

Indira Gandhi University Meerpur, Rewari

(A State University established under Haryana Act No.29 of 2013)

Recognized u/s 12 (b) & 2(f) of UGC Act, 1956



Scheme of Examination for Under-Graduate Programmes

Bachelor of Computer Applications (BCA)

SCHEME D (Interdisciplinary)

according to

Curriculum Framework for Under-Graduate Programmes

As per NEP-2020 (Multiple Entry-Exit, Internships and Choice Based

Credit System)

COMPUTER SCIENCE & ENGINEERING

(For the Batches Admitted From 2024-2025)

Indira Gandhi University, Meerpur, Rewari
Scheme of Examination for Undergraduate
Programmes Subject: BCA

According to

Curriculum Framework for Undergraduate Programmes

As per NEP 2020 (Multiple Entry-Exit, Internships and Choice Based Credit System)

Sem	Course Type	Course Code	Nomenclature of paper	Credits	Contact hours	Internal marks	End term Marks	Total Marks	Duration of exam (Hrs) T+P	
1	CC-A1	24 L4.5-BCA-101	Problem Solving through C	3	3	20	50	70	3	
			Practicum (Practical)	1	2	10	20	30	3	
	CC-B1	24 L4.5-BCA-102	Foundations of Computer Science	3	3	20	50	70	3	
			Practicum (Practical-MS-Office)	1	2	10	20	30	3	
	CC-C1	24 L4.5-BCA-103	Logical Organization of Computer	4	4	30	70	100	3	
	CC-M1	24 L4.5-BCA-104	Mathematical Foundations for Computer Science-I	2	2	15	35	50	3	
	MDC-1	Each student will opt one Multidisciplinary course from the discipline which is different from the discipline of Bachelor of Computer Applications								
	SEC-1	From Available pool of SEC-1 of 3 credits as per NEP								
	VAC-1	From Available pool of VAC-1 of 2 credits as per NEP								
	AEC-1	From Available pool of AEC-1 of 2 credits as per NEP								
2	CC-A2	24 L4.5-BCA-201	Object Oriented Programming using C++	3	3	20	50	70	3	
			Practicum (Practical)	1	2	10	20	30	3	

CC-B2	24 L4.5-BCA-202	Introduction to Web Technologies	3	3	20	50	70	3	
		Practicum (Practical-HTML)	1	2	10	20	30	3	
CC-C2	24 L4.5-BCA-203	Concepts of Operating Systems	4	4	30	70	100	3	
CC-M2	24 L4.5-BCA-204	Mathematical Foundations for Computer Science-II	2	2	15	35	50	3	
MDC-2	Each student will opt one Multidisciplinary course from the discipline which is different from the discipline of Bachelor of Computer Applications								
SEC-2	From Available pool of SEC-2 of 3 credits as per NEP								
VAC-2	From Available pool of VAC-2 of 2 credits as per NEP								
AEC-2	From Available pool of AEC-2 of 2 credits as per NEP								
Internship* 4 credits	24 L4.5-BCA-205	*Internship of 4 credits of 4-6 weeks duration							
3	CC-A3	24 L5.0-BCA-301	Java OOP Foundations	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
CC-B3	24 L5.0-BCA-302	Network Infrastructure and Data Communication Technologies	4	4	30	70	100	3	
CC-C3	24 L5.0-BCA-303	Data Base Technologies	3	3	20	50	70	3	
		Practicum (Practical)	1	2	10	20	30	3	
MDC-3	Each student will opt one Multidisciplinary course from the discipline which is different from the discipline of Bachelor of Computer Applications								
CC-M3	From Available CC-M3 of 4 credits as per NEP								
SEC-3	From Available pool of SEC-3 of 3 credits as per NEP								
AEC-3	From Available pool of AEC-3 of 2 credits as per NEP								

4	CC-A4	24 L5.0-BCA-401	Data Structures and Applications	3	3	20	50	70	3	
			Practicum (Practical)	1	2	10	20	30	3	
	CC-B4	24 L5.0-BCA-402	Management Information System	4	4	30	70	100	3	
	CC-C4	24 L5.0-BCA-403	Computer Graphics	3	3	20	50	70	3	
			Practicum (Practical)	1	2	10	20	30	3	
	Internship * (4 credits)	24 L5.0-BCA-404								
	AEC-4	From Available pool of AEC-3 of 2 credits as per NEP								
	VAC-3	From Available pool of VAC-3 of 2 credits as per NEP								
CC-M4(V)	From Available pool of CC-M4(V) of 4 credits as per NEP									
*Internship of 4 credits of 4-6 weeks duration for students who wish to exit after 4th semester										
5	CC-A5	24 L5.5-BCA-501	Software Engineering	4	4	30	70	100	3	
	CC-B5	24 L5.5-BCA-502	Front-end and Back-end Development	3	3	20	50	70	3	
			Practicum (Practical)	1	2	10	20	30	3	
	CC-C5	24 L5.5-BCA-503	Linux and Shell programming	3	3	20	50	70	3	
			Practicum (Practical)	1	2	10	20	30	3	
	CC-M5(V)	From Available pool of VOC-1 of 4 credits as per NEP								
SEC-4	Internship @4 Credits									
6	CC-A6	24 L5.5-BCA-601	Programming using Python	3	3	20	50	70	3	
			Practicum (Practical)	1	2	10	20	30	3	

	CC-B6	24 L5.5-BCA-602	Advanced Web Development	3	3	20	50	70	3	
			Practicum (Practical-PHP)	1	2	10	20	30	3	
	CC-C6	24 L5.5-BCA-603	Artificial Intelligence	4	4	30	70	100	3	
	CC-M6	From Available CC-M6 of 4 credits as per NEP								
	CC-M7(v)	From Available pool VOC-3 of 4 credits as per NEP								
7	CC-H1	24 L6.0-BCA-701	E-Commerce	4	4	30	70	100	3	
	CC-H2	24 L6.0-BCA-702	Software Testing	4	4	30	70	100	3	
	CC-H3	24 L6.0-BCA-703	Data Mining and Warehousing	4	4	30	70	100	3	
	DSE-H1	24 L6.0-BCA-704	No SQL Databases							
			Or							
			24 L6.0-BCA-705	Cyber Security	4	4	30	70	100	3
	PC-H1	24 L6.0-BCA-706	Practicum (Practical Based on 24 L6.0-BCA-703-704/Case Study Report Based on 24 L6.0-BCA-705)							
CC-HM1	24 L6.0-BCA-707	Cloud Computing	4	4	30	70	100	3		
8	CC-H4	24 L6.0-BCA-801	Design & Analysis of Algorithms	4	4	30	70	100	3	
	CC-H5	24 L6.0-BCA-802	Software Project Management	4	4	30	70	100	3	
	CC-H6	24 L6.0-BCA-803	Emerging Trends in Information Security	4	4	30	70	100	3	
	DSE-H2	24 L6.0-BCA-804	Big Data							
			Or							
		24 L6.0-BCA-805	Machine Learning	4	4	30	70	100	3	

PC-H2	24 L6.0-BCA-806	Practicum (Practical Based on 24 L6.0-BCA-801,804,805/Case Study ReportBased on 24 L6.0-BCA-803)	4	8	30	70	100	6
CC-HM2	24 L6.0-BCA-807	Internet of Things (IoT)	3	2	20	50	70	3
		Practicum (Project)	1	2	10	20	30	3
OR								
CC-H4	24 L6.0-BCA-801	Design & Analysis of Algorithms	4	4	30	70	100	3
CC-H5	24 L6.0-BCA-802	Software Project Management	4	4	30	70	100	3
CC-HM2	24 L6.0-BCA-807	Internet of Things (IoT)	3	2	20	50	70	3
		Practicum (Project)	1	2	10	20	30	3
Research	24 L6.0-BCA-808	Project/ Dissertation	12				300	

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Syllabus of Examination (1st and 2nd Year) for Under-Graduate Programmes

Bachelor of Computer Applications (BCA)

According to

Curriculum Framework for Under-Graduate Programmes

As per NEP-2020 (Multiple Entry-Exit, Internships and Choice Based Credit System)

COMPUTER SCIENCE & ENGINEERING

(For the Batches Admitted From 2024-2025)

SEMESTER-1
COMPUTER SCIENCE & ENGINEERING

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A- Introduction			
Subject	BCA		
Semester	I		
Name of the Course	Problem Solving through C		
Course Code	24 L4.5-BCA-101		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-A1 (Core Course)		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. learn the basics of C program, data types and input/output statements. 2. understand different types of operators, their hierarchies and also control statements of C. 3. implement programs using arrays and strings. 4. get familiar with advanced concepts like structures, union etc. in C language. <hr/> <p>5*. to implement the programs based on various concepts of C.</p>		
Credits	Theory	Practicum	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Internal Assessment Marks:30(20(T)+10(P))			
End Term Exam Marks:70(50(T)+20(P))			
Part B- Contents of the Course			

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
I	Overview of C: History, Importance, Structure of C Program, Character Set, Constants and Variables, Identifiers and Keywords, Data Types, Assignment Statement, Symbolic Constant. Input/output: Formatted I/O Function-, Input Functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putchar(), puts().	10
II	Operators & Expression: Arithmetic, Relational, Logical, Bitwise, Unary, Assignment, Conditional Operators and Special Operators Operator Hierarchy; Arithmetic Expressions, Evaluation of Arithmetic Expression, Type Casting and Conversion. Decision making with if statement, ifelse statement, nested if statement, else-if ladder, switch and break statement, goto statement, Looping Statements: for, while, and dowhile loop, jumps in loops.	10
III	Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation. Functions: definition, prototype, function call, passing arguments to a function: call by value; call by reference, recursive functions. Strings: Declaration and Initialization, String I/O, Array of Strings, String Manipulation Functions: String Length, Copy, Compare, Concatenate etc., Search for a Substring.	10
IV	Pointers in C: Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays. User defined data types: Structures - Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, Array of Structures; Unions - Union definition; difference between Structure and Union.	10
V*	Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: <ul style="list-style-type: none">• To read radius of a circle and to find area and circumference• To read three numbers and find the biggest of three• To check whether the number is prime or not• To read a number, find the sum of the digits, reverse the number and check it for palindrome• To read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers	25

	<ul style="list-style-type: none"> • To read percentage of marks and to display appropriate message (Demonstration of else-if ladder) • To find the roots of quadratic equation To read marks scored by n students and find the average of marks (Demonstration of single dimensional array) • To remove Duplicate Element in a single dimensional Array • To perform addition and subtraction of Matrices • To find factorial of a number • To generate Fibonacci series • To remove Duplicate Element in a single dimensional Array • To find the length of a string without using built in function • To demonstrate string functions • To read, display and add two m x n matrices using functions • To read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters • To Swap Two Numbers using Pointers • To demonstrate student structure to read & display records of n students • To demonstrate the difference between structure & union. 	
	Suggested Evaluation Methods	
	<p>Internal Assessment:</p> <ul style="list-style-type: none"> ➤ Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 □Mid-Term Exam: NA 	<p>End Term Examination: A three hour exam for both theory and practicum.</p>
Part C- Learning Resources		
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • Gottfried, Byron S., Programming with C, Tata McGraw Hill. • Balagurusamy, E., Programming in ANSI C, Tata McGraw-Hill. • Jeri R. Hanly& Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley. • Yashwant Kanetker, Let us C, BPB. • Rajaraman, V., Computer Programming in C, PHI. • Yashwant Kanetker, Working with C, BPB. 		

*Applicable for courses having practical component.

COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A-Introduction			
Subject	BCA		
Semester	I		
Name of the Course	Foundations of Computer Science		
Course Code	24 L4.5-BCA-102		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-B1 (Core Course)		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. understand the basics of computer 2. learn about I/O devices and operating systems 3. understand internet and its services 4. learn about the threats and security concepts on computers <hr style="width: 50%; margin: 10px auto;"/> 5*. to understand the working of operating system, internet and security related concepts.		
Credits	Theory	Practicum	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Internal Assessment Marks:30(20(T)+10(P))			
End Term Exam Marks:70(50(T)+20(P))			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.</p>			

Unit	Topics	Contact Hours
I	<p>Computer Fundamentals: Evolution of Computers through generations, Characteristics of Computers, Strengths and Limitations of Computers, Classification of Computers, Functional Components of a Computer System, Applications of computers in Various Fields. Types of Software: System software, Application software, Utility Software, Shareware, Freeware, Firmware, Free Software.</p> <p>Memory Systems: Concept of bit, byte, word, nibble, storage locations and addresses, measuring units of storage capacity, access time, concept of memory hierarchy. Primary Memory - RAM, ROM, PROM, EPROM. Secondary Memory - Types of storage devices, Magnetic Tape, Hard Disk, Optical Disk, Flash Memory.</p>	10
II	<p>I/O Devices: I/O Ports of a Desk Top Computer, Device Controller, Device Driver. Input Devices: classification and use, keyboard, pointing devices - mouse, touch pad and track ball, joystick, magnetic stripes, scanner, digital camera, and microphone Output Devices: speaker, monitor, printers: classification, laser, ink jet, dot-matrix. Plotter.</p> <p>Introduction to Operating System: Definition, Functions, Features of Operating System, Icon, Folder, File, Start Button, Task Bar, Status Buttons, Folders, Shortcuts, Recycle Bin, Desktop, My Computer, My Documents, Windows Explorer, Control Panel.</p>	10
III	<p>The Internet: Introduction to networks and internet, history, Internet, Intranet & Extranet, Working of Internet, Modes of Connecting to Internet.</p> <p>Electronic Mail: Introduction, advantages and disadvantages, User Ids, Passwords, e-mail addresses, message components, message composition, mailer features. Browsers and search engines.</p>	10
IV	<p>Threats: Physical & non-physical threats, Virus, Worm, Trojan, Spyware, Keyloggers, Rootkits, Adware, Cookies, Phishing, Hacking, Cracking.</p> <p>Computer Security Fundamentals: Confidentiality, Integrity, Authentication, Non-Repudiation, Security Mechanisms, Security Awareness, Security Policy, anti-virus software & Firewalls, backup & recovery.</p>	10
V*	<p>Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: MS-Office:</p> <ul style="list-style-type: none"> • Starting with basics of MS-Office • Understand basics of MS-Word, Excel, Powerpoint <p>Internet and E-mail:</p> <ul style="list-style-type: none"> • Using Internet for various tasks • Creating and using e-mail. Security: • Understanding various threats • How to be safe from virus threats <p>Various software to get safe from virus attacks.</p>	25

Suggested Evaluation Methods		
	<p>Internal Assessment:</p> <p>➤ Theory</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 <p>➤ Practicum</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 □Mid-Term Exam: NA 	<p>End Term Examination: A three hour exam for both theory and practicum.</p>
Part C-Learning Resources		
	<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB. • Dromey, R.G., How to Solve it By Computer, PHI. • Norton, Peter, Introduction to Computer, McGraw-Hill. • Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World. • Rajaraman, V., Fundamentals of Computers, PHI. 	

*Applicable for courses having practical component.

COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	BCA	
Semester	I	
Name of the Course	Logical Organization of Computer	
Course Code	24 L4.5-BCA-103	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-C1 (Core Course)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	Basic Knowledge of Mathematics (10 th Level)	
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. understand number systems, error detecting correcting code and representations of numbers in a computer system. 2. understand computer arithmetic and Boolean algebra and simplification of Boolean expressions. 3. understand working of logic gates and design various combinational circuits using these logic gates. 4. understand working of different types of flip-flops and design different types of registers. 	
Credits	Theory	Total
	4	4
Contact Hours	4	4
Max. Marks:100(70(T)+30(IA)) Internal Assessment Marks:30 End Term Exam Marks:70		Time: 3 Hrs.(T)
Part B- Contents of the Course		
<u>Instructions for Paper- Setter</u>		
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Examination will be of three-hour duration.		

Unit	Topics	Contact Hours
I	Number Systems: Binary, Octal, Hexadecimal etc. Conversions from one number system to another, BCD Number System. BCD Codes: Natural Binary Code, Weighted Code, SelfComplimenting Code, Cyclic Code. Error Detecting and Correcting Codes. Character representations: ASCII, EBCDIC and Unicode. Number Representations: Integer numbers - sign-magnitude, 1's & 2's complement representation. Real Numbers normalized floating point representations.	16
II	Binary Arithmetic: Binary Addition, Binary Subtraction, Binary Multiplication, Binary Division using 1's and 2's Compliment representations, Addition and subtraction with BCD representations. Boolean Algebra: Boolean Algebra Postulates, basic Boolean Theorems, Boolean Expressions, Boolean Functions, Truth Tables, Canonical Representation of Boolean Expressions: SOP and POS, Simplification of Boolean Expressions using Boolean Postulates & Theorems, Karnaugh-Maps (upto four variables), Handling Don't Care conditions.	14
III	Logic Gates: Basic Logic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. Their symbols, truth tables and Boolean expressions. Combinational Circuits: Design Procedures, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexers, Demultiplexers, Decoder, Encoder, Comparators, Code Converters.	14
IV	Sequential Circuits: Basic Flip- Flops and their working. Synchronous and Asynchronous Flip –Flops, Triggering of Flip- Flops, Clocked RS, D Type, JK, T type and Master-Slave Flip-Flops. State Table, State Diagram and State Equations. Flip-flops characteristics & Excitation Tables, Sequential Circuits.	16
Suggested Evaluation Methods		
	Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 15 • Mid-Term Exam: 10 	End Term Examination: A three hour exam for theory.
Part C-Learning Resources		
	Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd. • V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall. • Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd. • Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill. 	

COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	BCA	
Semester	I	
Name of the Course	Mathematical Foundations for Computer Science-I	
Course Code	24 L4.5-BCA-104	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-M1(Minor)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)		
Course Learning Outcomes (CLO):	<p>After learning this course student will be able:</p> <ol style="list-style-type: none"> 1. Gain the knowledge of set theory, types of sets and operations on sets. Understand various concepts of matrices and determinants, and acquire the cognitive skills to apply different operations on matrices and determinants. 2. Have the knowledge of the basic concepts of complex numbers and acquire skills to solve linear quadratic equations. 3. Understand the concept of differentiation 4. * Attain the skills to make use of the learnt concepts of Introductory Mathematics in multidisciplinary learning contexts and to know their applications 	
Credits	Theory	Total
	2	2
Contact Hours	2	2
Max. Marks:50(35(T)+15(IA)) Internal Assessment Marks:15 End Term Exam Marks:35		Time: 3 Hrs.(T)
Part B-Contents of the Course		
<u>Instructions for Paper- Setter</u>		
<p>Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Examination will be of three-hour duration.</p>		

Unit	Topics	Contact Hours
I	<p>Sets: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Practical applications of set theory.</p> <p>Relations And Functions: Properties of Relations, Equivalence Relation, Partial Order Relation. Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.</p>	7
II	<p>Trigonometry: Introduction, Measurement of angles, trigonometric functions, relation between trigonometric functions, signs of trigonometric functions, trigonometric functions of standard angles. Basic of inverse trigonometry.</p> <p>Limits & Continuity: Limit at a Point, properties of limit, computation of limits of various types of functions, Continuity of a function at a point, Continuity over an interval.</p>	8
III	<p>Differentiation: Derivative of a function, Derivatives of sum, differences, product & quotient of functions, Derivatives of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions, Logarithmic Differentiation, Chain rule and differentiation by substitution.</p>	7
IV	<p>Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices.</p> <p>Determinants: Definition, Minors, Cofactors, Properties of Determinants, Applications of determinants in finding area of triangle, Adjoint of matrix, Inverse of matrix, solving a system of linear equations using matrix method.</p>	8
Suggested Evaluation Methods		
<p>Internal Assessment:</p> <p>➤ Theory</p> <p><input type="checkbox"/> Class Participation: 5</p> <p><input type="checkbox"/> Seminar/presentation/assignment/quiz/class test etc.: 5</p> <p><input type="checkbox"/> Mid-Term Exam: 5</p>		<p>End Term Examination: A three hour exam for theory.</p>
Part C-Learning Resources		
<p>Text /Reference Books:</p> <ul style="list-style-type: none"> • C. Y. Young (2021). <i>Algebra and Trigonometry</i>. Wiley. • S.L. Loney (2016). <i>The Elements of Coordinate Geometry (Cartesian Coordinates)</i> (2nd Edition). G.K. Publication Private Limited. • Seymour Lipschutz and Marc Lars Lipson (2013). <i>Linear Algebra</i>. (4th Edition) • Schaum's Outline Series, McGraw-Hill. • C.C. Pinter (2014). <i>A Book of Set Theory</i>. Dover Publications. • J. V. Dyke, J. Rogers and H. Adams (2011). <i>Fundamentals of Mathematics</i> (10th Edition), Brooks/Cole. • A. Tussy, R. Gustafson and D. Koenig (2010). <i>Basic Mathematics for College Students</i>(4th Edition). Brooks Cole 		

SEMESTER - 2

COMPUTER SCIENCE & ENGINEERING **INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI**

Session:2024-25			
Part A-Introduction			
Subject	BCA		
Semester	II		
Name of the Course	Object Oriented Programming Using C++		
Course Code	24 L4.5-BCA-201		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-A2 (Core Course)		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	Knowledge of any Computer Programming Language		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: <ul style="list-style-type: none">• understand basic concepts of C++.• learn operators, hierarchy and their precedence and different control structures of C++.• develop programs using arrays, strings and functions.• implement OOPS concepts with C++.		
Credits	Theory	Practicum	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks:70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-</p>			

hour duration.		
Unit	Topics	Contact Hours
I	Introduction to C++: About C++, Character Set, Keywords, Identifiers, Constants, Punctuators, Date Types: UserDefined, Built-in, Derived Data Types, Access Modifiers. Unformatted and Formatted I/O Operations. I/O using extraction and extraction operators, Type Conversion, Type Casting.	10
II	Operators in C++: Arithmetic, Relational, Logical, Bitwise, Ternary, Precedence & associativity of Operators. Control Structures: if statement, if-else statement, nested if, if-else-if ladder, switch...case statement, break and continue, goto statement, nested switch...case statement, Loops: while loop, do...while loop, for loop.	10
III	Arrays and strings: Array definition, initialization, multidimensional arrays, Manipulation of array elements, String declaration and initialization, Manipulations, String handing functions. Functions: Declaration and Definition, return values, arguments, passing parameters by value, call by reference, call by pointer, Recursions, Inline and external linkage Functions, storage classes.	10
IV	Object-Oriented Features of C++: Class and Objects, Data hiding & encapsulation, abstraction, constructors & destructors. Data Members and Member Functions, accessing class members, empty class, local class, global class, Scope Resolution Operator and its Uses, Static Data Members, Static Member Functions, Structure vs Class.	10
V*	Practicum: Students are advised to do laboratory/practical practice by including following types of problems: <ul style="list-style-type: none"> • Programs for showing use of different operators • Program for array • Program for constructor and destructor • Program for structure. 	25
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 □ Mid-Term Exam: NA 		End Term Examination: A three-hour exam for both theory and practicum.
Part C-Learning Resources		
Recommended Books/e-resources/LMS: Text Books: <ol style="list-style-type: none"> 1. Herbert Scildt, C++, The Complete Reference, Tata McGraw-Hill 2. Robert Lafore, Object Oriented Programming in C++, SAMS Publishing Reference Books:		

1. Bjarne Stroustrup, The C++ Programming Language, Pearson Education
2. Balaguruswami, E., Object Oriented Programming In C++, Tata McGraw-Hill.
3. Richard Johnson, An Introduction to Object-Oriented Application Development, Thomson Learning.

*Applicable for courses having practical component.

COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A-Introduction			
Subject	BCA		
Semester	II		
Name of the Course	Introduction to Web Technologies		
Course Code	24 L4.5-BCA-202		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-B2 (Core Course)		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	Knowledge of any Computer Programming Language		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ul style="list-style-type: none"> • outline the idea of web and its components. • understand the theoretical steps for developing a website • learn the skills that will enable him/her to design simple web pages. • learn CSS to specify style to web pages. 		
Credits	Theory	Practicum	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Internal Assessment Marks:30(20(T)+10(P))			
End Term Exam Marks:70(50(T)+20(P))			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.</p>			

Unit	Topics	Contact Hours
I	Introduction to Internet and World Wide Web (WWW); Evolution and History of World Wide Web, Web Pages and Contents, Web Clients, Web Servers, Web Browsers; Hypertext Transfer Protocol, URLs; Searching and Web Casting Techniques, Search Engines and Search Tools, Scripting Languages.	10
II	Web Publishing: Hosting website; Internet Service Provider; Planning and designing website; Web Content Authoring, Web Graphics Design, Web Programming, Steps For Developing website, Choosing the Contents, Home Page, Domain Names, Creating a Website and Introduction to Markup Languages (HTML and DHTML).	10
III	Web Development: HTML Document Features, Fundamentals HTML Elements, Creating Links; Headers; Text styles; Text Structuring; Text color and Background; Formatting text; Page layouts, Images; Ordered and Unordered lists; Inserting Graphics; Table Creation and Layouts; Frame Creation and Layouts; Working with Forms and Menus; 10(3343) Working with Radio Buttons; Check Boxes; Text Boxes.	10
IV	Introduction to CSS (Cascading Style Sheets): Features, Core Syntax, Types, Style Sheets and HTML, Style Rule Cascading and Inheritance, Text Properties, CSS Box Model, Normal Flow Box Layout, Positioning and other useful Style Properties; Features of CSS3.	10
V*	Practicum: Students are advised to do laboratory/practical practice by including different types of problems base on HTML tags.	25

Suggested Evaluation Methods

<p>Internal Assessment:</p> <p>➤ Theory</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 <p>➤ Practicum</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • □Mid-Term Exam: NA 	<p>End Term Examination: A three-hour exam for both theory and practicum.</p>
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Part C-Learning Resources

<p>Textbooks:</p> <p>[1] Raj Kamal, Internet and Web Technologies, Tata McGraw-Hill. [2] Ramesh Bangia, Multimedia and Web Technology, Firewall Media.</p> <p>REFERENCE BOOKS:</p> <p>[1] Thomas A. Powell, Web Design: The Complete Reference, Tata McGraw-Hill [2] Wendy Willard, HTML Beginners Guide, Tata McGraw-Hill. [3] Deitel and Goldberg, Internet and World Wide Web, How to Program, PHI</p>
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*Applicable for courses having practical component.

COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	BCA	
Semester	II	
Name of the Course	Concepts of Operating Systems	
Course Code	24 L4.5-BCA-203	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-C2 (Core Course)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	Knowledge of any Computer Programming Language	
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ul style="list-style-type: none"> • understand the basic concepts of operating systems and its services. • understand concept of process management and scheduling. • acquire knowledge of process synchronization along with deadlock handling. • learn about memory management and virtual memory concepts. 	
Credits	Theory	Total
	4	4
Contact Hours	4	4
Max. Marks:100(70(T)+30(IA)) Internal Assessment Marks:30 End Term Exam Marks:70		Time: 3 Hrs.(T)
Part B- Contents of the Course		
<u>Instructions for Paper- Setter</u>		
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Examination will be of three-hour duration.		

Unit	Topics	Contact Hours
I	Introductory Concepts: Operating System Functions and Characteristics, Historical Evolution of Operating Systems, Operating System Structure, Operating System Operations; Types of Operating System: Real time, Multiprogramming, Multiprocessing, Batch processing; Operating System Services, Operating System Interface, Methodologies for Implementation of Operating System, Service System Calls, System Programs.	16
II	Process Management: Process Concepts, Operations on Processes, Process States and Process Control Block. InterProcess Communication; Multithreaded Programming: Multithreading Models, Threading Issues; CPU Scheduling: Scheduling Criteria, Levels of Scheduling, Scheduling Algorithms, Multiple Processor Scheduling; Algorithm Evaluation.	14
III	Synchronization: Critical Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classical Problem of Synchronization, Monitors, Atomic Transactions; Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.	14
IV	Memory Management Strategies: Memory Management of Single-User and Multiuser Operating System, Partitioning, Swapping, Contiguous Memory Allocation, Paging and Segmentation; Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing, Memory Mapped Files.	16
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 15 • Mid-Term Exam: 10 	End Term Examination: A three-hour exam for theory.	
Part C-Learning Resources		
Text Books: 1. Silberschatz A., Galvin P.B., and Gagne G., Operating System Concepts, John Wiley & Sons. 2. Godbole, A.S., Operating Systems, Tata McGraw-Hill Publishing Company, New Delhi. REFERENCE BOOKS: 1. Deitel, H.M., Operating Systems, Addison- Wesley Publishing Company, New York. 2. Tanenbaum, A.S., Operating System- Design and Implementation, Prentice Hall of India, New Delhi.		

COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	BCA	
Semester	II	
Name of the Course	Mathematical Foundations for Computer Science-II	
Course Code	24 L4.5-BCA-204	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-M2 (Minor)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	Knowledge of any Computer Programming Language	
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ul style="list-style-type: none"> • Understand concept of algorithms • Understand graph theory • Understand concept of recursion • In-depth understanding of number theory 	
Credits	Theory	Total
	2	2
Contact Hours	2	2
Max. Marks:50(35(T)+15(IA)) Internal Assessment Marks:15 End Term Exam Marks:35		Time: 3 Hrs.(T)
Part B- Contents of the Course		
<u>Instructions for Paper- Setter</u>		
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Examination will be of three-hour duration.		
Unit	Topics	Contact Hours
I	Basic Statistics: Measure of Central Tendency, Preparing frequency distribution table, Mean, Mode, Median, Measure of Dispersion: Range, Variance and Standard Deviations, Correlation and Regression.	7

II	<p>Algorithm: Algorithms, merits and demerits, Exponentiation, How to compute fast exponentiation. Linear Search, Binary Search, "Big Oh" notation, Worst case, Advantage of logarithmic algorithms over linear algorithms, complexity.</p> <p>Graph Theory: Graphs, Types of graphs, degree of vertex, sub graph, isomorphic and homeomorphic graphs, Adjacent and incidence matrices, Path Circuit; Eulerian, Hamiltonian path circuit.</p>	8
III	<p>Tree: Trees, Minimum distance trees, Minimum weight and Minimum distance spanning trees.</p> <p>Recursion: Recursively defined function. Merge sort, Insertion sort, Bubble sort, and Decimal to Binary</p>	7
IV	<p>Recurrence Relations: LHRR, LHRRWCCs, DCRR. Recursive procedures.</p> <p>Number Theory: Principle of Mathematical induction, GCD, Euclidean algorithm, Fibonacci numbers, congruences and equivalence relations, public key encryption schemes</p>	8
Suggested Evaluation Methods		
<p>Internal Assessment:</p> <p>➤ Theory</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 5 		<p>End Term Examination: A three-hour exam for theory.</p>
Part C-Learning Resources		
<p>Textbooks:</p> <ol style="list-style-type: none"> 1. Discrete Mathematics and Structures by Satinder Bal Gupta. 2. A Textbook of Graph Theory by R. Balakrishnan and K. Ranganathan <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Schaum's Outline of Graph Theory: Including Hundreds of Solved Problems. by V. K. Balakrishnan 2. Algorithms, 4th Edition by Robert Sedgewick and Kevin Wayne. 		

Semester - 3
COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A-Introduction			
Subject	BCA		
Semester	III		
Name of the Course	Java OOP Foundations		
Course Code	24 L5.0-BCA-301		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-A3 (Core Course)		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	Knowledge of any Computer Programming Language		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. Implement simple java programs. 2. Implement multiple inheritance using Interfaces 3. Implement Exception Handling and File Handling. 4. Use AWT to design GUI applications. 5* develop the project using java.		
Credits	Theory	Practicum	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Internal Assessment Marks:30(20(T)+10(P))			
End Term Exam Marks:70(50(T)+20(P))			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.</p> <p>Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.</p> <p>Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.</p>			

Unit	Topics	Contact Hours
I	Object Oriented Programming and Java Fundamentals: Structure of Java programs, Classes and Objects, Data types, Type Casting, Looping Constructs.	10
II	Interfaces: Interface basics; Defining, implementing and extending interfaces; Implementing multiple inheritance using interfaces Packages: Basics of packages, Creating and accessing packages, System packages, Creating user defined packages	10
III	Exception handling using the main keywords of exception handling: try, catch, throw, throws and finally; Nested try, multiple catch statements, creating user defined exceptions. File Handling Byte Stream, Character Stream, File I/O Basics, File Operations	10
IV	AWT and Event Handling: The AWT class hierarchy, Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Creating GUI applications using AWT.	10
*	<p>Practicum:</p> <p>Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:</p> <ul style="list-style-type: none"> • WAP to find the sum of 10 numbers, entered as command line arguments. • WAP to find the area of rectangle and circle using Interface. • WAP to implement multiple inheritance. • WAP to show the concept of packages. • WAP to handle the Exception using try and multiple catch blocks and a finally block. • WAP for Implementing Calculator in an Applet, use appropriate Layout Manager. • Write Applet code to add two integers in textbox and their sum should appear in third textbox. • Write AWT program in Java to find the sum, Multiplication and average of three numbers entered in three Text fields by clicking the corresponding Labeled Button. The result should be appearing in fourth text field. • Write Applet code to show all the activities of Mouse using Mouselistener and MouseMotionlistener. • What are various stream classes in Java? Write Java code to read character from a file and write into another file. • What are AWT Classes? Write Java Program to generate Even numbers and Odd Numbers in TextField “T1 and T2 respectively” while pressing Button “Even” and “Odd”. • Write a program to Copy the text from one file to another using byte stream. 	25
Suggested Evaluation Methods		

<p>Internal Assessment:</p> <ul style="list-style-type: none"> ➤ Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA 	<p>End Term Examination: A three-hour exam for both theory and practicum.</p>
<p>Part C-Learning Resources</p>	
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • Schildt, H. (2018). Java: The Complete Reference. 10th edition. McGraw-Hill Education. • Balaguruswamy E. (2014). Programming with JAVA: A Primer. 5th edition. India: McGraw Hill Education • Horstmann, C. S. (2017). Core Java - Vol. I – Fundamentals (Vol. 10). Pearson Education • Schildt, H., &Skrien, D. (2012). Java Fundamentals - A Comprehensive Introduction. India: McGraw Hill Education. 	

*Applicable for courses having practical component.

COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	BCA	
Semester	III	
Name of the Course	Network Infrastructure and Data Communication Technologies	
Course Code	24 L5.0-BCA-302	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-B3 (Core Course)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	Must have basic knowledge of computer	
Course Learning Outcomes(CLO):	<p>At the end of this course, the student will be able to:</p> <ul style="list-style-type: none"> • characterize various types of computer networks and standards along with an insight into the principles of networking by using protocol layering of the Internet and the TCP/IP protocol suite; • comprehend the notion of data communication and its related functional components and aspects; • understand design issues related to Local area Networks and get acquainted with the prevailing wired and wireless LAN technology standards; • get versed with the routing, addressing and congestion control issues in Networks and the Internet architecture 	
Credits	Theory	Total
	4	4
Contact Hours	4	4
Max. Marks:100(70(T)+30(IA)) Internal Assessment Marks:30 End Term Exam Marks:70		Time: 3 Hrs.(T)
Part B- Contents of the Course		

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
I	Network Characterization: Goals and Applications; Categorization according to Size, Purpose, Design issues & Transmission Technologies; Network Architecture and Service Models; Design issues for the Layers; OSI and TCP/IP Reference Models; Functions of layers and protocols of TCP/IP; Comparison of OSI & TCP/IP ; 10(3454) Data Transmission using TCP/IP, X.25, Frame Relay and ATM.	16
II	Data Communication Concepts & Components: Digital and Analog Data and Signals, Asynchronous and Synchronous transmission; bit rate, baud, bandwidth& Channel Capacity. Connecting Devices & Transmission Media: Network Interface Cards, Connectors, Hubs, Transceivers & Media Connectors; Link-Layer Switches, Bridge, Routers, Gateways, Virtual LANs; Guided Transmission Media; Wireless transmission; Satellite communication. Data Encoding & Modulation Techniques, Digital to Analog encoding, Switching.	14
III	Data Link Layer: Communication at the Data Link Layer; Nodes and Links; Link Layer Addressing; Examples of Data Link layer protocols. Design Issues: Framing techniques: Byte Oriented and Bit Oriented Protocols; Error Control: Error Detection and Correction; Sliding Window Flow Control Protocols. Media Access Control: Aloha, CSMA, CSMA/CD, CSMA/CA; Collision free protocols with Controlled Access; Limited Contention Protocols; Channelization: FDMA, TDMA, CDMA.	14
IV	Transport layer: Addressing, Services and Protocols; TCP and UDP services & header formats. Network Layer: Services, Routing Algorithms: Shortest path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Multi Cast Routing, Routing for Mobile hosts, IPv4, IPv6. Congestion control in Virtual – Circuit Subnets; Congestion Control in Datagram Subnets: Choke packets, Load Shedding; Random Early Detection, Jitter Control; Over provisioning, Buffering, Traffic Shaping, Leaky bucket, token bucket, Resource Reservation, Admission Control, Packet Scheduling.	16
	Suggested Evaluation Methods	
	Internal Assessment: ➤ Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 15 • Mid-Term Exam: 10 	End Term Examination: A three hour exam for theory.

Part C-Learning Resources	
	<p>Text Books:</p> <ol style="list-style-type: none">1. Andrew S. Tanenbaum, Computer Networks, PHI.2. Behrouz A Forouzan, Data Communications and Networking, Mc-Graw Hill Education. <p>Reference Books:</p> <ol style="list-style-type: none">1. Michael A. Gallo, William M. Hancock, Computer Communications and Networking Technologies, CENGAGE learning.2. William Stallings, Data and Computer Communications, PHI

COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A-Introduction			
Subject	BCA		
Semester	III		
Name of the Course	Data Base Technologies		
Course Code	24 L5.0-BCA-303		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-C3 (Core Course)		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	Basic Knowledge of computer		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. understand the concepts of database 2. understand the basics of data models 3. understand various SQL queries 4. understand relational model <hr/> 5*. to solve queries using SQL.		
Credits	Theory	Practicum	Theory
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Internal Assessment Marks:30(20(T)+10(P))			
End Term Exam Marks:70(50(T)+20(P))			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.			
Unit	Topics		Contact Hours

I	Basic Concepts – Data, Information, Records, Files, Schema and Instance etc. Limitations of File Based Approach, Characteristics of Database Approach, Database Management System (DBMS), Components of DBMS Environment, DBMS Functions and Components, Database Interfaces, Advantages and Disadvantages of DBMS. Database Users: Data and Database Administrator, Role and Responsibilities of Database Administrator, Database Designers, Application Developers etc. Database System Architecture – 1-Tier, 2-Tier & Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances, Data Independence – Logical and Physical Data Independence.	10
II	Data Models: Hierarchical, Network and Relational Data Models. Entity-Relationship Model: Entity, Entity Sets, Entity Type, Attributes: Type of Attributes, Keys, Integrity Constraints, Designing of ER Diagram, Symbolic Notations for Designing ER Diagram,	10
III	SQL: Meaning, Purpose and Need of SQL, Data Types, SQL Components: DDL, DML, DCL and DQL, Basic Queries, Join Operations and Sub-queries, Views, Specifying Indexes. Constraints and its Implementation in SQL. Relational Algebra: Basic Operations: Select, Project, Join, Union, Intersection, Difference, and Cartesian Product etc. Relational Calculus: Tuple Relational and Domain Relational Calculus. Relational Algebra Vs. Relational Calculus.	10
IV	Relational Model: Functional Dependency, Characteristics, Inference Rules for Functional Dependency, Types of Functional Dependency, Normalization: Benefits and Need of Normalization, Normal Forms Based on Primary Keys- (1NF, 2NF, 3NF, BCNF), Multi-valued Dependencies, 4 NF, Join dependencies, 5 NF, Domain Key Normal Form.	10
V*	The following activities be carried out/ discussed in the lab during the period of the semester. Programming Lab: <ul style="list-style-type: none"> • Performing various SQL statement. Creating various tables and performing all possible queries based on syllabus. • Understanding relational model concepts • Understanding normalization • Understanding various concepts of databases. 	25
Suggested Evaluation Methods		
	Internal Assessment: ➤ Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 	End Term Examination: A three-hour exam for both theory and practicum.
	➤ Practicum <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 	

	<ul style="list-style-type: none"> • Mid-Term Exam: NA 	
Part C-Learning Resources		
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • Elmasri& Navathe, Fundamentals of Database Systems, Pearson Education. • A Silberschatz, H Korth, S Sudarshan, Database System and Concepts, McGraw-Hill. • Thomas Connolly Carolyn Begg, Database Systems, Pearson Education. <p>C. J. Date, An Introduction to Database Systems, Addison Wesley.</p>		

*Applicable for courses having practical component.

SEMESTER 4

COMPUTER SCIENCE & ENGINEERING **INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI**

Session:2024-25			
Part A-Introduction			
Subject	BCA		
Semester	IV		
Name of the Course	Data Structures and Applications		
Course Code	24 L5.0-BCA-401		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-A4 (Core Course)		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	Basic Knowledge of computer		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ul style="list-style-type: none">• learn basics of data structure and algorithm complexities.• acquire knowledge of arrays and strings.• understand the idea of implementation for linked lists and stacks.• learn various searching and sorting techniques along with implementation of queues		
Credits	Theory	Practicum	Theory
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks:70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.</p> <p>Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.</p>			

Unit	Topics	Contact Hours
I	Data Structure Definition, Data Type vs. Data Structure, Classification of Data Structures, Data Structure Operations, Applications of Data Structures; Algorithm Specifications: Performance Analysis and Measurement (Time and Space Analysis of Algorithms- Average, Best and Worst Case Analysis), Asymptotic Notations and their use in Algorithm Handling.	10
II	Arrays: Introduction, Linear Arrays, Representation of Linear Array In Memory, Two Dimensional and Multidimensional Arrays, Sparse Matrix and its Representation, Operations on Array: Algorithm for Traversal, Selection, Insertion, Deletion and its implementation. String Handling: Storage of Strings, Operations on Strings viz., Length, Concatenation, Substring, Insertion, Deletion, Replacement, Pattern Matching.	10
III	Linked List: Introduction, Array vs. linked list, Representation of linked lists in Memory, Traversing a Linked List, Insertion, Deletion, Searching into a Linked list, Type of Linked List. Stack: Array Representation of Stack, Linked List Representation of Stack, Algorithms for Push and Pop, Application of Stack: Polish Notation, Postfix Evaluation Algorithms, Infix to Postfix Conversion, Infix to Prefix Conversion, Recursion.	10
IV	Introduction to Queues: Simple Queue, Double Queue, Circular Queue, Priority Queue, Representation of Queues as Linked List and Array, Applications of Queue. Algorithm on Insertion and Deletion in Simple Queue and Circular Queue. Searching and Sorting Techniques, Sorting Techniques: Bubble sort, Merge sort, Selection sort, Quick sort, Insertion Sort. Searching Techniques: Sequential Searching, Binary Searching.	10
V*	The following activities be carried out/ discussed in the lab during the period of the semester. Programming Lab: <ul style="list-style-type: none"> • Program for Array • Program for Linked List • Program for Queue • Sorting programs 	25
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 		End Term Examination: A three-hour exam for both theory and practicum.
> Practicum <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA 		
Part C-Learning Resources		

	<p>Text Books:</p> <ol style="list-style-type: none"> 1. Seymour Lipschutz, Data Structures, Tata McGraw- Hill Publishing Company Limited, Schaum's Outlines. 2. YedidyanLangsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, Data Structures Using C, Pearson Education. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Trembley, J.P. And Sorenson P.G., An Introduction to Data Structures With Applications, McGraw- Hill. 2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Addison- Wesley. 	
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*Applicable for courses having practical component.

COMPUTER SCIENCE & ENGINEERING
INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	BCA	
Semester	IV	
Name of the Course	Management Information System	
Course Code	24 L5.0-BCA-402	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-B4 (Core Course)	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	Basic Knowledge of computer	
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ul style="list-style-type: none"> ▪ Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions. ▪ Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline. ▪ Communicate effectively in a variety of professional contexts. ▪ Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. ▪ Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline. 	
Credits	Theory	Total
	4	4
Contact Hours	4	4
Max. Marks:100(70(T)+30(IA)) Internal Assessment Marks:30 End Term Exam Marks:70		Time: 3 Hrs.(T)
Part B- Contents of the Course		
<u>Instructions for Paper- Setter</u>		
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question		

will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
I	Introduction to system and Basic System Concepts, Types of Systems, The Systems Approach, Information System: Definition & Characteristics, Types of information, Role of Information in Decision-Making, Sub-Systems of an Information system: EDP and MIS management levels, EDP/MIS/DSS.	16
II	An overview of Management Information System: Definition & Characteristics, Components of MIS, Frame Work for Understanding MIS: Information requirements & Levels of Management, Simon's Model of decision-Making, Structured Vs Un-structured decisions, Formal vs. Informal systems.	14
III	Developing Information Systems: Analysis & Design of Information Systems: Implementation & Evaluation, Pitfalls in MIS Development.	14
IV	Functional MIS: A Study of Personnel, Financial and production MIS, Introduction to ebusiness systems, ecommerce – technologies, applications, Decision support systems – support systems for planning, control and decision-making	16
Suggested Evaluation Methods		
	Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 15 • Mid-Term Exam: 10	End Term Examination: A three-hour exam for theory.
Part C-Learning Resources		
	Text Books: 1. J. Kanter, “Management/Information Systems”, PHI. 2. Gordon B. Davis, M. H. Olson, “Management Information Systems – Conceptual foundations, structure and Development”, McGraw Hill. 3. James A. O’Brien, “Management Information Systems”, Tata McGraw-Hill. 4. James A. Senn, “Analysis & Design of Information Systems”, Second edition, McGraw Hill. 5. Robert G. Murdick & Joel E. Ross & James R. Claggett, “Information Systems for Modern Management”, PHI. 6. Lucas, “Analysis, Design & Implementation of Information System”, McGraw Hill.	

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A-Introduction			
Subject	BCA		
Semester	IV		
Name of the Course	Computer Graphics		
Course Code	24 L5.0-BCA-403		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-C4 (Core Course)		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	Basic Knowledge of computer		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ul style="list-style-type: none"> • understand the core concepts of computer graphics. • learn and implement point, line and circle drawing algorithms. • acquire knowledge two dimensional transformations and line clipping algorithms. • understand 3-D graphics concept and acquire skills for designing 3-D graphics. 		
Credits	Theory	Practicum	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Internal Assessment Marks:30(20(T)+10(P))			
End Term Exam Marks:70(50(T)+20(P))			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.			
Unit	Topics		Contact Hours
I	Introduction: History of Computer Graphics (CG), Applications of Computer Graphics, Components of interactive graphics systems, Display devices: Refresh CRT, Color CRT, Plasma Panel displays LCD		10

	Panels, Raster-scan System, Random scan System, Graphic software, Input/output Devices, Tablets.	
II	Output Primitives: Points and Lines, Line Drawing Algorithms: DDA algorithm, Bresenham's algorithm, Circle drawing algorithms: Polynomial Method, Bresenham's algorithm. Parametric representation of Cubic Curves, Bezier Curves.	10
III	2D Transformation: Use of Homogeneous Coordinates Systems, Composite Transformation: Translation, Scaling, Rotation, Mirror Reflection, Rotation about an Arbitrary Point. Clipping and Windowing, Clipping Operations. Line Clipping Algorithms: The Mid-Point subdivision method, Cohen-Sutherland Line Clipping Algorithms, Polygon Clipping, Sutherland-Hodgeman Algorithms, Text Clipping	10
IV	3-D Graphics: 3-D object representations, 3-D Transformations: Translation, Rotation, Scaling, Projections, Hidden surface elimination: Back face removal, Depth Buffer algorithm, Scan-line algorithm, Depth sort algorithm, Shading.	10
V*	The following activities be carried out/ discussed in the lab during the period of the semester. Programming Lab: <ul style="list-style-type: none"> • Programs on 2 D transformations • Program for implementing Circle drawing algorithm. • Program for Bradenham's algorithm • Program for clipping algorithms 	25
	Suggested Evaluation Methods	
	Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 	End Term Examination: A three-hour exam for both theory and practicum.
	> Practicum <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA 	
	Part C-Learning Resources	
	Text Books: Text Books: 1. Hearn & P.M. Baker, Computer Graphics, Prentice Hall India. Reference Books: 1. T. Vaughan, Multimedia, making it working, Tata McGraw Hill. 2. J.D. Foley & A VanDam, Fundamentals of Interactive Computer Graphics, Addison Wesley. 3. S. Harrington, Computer Graphics – A programming, Tata McGraw Hill. 4. Woo, Neider, Davis, Shreiner, OpenGL Programming Guide, Addison-Wesley Professional.	

*Applicable for courses having practical component.