

INDIRA GANDHI UNIVERSITY MEERPUR



Scheme of Examination and Syllabus for Under-Graduate Programme (Subject: Computer Science)

**Under Multiple Entry-Exit, Internship and CBCS-LOCF in
accordance to NEP-2020 w.e.f. 2024-25 (in phased manner)**

Scheme of Examination for Under-Graduate Program
Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020
w.e.f. 2024-25 (in phased manner)
Subject: Computer Science

1st YEAR: SEMESTER-1									
Applicable Scheme	Course	Course Code	Nomenclature of course	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration (in hrs)
Scheme A, B & C	CC-1 MCC-1 4 credits	24 L4.5-CSE-101	Problem Solving through C	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
Scheme C only	MCC-2 4 credits	24 L4.5-CSE-102	Foundations of Computer Science	3	3	20	50	70	3
			Practicum (Practical-MS-Office)	1	2	10	20	30	3
Scheme A, B & D	CC-M1 2 credits	24 L4.5-CSE-103	Mathematical Foundations for Computer Science-I	2	2	15	35	50	3
Scheme A, B, C & D	MDC-1 3 credits	24 L4.5-CSE-104	Fundamentals of Computer Science	3	3	20	50	70	3
Scheme C only	CC-M1 4 credits	From Available CC-M1 of 4 credits as per NEP							
Scheme A, B & C	AEC-1 2 credits	From Available pool of AEC-1 of 2 credits as per NEP							
	SEC-1 3 credits	From Available pool of SEC-1 of 3 credits as per NEP							
	VAC-1 2 credits	From Available pool of VAC-1 of 2 credits as per NEP							

CC: Core Course

MDC: Multidisciplinary Course

SEC: Skill Enhancement Course

CC-M: Minor Course

AEC: Ability Enhancement Course

VAC: Value Added Course

Note: Student may also opt DSE/SEC/VAC courses from SWAYAM/NPTEL/MOOC, or any other online courses recognized by UGC.

Scheme of Examination for Under-Graduate Program
Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020
w.e.f. 2024-25 (in phased manner)
Subject: Computer Science

1st YEAR: SEMESTER-II									
Applicable Scheme	Course	Course Code	Nomenclature of Course	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-2 MCC-3 4 credits	24 L4.5-CSE-201	Object Oriented Programming using C++	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
Scheme C only	DSEC-1 4 credits	24 L4.5-CSE-202	Database Management Systems	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
Scheme A, B & D	CC-M2 2 credits	24 L4.5-CSE-203	Mathematical Foundations for Computer Science-II	2	2	15	35	50	3
Scheme A, B, C & D	MDC-2 3 credits	24 L4.5-CSE-204	Web Technologies Fundamentals	3	3	20	50	70	3
Scheme A, B, & C	Internship* 4 credits	24 L4.5-CSE-205	*Internship of 4 credits of 4-6 weeks duration						
Scheme C only	CC-M2 4 credits	From Available CC-M2 of 4 credits as per NEP							
Scheme A, B & C	AEC-2 2 credits	From Available pool of AEC-2 of 2 credits as per NEP							
	SEC-2 3 credits	From Available pool of SEC-2 of 3 credits as per NEP							
	VAC-2 2 credits	From Available pool of VAC-2 of 2 credits as per NEP							

CC: Core Course

MDC: Multidisciplinary Course

SEC: Skill Enhancement Course

DSEC: Discipline Skill Enhancement Course

CC-M: Minor Course

AEC: Ability Enhancement Course

VAC: Value Added Course

***Applicable for those students who wish to exit after 2nd semester**

Note: Student may also opt DSE/SEC/VAC courses from SWAYAM/NPTEL/MOOC, or any other online courses recognized by UGC.

Note: UG Certificate in Computer Science (with 48 Credits) will be provided, if student want to exit after 2nd Semester, on submitting 4-6 weeks Internship Report (4 Credits).

Scheme of Examination for Under-Graduate Program
Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020
w.e.f. 2024-25 (in phased manner)
Subject: Computer Science

2nd YEAR: SEMESTER-III									
Applicable Scheme	Course	Course Code	Nomenclature of Course	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-3 MCC-4 4 credits	24 L5.0-CSE-301	Data Structures and Applications	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
Scheme B only	MCC-2 4 credits	24 L5.0-CSE-102	Foundations of Computer Science	3	3	20	50	70	3
			Practicum (Practical-MS-Office)	1	2	10	20	30	3
Scheme B & C	MCC-5 4 credits	24 L5.0-CSE-302	Concept of Operating Systems	4	4	30	70	100	3
Scheme A, B, C & D	MDC-3 3 credits	24 L5.0-CSE-303	Programming with C	3	3	20	50	70	3
Scheme A & C	CC-M3 4 credits	From Available CC-M3 of 4 credits as per NEP							
Scheme B only	CC-M3(V) 4 credits	From Available pool of VOC-1 of 4 credits as per NEP							
Scheme A, B & C	AEC-3 2 credits	From Available pool of AEC-3 of 2 credits as per NEP							
	SEC-3 3 credits	From Available pool of SEC-3 of 3 credits as per NEP							
Scheme C only	VAC-3 2 credits	From Available pool of VAC-3 of 2 credits as per NEP							

CC: Core Course

MDC: Multidisciplinary Course

SEC: Skill Enhancement Course

CC-M: Minor (Vocational)

AEC: Ability Enhancement Course

VAC: Value Added Course

Note: Student may also opt DSE/SEC/VAC courses from SWAYAM/NPTEL/MOOC, or any other online courses recognized by UGC.

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w.e.f. 2024-25 (in phased manner)
Subject: Computer Science

2nd YEAR: SEMESTER-IV									
Applicable Scheme	Course	Course Code	Nomenclature of Course	Credits	Hours / Week	Internal Marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-4 MCC-6 4 credits	24 L5.0-CSE-401	Java OOP Foundations	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
Scheme B & C	MCC-7 4 credits	24 L5.0-CSE-402	Logical Organization of Computer	4	4	30	70	100	3
Scheme B & C	MCC-8 4 credits	24 L5.0-CSE-403	Computer Graphics	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
Scheme B & C	DSE-1 4 credits (Select any one)	24 L5.0-CSE-404	Software Engineering	4	4	30	70	100	3
		24 L5.0-CSE-405	Software Testing	4	4	30	70	100	3
Scheme A, B & C	Internship* (4 credits)	24 L5.0-CSE-406							
Scheme A, B & C	CC-M4 (V) 4 credits	From Available pool of CC-M4(V) of 4 credits as per NEP							
	AEC-4 2 credits	From Available pool of AEC-3 of 2 credits as per NEP							
Scheme Only	VAC-4 2 credits	From Available pool of VAC-4 of 2 credits as per NEP							
Scheme A & B	VAC-3 2 credits	From Available pool of VAC-3 of 2 credits as per NEP							
*Internship of 4 credits of 4-6 weeks duration for students who wish to exit after 4th semester									

CC: Core Course

MDC: Multidisciplinary Course

SEC: Skill Enhancement Course

DSE: Discipline Specific Elective course

Note: Student may also opt DSE/SEC/VAC courses from SWAYAM/NPTEL/MOOC or any other online courses recognized by UGC.

Note: UG Diploma in Computer Science (with 94 Credits) will be provided, if student want to exit after 4th Semester on submitting the 4-6 weeks Internship Report (4 Credits).

CC-M (V): Minor (Vocational)

AEC: Ability Enhancement Course

VAC: Value Added Course

**Scheme of Examination for Under-Graduate Program
Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020
w.e.f. 2024-25 (in phased manner)
Subject: Computer Science**

3rd YEAR: SEMESTER-V									
Applicable Scheme	Course	Course Code	Nomenclature of Course	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-5 MCC-9 4 credits	24 L5.5-CSE-501	Data Communication and Networking	4	4	30	70	100	3
Scheme B & C	MCC-10 4 credits	24 L5.5-CSE-502	Artificial Intelligence	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
Scheme B & C	DSE-2 4 credits Select one Option	24 L5.5-CSE-503	Web Development using PHP	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
		24 L5.5-CSE-504	Web Development using ASP	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
Scheme B & C	DSE-3 4 credits Select one Option	24 L5.5-CSE-505	Animation Technology	4	4	30	70	100	3
		24 L5.5-CSE-506	Multimedia Technology	4	4	30	70	100	3
Scheme A, B & C	Internship* 4 credits	24 L5.5-CSE-507	If not done in II and IV semester						
Scheme A & C	CC-M5 (V) 4 credits	From Available pool of VOC-1 of 4 credits as per NEP							

CC: Core Course

MDC: Multidisciplinary Course

SEC: Skill Enhancement Course

DSE: Discipline Skill Elective Course

Note: Student may also opt DSE/SEC/VAC courses from SWAYAM/NPTEL/MOOC or any other online courses recognized by UGC.

CC-M (V) : Minor (Vocational)

AEC: Ability Enhancement Course

VAC: Value Added Course

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3rd YEAR: SEMESTER-VI									
Applicable Scheme	Course	Course Code	Nomenclature of Paper	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-6 MCC-11 4 credits	24L5.5 -CSE-601	Programming using Python	3	3	20	50	70	3
			Practicum (Practical)	1	2	10	20	30	3
Scheme B & C	MCC-12 4 credits	24 L5.5-CSE-602	Linux and Shell programming	3	3	20	50	70	3
			Practicum (Practical-PHP)	1	2	10	20	30	3
Scheme B & C	DSE-4 4 credits Select oneOption	24 L5.5-CSE-603	Mobile Application Development	4	4	30	70	100	3
		24 L5.5-CSE-604	Data ware Housing & Data Mining	4	4	30	70	100	3
Scheme B & C	DSE-5 4 credits Select oneOption	24 L5.5-CSE-605	Ethical Hacking	4	4	30	70	100	3
		24 L5.5-CSE-606	Cyber Forensics and Investigations	4	4	30	70	100	3
Scheme A only	CC-M6 4 credits	From Available CC-M6 of 4 credits as per NEP							
Scheme A only	CC-M7(V) 4 credits	From Available pool VOC-3 of 4 credits as per NEP							
Scheme B only	CC-M5(V) 4 credits	From Available pool of VOC-3 of 4 credits as per NEP							
Scheme C only	CC-M6(V) 4 credits	From Available pool of VOC-3 of 4 credits as per NEP							
Scheme C only	SEC-4 2 credits	From Available pool of SEC-4 of 2 credits as per NEP							

CC: Core Course

MDC: Multidisciplinary Course

SEC: Skill Enhancement Course

DSE: Discipline Skill Elective Course

CC-M(V): Minor (Vocational)

AEC: Ability Enhancement Course

VAC: Value added Course

Note: Student may also opt DSE/SEC/VAC courses from SWAYAM/NPTEL/MOOC or any other online courses recognized by UGC.

Note: Bachelor Degree in Computer Science will be awarded if student want to exit after 6th Semester.

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w.e.f. 2024-25 (in phased manner)
Subject: Computer Science

4th YEAR: SEMESTER-VII									
(FOR HONOURS/HONOURS WITH RESEARCH IN COMPUTER SCIENCE)									
Applicable Scheme	Course	Course Code	Nomenclature of Course	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme B & C	CC-H1 4 credits	24 L6.0-CSE-701	Machine Learning	4	4	30	70	100	3
	CC-H2 4 credits	24 L6.0-CSE-702	Cloud Computing	4	4	30	70	100	3
	CC-H3 4 credits	24 L6.0-CSE-703	Data Science	4	4	30	70	100	3
	DSE-H1 4 credits	24 L6.0-CSE-704	Soft Computing	4	4	30	70	100	3
	Select one Option	24 L6.0-CSE-705	Cyber Security	4	4	30	70	100	3
	PC-H1 4 credits	24 L6.0-CSE-706	Practicum (Practical Based on any one out of 24 L6.0-CSE - 701/704/705)	4	8	30	70	100	6
	CC-HM1 4 credits	From Available Minor of 4 credits as per NEP							

CC- H: Core Course in Honours Subject

CC-HM: Core course in Minor Subject of Honours Programme

DSE: Discipline Skill Elective Course in Honours Subject **PC: Practicum Course in Honours Subject**

Note: Student may also opt DSE/SEC/VAC courses from SWAYAM/NPTEL/MOOC or any other online courses recognized by UGC.

**Scheme of Examination for Under-Graduate Program
Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020
w.e.f. 2024-25 (in phased manner)
Subject: Computer Science**

4th YEAR: SEMESTER-VIII(FOR HONOURS IN COMPUTER SCIENCE)									
Applicable Scheme	Course	Course Code	Nomenclature of Course	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme B & C	CC-H4 4 credits	24 L6.0-CSE-801	Design & Analysis of Algorithms	4	4	30	70	100	3
	CC-H5 4 credits	24 L6.0-CSE-802	Internet of Things (IoT)	4	4	30	70	100	3
	CC-H6 4 credits	24 L6.0-CSE-803	Emerging Trends in Information Security	4	4	30	70	100	3
	DSE-H2 4 credits Select one option	24 L6.0-CSE-804	Block Chain Technology	4	4	30	70	100	3
		24 L6.0-CSE-805	Deep Learning	4	4	30	70	100	3
		24 L6.0-CSE-806	Big Data	4	4	30	70	100	3
	PC-H2 4 credits	24 L6.0-CSE-807	Practicum (Practical Based on 24 L6.0-CSE-801,802,804,805,806/Case Study Report Based on 24 L6.0-CSE-803)	4	8	30	70	100	6
CC-HM2 4 credits	From Available Minor of 4 credits as per NEP								
OR SEMESTER-VIII (FOR HONOURS WITH RESEARCH IN COMPUTER SCIENCE)									
Applicable Scheme	Course	Course Code	Nomenclature of Course	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme B & C	CC-H4 4 credits	24 L6.0-CSE-801	Design & Analysis of Algorithms	4	4	30	70	100	3
	CC-H5 4 credits	24 L6.0-CSE-802	Internet of Things (IoT)	4	4	30	70	100	3
	Project/ Dissertation 12 credits	24 L6.0-CSE-808	Project/Dissertation	8+4				300	
	CC-HM2 4 credits	From Available Minor of 4 credits as per NEP							

CC: Core Course

CC-HM: Minor

PC: Practicum Course

Note: Bachelor (Hons.) Degree in Computer Science with 184 credits will be awarded.

Note: Bachelor (Hons.) Degree (With Research) in Computer Science with 184 credits will be awarded.

Note: Student may also opt DSE/SEC/VAC courses from SWAYAM/NPTEL/MOOC or any other online courses recognized by UGC

SEMESTER-1

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session: 2024-25			
Part A- Introduction			
Subject	Computer Science		
Semester	I		
Name of the Course	Problem Solving through C		
Course Code	24 L4.5-CSE-101		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC (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. 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)) 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			

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*	<p>Practicum: 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"> • 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 • 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. 	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>
Part C- Learning Resources		

Recommended Books/e-resources/LMS:

- 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.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A-Introduction			
Subject	Computer Science		
Semester	I		
Name of the Course	Foundations of Computer Science		
Course Code	24 L4.5-CSE-102		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC (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 an 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>			
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	<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 • Identify the various computer hardware • Understanding the working of computer • Understanding various types of software <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 	25

	<ul style="list-style-type: none"> • How to be safe from virus threats <p>Various software to get safe from virus attacks.</p>	
	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"> • 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.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	Computer Science	
Semester	I	
Name of the Course	Mathematical Foundations for Computer Science-I	
Course Code	24 L4.5-CSE-103	
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):	After learning this course student will be able: <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>		
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	<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 		

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	Computer Science	
Semester	I	
Name of the Course	Fundamentals of Computer Science	
Course Code	24 L4.5-CSE-104	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-1	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)		
Course Learning Outcomes (CLO):	After learning this course student will be able: <ol style="list-style-type: none"> 1. understand the basic concepts of operating systems 2. do the basic editing and formatting in a document 3. create basic spread-sheets for different purposes 4. create basic presentations for different applications <hr/> 5*. to understand the working of operating system and various office tools practically.	
Credits	Theory	Total
	3	3
Contact Hours	3	3
Max. Marks:70(50(T)+20(IA)) Internal Assessment Marks:20 End Term Exam Marks:50		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	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.	7
II	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. 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.	8
III	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.	7
IV	The Internet: Introduction to networks and internet, history, Internet, Working of the Internet, Modes of Connecting to Internet. Electronic Mail: Introduction, advantages and disadvantages, User Ids, Passwords, e-mail addresses, message components, message composition, mailer features. Browsers and search engines	8
Suggested Evaluation Methods		
Internal Assessment: > Theory <input type="checkbox"/> Class Participation: 5 <input type="checkbox"/> Seminar/presentation/assignment/quiz/class test etc.: 5 <input type="checkbox"/> Mid-Term Exam: 5		End Term Examination: A three-hour exam for theory.
Part C-Learning Resources		
Text /Reference Books: <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. 		

SEMESTER - 2

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A-Introduction			
Subject	Computer Science		
Semester	II		
Name of the Course	Object Oriented Programming Using C++		
Course Code	24 L4.5-CSE-201		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-2 (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))		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 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/classes 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 Schildt, 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.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session: 2024-25			
Part A-Introduction			
Subject	Computer Science		
Semester	II		
Name of the Course	Database Management Systems		
Course Code	24 L4.5-CSE-202		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	DSEC-1		
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. Describe major components of DBMS and their functions 2. Model an application's data requirements using conceptual modelling tools like ER diagrams and design database schemas based on the conceptual model. 3. Write queries in relational algebra / SQL 4. Normalize a given database schema to avoid data anomalies and data redundancy. <hr/> 5*. to implement the concepts of databases using SQL.		
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	Database Management System – Introduction and Purpose, Database Architectures: Centralised, Client-Server, Parallel, Distributed, Web based system: Web architecture (2 tier, 3 tier, N-tier Architecture) Database Storage Structures: Introduction, Indexing, Hashing, Data Dictionary.	10
II	Data Models: Introduction to various data models, Cardinality Ratio & Relationships, Representation of entities, attributes, relationship attributes, relationship set, Generalization, aggregation, Structure of relational Database and different types of keys, Codd’s rules and Relational data model	10
III	Relational Database design: Basic System Development Life Cycle, Database Design – ER to Relational, Functional dependencies, Normalization, Normal forms based on primary keys (1NF, 2NF, 3NF)	10
IV	SQL queries: SQL data definition, data types, specifying constraints, Queries for retrieval, insertion, deletion, updation, introduction to views.	10
V*	<p>Practicum:</p> <p>Create and use the following database schema to answer the given queries.</p> <p>EMPLOYEE Schema:</p> <p>Field Type NULL KEY DEFAULT</p> <p>Eno Char(3) NO PRI NIL</p> <p>Ename Varchar(50) NO NIL</p> <p>Job_type Varchar(50) NO NIL</p> <p>Manager Char(3) Yes FK NIL</p> <p>Hire_date Date NO NIL</p> <p>Dno Integer YES FK NIL</p> <p>Commission Decimal(10,2) YES NIL</p> <p>Salary Decimal(7,2) NO NIL</p> <p>DEPARTMENT Schema:</p> <p>Field Type NULL KEY DEFAULT</p> <p>Dno Integer No PRI NULL</p> <p>Dname Varchar(50) Yes NULL</p> <p>Location Varchar(50) Yes New Delhi</p> <p>Query List</p> <ol style="list-style-type: none"> 1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first. 2. Query to display unique Jobs from the Employee Table. 3. Query to display the Employee Name concatenated by a Job separated by a comma. 4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT. 5. Query to display the Employee Name and Salary of all the employees earning more than \$2850. 6. Query to display Employee Name and Department Number for the Employee No= 7900. 7. Query to display Employee Name and Salary for all employees whose salary is not in the range of \$1500 and \$2850. 8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name. 9. Query to display Name and Hire Date of every Employee who was hired in 1981. 10. Query to display Name and Job of all employees who don’t have a 	25

	<p>current Manager.</p> <p>11. Query to display the Name, Salary and Commission for all the employees who earn commission.</p> <p>12. Sort the data in descending order of Salary and Commission.</p> <p>13. Query to display Name of all the employees where the third letter of their name is 'A'.</p> <p>14. Query to display Name of all employees either have two „R“s or have two A's in their name and are either in Dept No = 30 or their Manger's Employee No = 7788.</p> <p>15. Query to display Name, Salary and Commission for all employees whose Commission amount is 14 greater than their Salary increased by 5%.</p> <p>16. Query to display the Current Date.</p> <p>17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.</p> <p>18. Query to display Name and calculate the number of months between today and the date each employee was hired.</p> <p>19. Query to display the following for each employee earns < Salary > monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.</p>	
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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 & Reference Books:</p> <ul style="list-style-type: none"> • Elmasri, R., & Navathe, S.B. (2015). Fundamentals of Database Systems. 7th edition. Pearson Education. • Date, C. J. (2004). An Introduction to database systems. 8th edition. Pearson Education. • Silberschatz, A., Korth, H. F., & Sudarshan, S. (2010). Database System Concepts. 6th edition. McGrawHill.

*Applicable for courses having practical component.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	Computer Science	
Semester	II	
Name of the Course	Mathematical Foundations for Computer Science-II	
Course Code	24 L4.5-CSE-203	
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	Logic: Propositions, Logical operations, Conditional Statements, Tautologies, Contradictions, Logical Equivalence, The use of Quantifiers, Basic Counting Techniques: Fundamental Principle of Counting, Permutation and Combination, Addition and Multiplication Principles, Permutations as an Arrangement, Combinations as Selections	7
II	Algebraic Structures: Definitions and examples of Algebraic Structures with one Binary Operation: Semi Groups, Monoids, Groups; Congruence Relation and Quotient Structures, Permutation Groups, Cyclic groups, Normal Subgroups. Boolean Algebra, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.	8
III	Graph Theory: Graphs and their properties, Types of graphs, degree of vertex, Adjacent and incidence matrices, Connectivity, Path, Cycle, Sub Graph, Bi- connected component and Articulation Points, Isomorphic graphs, Homeomorphic graphs, Multigraph and Weighted graph, Shortest path in Weighted graphs, Eulerian paths and circuits, Hamiltonian path and circuits, Planar Graphs, Euler's formulae, Graph Coloring.	7
IV	Tree: Introduction to Trees, terminology and its properties, Binary trees and its traversals, BST, Minimum weight and Minimum distance spanning trees, Types of MST, DFS and BFS in trees.	8

Suggested Evaluation Methods

Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/classes test etc.: 5 • Mid-Term Exam: 5 	End Term Examination: A three-hour exam for theory.
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Part C-Learning Resources

Textbooks:

1. Discrete Mathematics and Structures by Satinder Bal Gupta.
2. A Textbook of Graph Theory by R. Balakrishnan and K. Ranganathan

Reference Books:

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.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	Computer Science	
Semester	II	
Name of the Course	Web Technologies Fundamentals	
Course Code	24 L4.5-CSE-204	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-2	
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"> • To know Protocols of Internet, World Wide Web • To describe the planning the site and navigation. • To apply the concept Text Basics, Document: Images and Multimedia • To impart the Need for CSS, introduction to CSS • To know about the current applications of XML, Features of XML • To instruct about the Mark-up Element and Attributes, Document. 	
Credits	Theory	Total
	3	3
Contact Hours	3	3
Max. Marks:70(50(T)+20(IA)) Internal Assessment Marks:20 End Term Exam Marks:50		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	Introduction: Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser, HTML, HTTP, SMTP, POP3, MIME, IMAP. Web site design principles, planning the site and navigation	7
II	HTML and CSS: History of HTML, Structure of HTML Document: Text Basics, Document: Images and Multimedia, Links and webs, Document Layout, Cascading Style Sheet: 4 Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS	8
III	XML: Introduction of XML- Some current applications of XML, Features of XML, Anatomy of XML document, The XML Declaration, Element Tags- Nesting and structure, XML text and text formatting element, Table element, Mark-up Element and Attributes, Document Type Definition (DTD), types. XML Objects, Checking Validity, Understanding XLinks, XPointer, Eventdriven Programming, XML Scripting	7
IV	PHP: PHP Introduction, Structure of PHP, PHP Functions, AJAX with PHP, PHP Code and the Complete AJAX Example. AJAX Database, Working of AJAX with PHP, Ajax PHP Database Form, AJAX PHP MySQL Select Query	8

Suggested Evaluation Methods

Internal Assessment: <ul style="list-style-type: none">➤ Theory• Class Participation: 5• Seminar/presentation/assignment/quiz/classes test etc.: 5• Mid-Term Exam: 5	End Term Examination: A three-hour exam for theory.
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Part C-Learning Resources

Textbooks and Reference Books:

1. Steven Holzner, "HTML Black Book", Dremtech press.
2. Developing Web Applications, 2ed by Savaliya, Wiley India Ltd
3. Web Technologies, Black Book, Dreamtech Press
4. Web Applications : Concepts and Real World Design, Knuckles, Wiley-India
5. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Bookby Kogent, Wiley India Ltd.
6. Internet and World Wide Web How to program, P.J. Deitel& H.M. Deitel Pearson.

Semester - 3

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A-Introduction			
Subject	Computer Science		
Semester	III		
Name of the Course	Data Structures and Applications		
Course Code	24 L5.0-CSE-301		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-3 (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))		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	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		
	Text Books: 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.	

	Reference Books:	
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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.

*Applicable for courses having practical component.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	Computer Science	
Semester	III	
Name of the Course	Concept of Operating Systems	
Course Code	24 L5.0-CSE-302	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	MCC-5	
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 style="text-align: center;">At the end of this course, the student will be able to:</p> <ol style="list-style-type: none"> 1. understand the basic concepts of operating systems and its services along with process management. 2. understand concept of process scheduling and acquire knowledge of process synchronization. 3. learn about memory management and virtual memory concepts. 4. learn to work with directory structure and security aspects. <hr style="width: 20%; margin-left: 0;"/> <p>5*. to implement the programs based on operating systems.</p>	
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>		
<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.. Examination will be of three-hour duration.</p>		
Unit	Topics	Contact Hours

I	Introductory Concepts: Operating System, Functions and Characteristics, Historical Evolution of Operating Systems, Operating System Structure. Types of Operating System: Real time, Multiprogramming, Multiprocessing, Batch processing. Operating System Services, Operating System Interface, Service System Calls, System Programs. Process Management: Process Concepts, Operations on Processes, Process States and Process Control Block. Inter-Process Communication.	16
II	Introductory Concepts: Operating System, Functions and Characteristics, Historical Evolution of Operating Systems, Operating System Structure. Types of Operating System: Real time, Multiprogramming, Multiprocessing, Batch processing. Operating System Services, Operating System Interface, Service System Calls, System Programs. Process Management: Process Concepts, Operations on Processes, Process States and Process Control Block. Inter-Process Communication.	14
III	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.	14
IV	Implementing File System: File System Structure, File System Implantation, file operations, Type of Files, Directory Implementation, Allocation Methods, and Free Space Management. Disk Scheduling algorithm- SSTF, Scan, C- Scan, Look, C-Look. SSD Management.	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 and Reference Books: <ul style="list-style-type: none"> • Silberschatz A., Galvin P.B., and Gagne G., Operating System Concepts, John Wiley & Sons. • Godbole, A.S., Operating Systems, Tata McGraw-Hill Publishing Company, New Delhi. • Deitel, H.M., Operating Systems, Addison- Wesley Publishing Company, New York. • Tanenbaum, A.S., Operating System- Design and Implementation, Prentice Hall of India, New Delhi. 	

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	Computer Science	
Semester	III	
Name of the Course	Programming with C	
Course Code	24 L5.0-CSE-303	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-3	
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):	<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	Total
	3	3
Contact Hours	3	3
Max. Marks:70(50(T)+20(IA)) Internal Assessment Marks:20 End Term Exam Marks:70(50(T)+20(IA))		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.</p>		

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	<p>Overview of C: History, Importance, Structure of C Program, Character Set, Constants and Variables, Identifiers and Keywords, Data Types, Assignment Statement, Symbolic Constant.</p> <p>Input/output: Formatted I/O Function-, Input Functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putchar(), puts().</p>	10
II	<p>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, if-else statement, nested if statement, else-if ladder, switch and break statement, go to statement, Looping Statements: for, while, and do-while loop, jumps in loops.</p>	10
III	<p>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.</p>	10
IV	<p>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.</p>	10
V*	<p>Practicum: 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"> • 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 	25

	<p>presses 999 and to find the sum of only positive numbers</p> <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 <p>To read marks scored by n students and find the average of marks (Demonstration of single dimensional array)</p> <ul style="list-style-type: none"> • 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 	
	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>End Term Examination: A three-hour exam for both theory and practicum.</p>
	<p>➤ Practicum</p> <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>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.

SEMESTER 4

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25			
Part A-Introduction			
Subject	Computer Science		
Semester	IV		
Name of the Course	Java OOP Foundations		
Course Code	24 L5.0-CSE-401		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-4 (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 Interfaces3. 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>			
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	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
*	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"> • 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. 	25

	<ul style="list-style-type: none"> • 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. 	
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"> • 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.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session:2024-25		
Part A-Introduction		
Subject	Computer Science	
Semester	IV	
Name of the Course	Logical Organization of Computer	
Course Code	24 L5.0-CSE-402	
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	MCC-7	
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.	

Session:2024-25			
Part A-Introduction			
Subject	Computer Science		
Semester	IV		
Name of the Course	Computer Graphics		
Course Code	24 L5.0-CSE-403		
Course Type:(CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	MCC-8		
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>			
<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	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 Panels, Raster-scan System, Random scan System, Graphic software, Input/output Devices, Tablets.	10
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 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.	
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*Applicable for courses having practical component.

Session: 2025-26		
Part A-Introduction		
Subject	Computer Science	
Semester	IV	
Name of the Course	Software Engineering	
Course Code	24 L5.0-CSE-404	
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	DSE-1	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course(if any)		
Course Learning Outcomes(CLO):	<p>On the completion of the course students will:</p> <p>1: Basic knowledge and understanding of the analysis and design of complex systems.</p> <p>2: Ability to apply software engineering principles and techniques.</p> <p>3: Ability to develop, maintain and evaluate large-scale software systems.</p> <p>4: To produce efficient, reliable, robust and cost-effective software solutions.</p> <p>5: Ability to perform independent research and analysis.</p> <p>6: Ability to work as an effective member or leader of software engineering teams.</p>	
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	Introduction: The process, software products, emergence of software engineering, evolving role of software, software life cycle models, Software Characteristics, Applications, Software crisis. Software project management: Project management concepts, software process and project metrics Project planning, project size estimation metrics, project estimation Techniques, empirical estimation techniques, COCOMO- A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking	16
II	Requirements Analysis and specification requirements engineering, system modeling and simulation Analysis principles modeling, partitioning Software, prototyping: , Prototyping methods and tools; Specification principles, Representation, the software requirements specification and reviews Analysis Modeling: Data Modeling, Functional modeling and information flow: Data flow diagrams, Behavioral Modeling; The mechanics of structured analysis: Creating entity/relationship diagram, data flow model, control flow model	14
III	System Design: Design concepts and principles: the design process: Design and software quality, design principles; Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, software procedure, information hiding; Effective modular design: Functional independence, Cohesion, Coupling;	14
IV	Software Reliability and Quality Assurance: Quality concepts, Software quality assurance, SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and record keeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability, Software Configuration Management. Computer Aided software Engineering: CASE, building blocks, integrated case environments and architecture, repository.	16

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.: 15 •Mid-Term Exam: 10 	<p>End Term Examination: A three hour exam for theory.</p>
<p>Part C-Learning Resources</p>	
<p>Recommended Books/e-resources/LMS:</p> <ol style="list-style-type: none"> 1. Software Engineering – A Practitioner’s Approach, Roger S. Pressman, 1996, MGH. 2. Fundamentals of software Engineering, Rajib Mall, PHI 3. Software Engineering by Ian Somerville, Pearson Edu, 5 edition, 1999, AW, 4. Software Engineering – David Gustafson, 2002, T.M.H 5. Software Engineering Fundamentals Oxford University, Ali Behforooz and Frederick J. Hudson 1995 JW&S, 6. An Integrated Approach to software engineering by Pankaj jalote , 1991 Narosa, 	

*Applicable for courses having practical component.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI

Session: 2025-26		
Part A-Introduction		
Subject	Computer Science	
Semester	IV	
Name of the Course	Software Testing	
Course Code	24 L5.0-CSE-405	
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	DSE-1	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course(if any)		
Course Learning Outcomes(CLO):	On the completion of the course students will: 1. To understand the basic terminologies and types of testing 2. Understand different testing methods 3. Understand the testing process 4. Manage the tests, plan testing process and create reports 5. Testing the software/project sousing various techniques	
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: Definition of Software Testing and its Role, Terms: - Failure, Error, Fault, Defect, Bug, Goals of Testing, Principles of Testing, Software Testing Life Cycle, Verification and Validation: - V-testing Life cycle	16
II	Types of Testing: Black Box Testing: Overview: What is &When? Techniques: Boundary Value Analysis, Equivalence class testing, Decision Table White Box Testing: What is white box Testing, Need of white box Testing, Classification , Structural : Coverage, Path testing	14
III	Levels of Testing Unit Testing : Overview, Integration Testing : Overview, Techniques: Graph based & Path based, Functional Testing, System Testing : Overview, Categories: Reliability Security Performance Recovery, Acceptance Testing : Overview, Types of Acceptance Testing	14
IV	Test Planning: Preparing a Test plan, Scope management, Decide Test Approach, Setting Up Criteria, for testing, Identifying responsibilities, Staffing, training needs, Resource requirements, Test deliverables, Testing Tasks	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		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Software Testing: Principles and Practice by Srinivasan Desikan, Gopaldaswamy Ramesh, Pearson Publication • Software Testing: Principles and Practice by Naresh Chauhan, Oxford • Software Testing: Easy Learning Approach by Shubha Agarwal Kundlas 		

*Applicable for courses having practical component.