Design**: Instruction codes, stored program organization, direct and indirect address, basic computer registers, common bus system, computer instructions- instruction formats, instruction set. **Instruction Cycle:** Fetch & decode, determine the type of instruction, register reference instructions, memory reference instructions and its flowchart, timing and control, input/ output and interrupt with respect to 8085, control memory, design of control unit- micro programmed, hardwired and their comparative study.	CO-3
III	**Central Processing Unit:** Stack organization - register stack and memory stack, addressing modes- numerical example, program control with respect to 8085, RISC and CISC architecture. **Input-Output Organisation:** Peripheral devices, I/O Interface, asynchronous data transfer-strobe control, handshaking, modes of transfer-example of Programmed I/O, Interrupt-Initiated I/O, Priority interrupt -Daisy Chaining Priority, Interrupt Cycle.	CO-4
	Input-Output Organisation: Direct Memory Access (DMA)-DMA controller (architecture 8237A) and DMA transfer I/O processor-CPU-IOP communication.	CO-5
IV	**Memory Organisation & Advanced concepts of Computer Architecture:** Associative memory-hardware organization, cache memory-associative mapping, direct mapping, set-associative mapping, parallel processing, concept of pipeline, arithmetic pipeline, instruction pipeline(four-segment instruction pipeline), pipeline conflicts.	CO-6

References:
• Computer System Architecture, M. Morris Mano, Pearson Education. • Computer Organization and Architecture, William Stallings, Pearson Education. • Computer Architecture, David A Patterson, Pearson Education. • Computer Organization and Design, P. Pal Chaudhuri, Prentice Hall India.

Syllabus For B.Tech. CSE 2021 onwards

3rd Semester		AGCS-21306: DATA STRUCTURES LAB			
			L	**T**	**P**
Internal Marks:	30		0	0	2
External Marks:	20		0	0	2
Total Marks:	50		**Credits**		1

Course Outcomes: After studying the course, students will be able to:	
CO-1	Implement different sorting and searching algorithms.
CO-2	Perform different operations using arrays.
CO-3	Perform different operations using linked lists.
CO-4	Able to design & implement the stacks, queues and their applications.
CO-5	Perform basic operations on trees and graphs.
CO-6	Develop a project using various linear and non-linear data structures.

Part	Experiment	CO
A	Implementation of searching and sorting techniques using array.	CO-1
	Menu driven program that implements the following operations (using separate functions)on a linear array: • Insert a new element at end as well as at a given position. • Delete an element from a given whose value is given or whose position is given • To find the location of a given element. • To display the elements of the linear array.	CO-2
	Menu driven program that maintains a linear linked list whose elements are stored in an • ascending order and implement the following operations (using separate functions): • Insert a new element • Delete an existing element • Search an element • Display all the elements	CO-3
	Usage of Stack • Push and Pop operations. • Converting an arithmetic expression from infix notation to postfix notation • Evaluating an arithmetic expression in postfix notation • Recursion. Implementation of Insert and Delete operations in Queues.	CO-4
	Implementation of different traversals on a binary search tree and traversal of graphs.	CO-5
B	To develop a mini project based on usage of linear and non - linear data structures.	CO6

3rd Semester	AGCS-21307: OBJECT ORIENTED PROGRAMMING USING C++ LAB			

			L	T	P
Internal Marks:	30		**0**	**0**	**2**
External Marks:	20				
Total Marks:	50		**Credits**		**1**

Course Outcomes: After studying the course, students will be able to:	
CO-1	Understanding and applying various data types, operators, and conversions in program design.
CO-2	Apply the concepts of Classes &Objects, constructors and destructors.
CO-3	Able to design & implement various forms of inheritance.
CO-4	Apply & analyse operator overloading and runtime polymorphism.
CO-5	Usage of file handling to store and retrieve data and to explore exception handling.
CO-6	Developing an application using file handling.

Part	Experiment	CO
A	Use of control structures, functions, arrays and structures.	CO-1
	Implementation of pointers and classes & objects.	CO-2
	Implementation of constructors and destructors.	
	Usage of inheritance.	CO-3
	Usage of operator overloading and polymorphism.	CO-4
	Usage of typecasting, templates and file handling.	CO-5
B	To make a mini project that demonstrates a concept, based on the content of AGCS– 21307(OBJECT ORIENTED PROGRAMMING USING C++ LAB).	CO-6

3rd Semester		AGCS-21308: COMPUTER NETWORKS LAB			
Internal Marks:	30		**L**	**T**	**P**
External Marks:	20		0	0	2
Total Marks:	50		**Credits**		1

Course Outcomes: After studying the course, students will be able to:	
CO-1	Identify and visualize the various components used in implementation of Computer Network.
CO-2	Prepare and test the straight and cross cable.
CO-3	Study and analyze the various network topologies.
CO-4	Plan the subnet and assign the IP addresses in a network accordingly.
CO-5	Access and monitor the remote network.
CO-6	Usage of various network tools.

Part	Experiment	CO
A	1. Familiarization with networking components and devices: LAN adapters, Hubs, Switches, Routers.	CO-1
	2. Co-axial cable, UTP Cable, crimping tool, connectors etc. 3. Preparing straight and cross cables.	CO-2
	4. Implementation of various LAN topologies. 5. Configuration of TCP/IP protocols in windows.	CO-3
	6. Implementation of file and printer sharing. 7. Subnet planning and its implementation.	CO-4
	8.Remote access and monitoring. 9. Generating IP addresses range using subnet-mask calculator and implementation of Who-is Domain tools.	CO-5
B	To make a mini project that demonstrates a concept, based on the content of AGCS-21308 (COMPUTER NETWORKS LAB)	CO-6

3rd Semester	AGFE-21301: FUNCTIONAL ENGLISH– I

Internal Marks:	50		L	T	P
External Marks:	0		0	1	0
Total Marks:	50		Credits		1

Course Outcomes: After studying the course, students will be able to:	
CO-1	Self-Introduction to prepare students to face one to one interaction.
CO-2	Body Language detail to prepare students in non-verbal communication.
CO-3	Vocabulary based session to improve language proficiency of students.
CO-4	Basic Grammar to make students proficient in English correspondence.
CO-5	Book reading to improve reading skills of students.
CO-6	Formal/ Informal Letter writing to make students proficient in written correspondence.

Part	Content	CO
I	Components of Self Introduction, Exemplary Performances, Student Performances on Self Introduction along with resume.	CO-1 CO-2
II	This section includes Common Vocabulary and its usage. Synonyms and Antonyms as a part of vocabulary to be done.	CO-3
	This section includes editing, omission, gap filling, rearranging jumbled sentences to test knowledge of passive voice, reported speech, articles and the other determiners, modals, tense, etc. Basic Grammar such as Tenses, Voice, Narration shall be done.	CO-4
III	Connect The Dots by Rashmi Bansal shall be prescribed for honing reading skills and comprehension in depth.	CO-5
IV	Formal/ Informal Letter Writing, Basic Format, Example, Practice shall be done.	CO-6

References:
- www.Indiabix.com
- English Grammar by Wren and Martin
- www.freshersworld.com
- www.alison.com

3rd Semester		(Mandatory Course) AGMC-21301: INDIAN CONSTITUTION			
Internal Marks:	-		L	T	P
External Marks:	-		1	0	0
Total Marks:	-		Credits		0

Part	Content	CO
-	- Meaning of the constitution law and constitutionalism. - Historical perspective of the Constitution of India. - Salient features and characteristics of the Constitution of India. - Scheme of the fundamental rights. - The scheme of the Fundamental Duties and its legal status. - The Directive Principles of State Policy – Its importance and implementation. - Federal structure and distribution of legislative and financial powers between the Union and the States. - Parliamentary Form of Government in India – The constitution powers and status of the President of India. - Amendment of the Constitutional Powers and Procedure. - The historical perspectives of the constitutional amendments in India. - Emergency Provisions: National Emergency, President Rule, Financial Emergency. - Local Self Government – Constitutional Scheme in India. - Scheme of the Fundamental Right to Equality. - Scheme of the Fundamental Right to certain Freedom under Article 19. - Scope of the Right to Life and Personal Liberty under Article 21	-