UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024 -25	**Max. Marks: 30**
Program Name:	**Master of Computer Science (M.Sc. CS)**
Course Code: MCS 101N	**Course Name: Discrete Mathematics**

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	By principle of mathematical induction prove that 8n-3n is multiple of 5. Where n is a positive integer.	**2**
2.	Use principle of inclusion-exclusion to find the number of positive integers not exceeding 500 and divisible by 7 or 11.	**2**
3.	Change the function x+y' into disjunctive normal form.	**2**
4.	Find the probability of getting sum '9' or '11' on dice, when a pair of dice is rolled.	**2**
5.	Show that f: IR→IR defined by f(x)=4x-5 is one to one and onto. Find $f^{-1}(x)$.	**2**
6.	If $^{34}C_{n+7} = {}^{34}C4_{n+2}$ Then find the value of n.	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	(a) In a Boolean algebra prove that: (a.b)' = a' + b' (b) Draw the logic circuit for the expression x .y+z.y	**6**
8.	(a) Let X={1, 2, 3 ,...,7} and R={ (x, y) : x - y is divisible by 3}. Show that R is an equivalence relation. (b) Let X = {-1, 1} and $f(x) = x^3$ and f:x→x, then prove that f is one-to-one and onto mapping.	**6**
9.	Let P (x) be the statement "x can speak Russian" and let Q(x) be the statement "x knows the computer language C++." Express each of these sentences in terms of P(x), Q(x), quantifiers, and logical connectives. The domain for quantifiers consists of all students at your school. a) There is a student at your school who can speak Russian but who doesn't know C++. b) Every student at your school either can speak Russian or knows C++. c) No student at your school can speak Russian or knows C++.	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

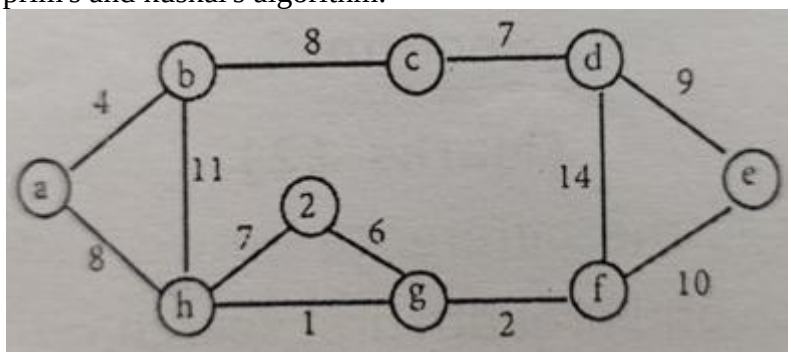
Session: 2024 -25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 102N	**Course Name:** C++ and Object-oriented programming

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	What is operator overloading? Write its functions.	**2**
2.	Discuss the simulation of real life problems using OOP concepts.	**2**
3.	Write a C++ program for checking whether a given number is prime or not prime.	**2**
4.	Write a C++ program to generate Fibonacci series up to 1000.	**2**
5.	What do you mean by "this" function? What are the applications of "this" pointer?	**2**
6.	What is friend function? How it is implemented in C++?	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	Define Object Oriented. Explain the important properties of Object Oriented Programming.	**6**
8.	Write a C++ program for checking whether a given number is prime or not prime.	**6**
9.	What is Constructors and Destructor? Illustrate with an example.	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024 -25	**Max. Marks: 30**
Program Name:	**Master of Computer Science (M.Sc. CS)**
Course Code: MCS 103N	**Course Name:** Data Structures

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
10.	What is the difference between the sequential search and binary search? Explain with suitable example in brief.	**2**
11.	What is spanning tree? Find minimum spanning tree of given graph by using prim's and kuskal's algorithm. 	**2**
12.	Sort the following sequence using heap sort method: 25, 30, 59, 10, 92, 85, 30.	**2**
13.	What is hash function? Explain the various hash function with suitable example.	**2**
14.	What is link list? Write down algorithm to insert and deletion of a node in the given link list. (i) At the end and (ii) Specified position in the given link list.	**2**
15.	What is stack? Evaluate the following postfix expression using stack. 5, 6, 2, +, *, 12, 4, /, -	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**

16.	(a) Explain the classification of data structure in brief with suitable example. (b) Write an algorithm for inserting an element into a circular queue and deleting an element from circular queue.	**6**
17.	The inorder and preorder traversal of a tree are given below: Inorder: DBMINEAFCJGK Preorder: ABDEIMNCFGJK (i) Construct a corresponding binary tree. (ii) Determine the postorder traversal of the tree drawn.	**6**
18.	Consider a two dimensional array A[20] [50] requires 4 bytes of storage Base address Array A is 2000. Determine the location of A[10] [10] when the array is stored as (i) Row major Order (ii) Column major Order	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024 -25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 106N	**Course Name:** Computer Organization

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	Define the substractor with the help of the truth table and circuit diagram?	**2**
2.	Draw the diagram of master-stare flip- flop and explain its working.	**2**
3.	Draw the diagram of ripple counter. Explain its working in brief.	**2**
4.	What is addressing? Explain different type of addressing in brief.	**2**
5.	What are the different BUS formats in a computer system.	**2**
6.	What is micro-controller and discuss its application	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	(a) Solve the problem: $(FAFAB)_{16} = (X)_{10}$ and $(26.24)_8 = (X)_{10}$. Show the steps of the solution. (b) Draw the symbol of NAND gate and EX- OR gate with their truth table. Explain it.	**6**
8.	(a) Obtain the Canonical sum of product term of the functions: F(A, B, C, D) =AC' +B (b) Find the minterm expansion f(a, b, c, d) = a' * (b' + d) + acd'	**6**
9.	(a) Draw the diagram of Demultipluxer and explain its working with example. (b) Draw the diagram of decoder and explain its working with an example.	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024 -25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 108N	**Course Name:** Data Communication and Computer Networks

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	Differentiate between 802.3, 802.4 and 802.5 IEEE standards.	**2**
2.	Find class of each address: (i) 140.213.10.80 (ii) 52.15.150.11	**2**
3.	What is unicast Routing? Discuss unicast routing protocols?	**2**
4.	Explain dynamic routing algorithms used in computer network.	**2**
5.	Explain about CDMA.	**2**
6.	What is network Topology. Explain different Network Topologies	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	(a) Discuss the services of each layer of OSI reference model in detail. (b) Write short note on pure ALOHA. Discuss slotted ALOHA and compare pure and slotted ALOHA.	**6**
8.	(a) What are network layer and describe design issues in network layer. (b) Enumerate how transport layer insures that the complete message arrives at the destination in proper order.	**6**
9.	(a) Write short note on token bucket algorithm? What are limitations of leaky bucket algorithm? (b) Explain about TCP Header and working of TCP and difference between TCP and UDP.	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024 -25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 109N	**Course Name:** Database Management System

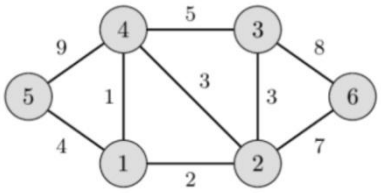
SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	Let R(ABCDEF) is a relational schema having FDs {A→BCDEF, BC→ADEF, B→C, D→E} Find out the Candidate Key ?	**2**
2.	What is dependency preserving and lossless join decomposition?	**2**
3.	Describe the main characteristics and advantages of the database management system in contrast with the earlier file oriented approach.	**2**
4.	What is index file? What are the differences between primary index and secondary index? Discuss in detail on B+ tree and B tree index file.	**2**
5.	Define 3NF (III Normal form) and BCNF (Boyee codd's Normal) form with example? Justify that 3NF is stronger than 2 NF?	**2**
6.	What is a transaction? What are the properties of a transaction?	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted. (i) Draw an E-R diagram (ii) Transform the E-R diagram to a Relational Schema.	**6**
8.	Write a query in SQL for following: a) Create a table client master with the following fieldsclient_no, name, address, city, state, pin_code, balance due. b) Add the following constraints on column of client master? • Create a primary key constraint on the column client_no? • create the following check constraints • Data values being inserted into the column name balance due should be greater than 0? d) Delete a row from client master where age is greater then 60?	**6**

9.	Let R (A, B, C, D) be a relational schema with the following functional dependencies: {A → B, B → C, C → D and D → B}. The relation R is decomposed into R1(AB), R2(BC), R3(BD). Determine whether it is dependency preserving or dependency not preserving decomposition.	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 111N	**Course Name:** Design and Analysis of Algorithm

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	How does the worse case time complexity of an algorithm is different from best case time complexity?	**2**
2.	What is the significance of Big-oh, Omega and theta?	**2**
3.	How Kruskal's algorithm is different from Prim's algorithm in finding a minimum cost spanning tree.	**2**
4.	Explain the data structure used for depth first search. Describe depth first search with an example.	**2**
5.	Explain breadth first search algorithm with an example. How it is different from depth first search?	**2**
6.	What is Kruskal's algorithm? Find the minimum cost spanning tree of the following graph using Kruskal's algorithm. 	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	i) How do we solve a problem with greedy algorithm? Does greedy algorithm always give optimal solution. Justify your answer. ii) What do you understand by data structure? Explain any two structure with suitable example.	**6**
8.	i) What do you understand by the divide and conquer algorithm? Explain any two applications of a divide and conquer algorithm. ii) What is a binary search algorithm? Explain working of binary search with a suitable example.	**6**
9.	i) Explain advantages of dynamic programming over divide and conquer. Describe two applications of dynamic programming. ii) What do you understand by time complexity of an algorithm? Explain how we perform performance analysis of an algorithm.	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 112N	**Course Name:** Java Programming

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	Explain exception handling and types of exception with example.	**2**
2.	Differentiate between byte stream and character stream in Java file handling. Write a program to copy one file to an- other.	**2**
3.	Explain synchronization methods and statements. Differentiate between file-inputstream and fileoutputstream with example.	**2**
4.	What is an applet? Explain applet life cycle methods.	**2**
5.	List all the AWT Controls with examples.	**2**
6.	What is JDBC? Write the JDBC connectivity steps.	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	a)What are lexical issues in Java? Explain identifiers, literals and keywords in Java with the program. b) Explain in detail operators and types of operators in Java. Write a program in Java to find the factorial of a number.	**6**
8.	(a) Differentiate between string buffer and string builder class in Java. (b) Differentiate between private, protected and public access specifiers with example.	**6**
9.	a) "Abstract classes can be defined with- out any abstract methods" support this statement with proper reasoning. b) Explain inheritance and types of inheritance with examples. Explain multilevel inheritance. Write a program to implement multilevel inheritance.	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

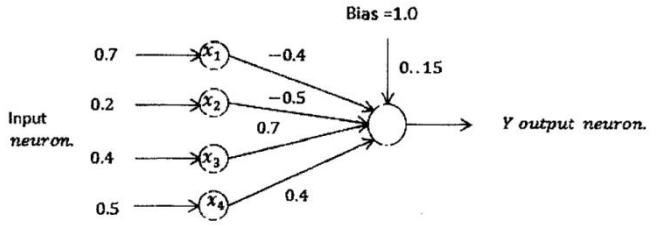
Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 113N	**Course Name:** Operating System

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	How does thrashing occurs? Explain with an example.	**2**
2.	What is a TLB? How does it improve effective access time of data?	**2**
3.	What are the minimum requirements that should be satisfied by a solution to critical section problem?	**2**
4.	What are the schemes used in operating system to handle deadlocks?	**2**
5.	How the SCAN does differs from C SCAN disk scheduling algorithm.	**2**
6.	What is the purpose of Unix Inode? Describe the structure of Unix Inode.	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	Why there is need of process synchronization? Explain how semaphores can be used to deal with n-process critical section problem.	**6**
8.	Consider the following table of arrival time and burst time for three processes P0, P1 and P2. Process Arrival time Burst Time P0 0 ms 9 ms P1 1 ms 4 ms P2 2 ms 9 ms The pre-emptive shortest job first scheduling algorithm is used. Scheduling is carried out only at arrival or completion of processes. What is the average waiting time for the three processes?	**6**
9.	Consider the following page reference string: 1,2,3,4,2,1,5,6,1,2,3,7,6,3,2,1,2,3,6 How many page faults would occur for the LRU, FIFO, LFU and optimal page replacement algorithms assuming three and five frames?	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 117N	**Course Name:** Soft Computing

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	Distinguish between hard and soft computing.	**2**
2.	Apply the binary and bipolar sigmoid function for the below figure and find its output. 	**2**
3.	What is Roulette Wheel Selection? Why mutation and crossover is important in genetic algorithm?	**2**
4.	What is the role of activation functions in a Neural Network? Explain various types of activation functions with their merits and demerits	**2**
5.	What is deep leaning? What are the applications of a Convolutional Neural Network (CNN)?	**2**
6.	Discuss how recurrent neural network is different from convolutional neural network.	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	Illustrate the various steps involved in the back propagation algorithm with a suitable diagram.	**6**
8.	Explain the different types of crossover operations and survivor selection methods used in genetic algorithm.	**6**
9.	Explain the fuzzy rule based system with help of a block diagram? Illustrate various types of defuzzification techniques.	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 116N	**Course Name:** Computer Graphics

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	Using midpoint circle drawing algorithm find the coordinates of pixels that lie on the boundary with radius 1.3 and center as (4,4).	**2**
2.	What is the difference between boundary fill and flood-fill algorithms? Write 8-boundary fill algorithm.	**2**
3.	Define image quantization. Explain zero memory quantizer. Is quantization process reversible? If yes, or no, justify.	**2**
4.	Write short notes on the following: (i) B-Spline (ii) cut vertex, cut edge, cut set	**2**
5.	What is a curve interpolation? Define Bezier curve and explain its properties.	**2**
6.	Construct the Bezier curve of order 3 and with 4 poly-gon vertices's A(2,2), B(4,3), C(5,4) and D(6,7).	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	(a) Distinguish between random scan and raster scan systems. Explain shadow mask and beam penetration methods. b) Differentiate between emissive and non-emissive displays? Explain the working of LED and LCD.	**6**
8.	(a) Explain the role of pixel and frame buffer in graphics devices. Explain the working of refresh CRT? (b) Explain the midpoint circle drawing algorithm.	**6**

9.	(a) Describe in detail Bresenham's line drawing algorithm and explain how it is better than DDA algorithm for line generation. (b) With suitable examples explain all 2D-transformations. What is the role of homogeneous coordinates in 2D-transformations?	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 114N	**Course Name:** Multimedia Technology

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	What are the differences between the GIF and JPEG?	**2**
2.	What do you mean by Animation? List the all Animation Tools.	**2**
3.	What are the various component of hypertext? Discuss the application of hypertext in multimedia.	**2**
4.	Explain the process involved in planning of Multimedia Application.	**2**
5.	Explain advantages of storing image in vector format.	**2**
6.	What are the important features of Flash Software?	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	List the hardware and software components essential for professional multimedia development. Also, justify purpose and need of each of the hardware components.	**6**
8.	a) How is animation useful in multimedia? List out the key features of all Animation Tools. b) Describe various phases of multimedia application development.	**6**
9.	What are the authoring tools? List out some silent features of a good authoring tool.	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 119N	**Course Name:** Information and Network Security

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	What is digital certification? How it can be achieved?	**2**
2.	Describe DES symmetric key cryptography algorithm.	**2**
3.	What is the need of firewall? Explain virtual private network.	**2**
4.	What is a virus? Explain various types of viruses.	**2**
5.	What is the need of a VPN? Explain the two modes of a VPN.	**2**
6.	What is digital certification? How it can be achieved?	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	Generate public key and private key in case of RSA algorithm if two prime numbers are 5 and 7 and p=5, q=7.	**6**
8.	i) Perform RSA encryption for the string "SECURE" using RSA algorithm by considering p = 17, q = 11 and e = 3 (for n value convert to ASCII). ii) Decode the following Caesar cipher using frequency analysis with shift +6 "KGYEZUHXKGQ"	**6**
9.	Explain the following (a) Replay attack (b) Denial of service attack (c) authentication (d) integrity (e) confidentiality (f) nonrepudiation	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 104N	**Course Name:** Software Engineering

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	What do you mean by SQA? How SQA is beneficial?	**2**
2.	What do you mean by SEI-CMM Model?	**2**
3.	What do you understand by the term Software Development Life Cycle (SDLC)? Why is it important to adhere to a life cycle model while developing a large software product?	**2**
4.	Differentiate between integration testing and system testing?	**2**
5.	Why does software fail after is has passed from acceptance testing? Explain.	**2**
6.	Some people feel that "Maintenance is manageable". What is your opinion about this issue?	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	Consider a project to develop a full screen editor. The major components identified are (1) Screen Edit (2) Command language interpreter (3) File input and output (4) Cursor movement and (5) Screen movement. The sizes for these are estimated to be 4K, 2K, 1K, 2K, and 3K delivered source code lines. Use COCOMO model to determine. (i) Overall estimates cost and schedule (ii) Cost and schedule estimates for different phases.	**6**
8.	(a) What is software engineering? It is an, craft or a science? Discuss. (b) "The software crisis is aggravated by the progress in hardware technology?" Explain with example.	**6**
9.	(a) What do you mean by Reverse engineering? Explain with suitable diagram? (b) What do you mean by Decision Table Based Testing? Explain with suitable example?	**6**

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY
SHANTIPURAM, SECTOR-F, PHAPHAMAU, PRAYAGRAJ-2110021

ASSIGNMENT QUESTION PAPER

Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 107N	**Course Name:** Theory of Computation

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	What are the difference between decidable and undecidable problems?	**2**
2.	Construct a DFA for the language 'all strings with 011 as a substring', over alphabet {0, 1}.	**2**
3.	What is Push Down Automata? Give an example of a language accepted by a PDA but not by DPDA.	**2**
4.	How to prove that a given problem is NP complete?	**2**
5.	Give an example of a language accepted by a PDA but not by DPDA.	**2**
6.	Obtain CFG for the language L = $\{ww^R \mid w \in \{a, b\}^*\}$, w^R is the reversal of w }.	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	Let G be the grammar S -> aB|bA A -> a|aS|bAA B-> b|bS|aBB For the string baaabbabba. Find leftmost derivation, rightmost derivation and parse tree.	**6**
8.	Convert the following grammar into CNF S -> aBa|abba A -> ab | AA B -> aB| a	**6**
9.	Distinguish NFA and DFA with suitable examples. Design a DFA to accept the binary numbers which are divisible by 5.	**6**

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ASSIGNMENT QUESTION PAPER

Session: 2024-25	**Max. Marks: 30**
Program Name: Master of Computer Science (M.Sc. CS)	
Course Code: MCS 120N	**Course Name:** System Software

SECTION -A		**2*6=12 marks**
Q. No.	**Short answer type question (approx. 200 -300 words)**	**Marks**
1.	What do you understand by Machine Dependency of System Software?	**2**
2.	What is a loader? How loader is different from linker?	**2**
3.	What is the regular expressions that denotes a language comprising all possible strings of even length over the alphabet (0 , 1)?	**2**
4.	What are different code optimization techniques?	**2**
5.	What are different code optimization techniques?	**2**
6.	Describe different forms of intermediate code.	**2**
SECTION -B		**6*3=18 marks**
Q. No.	**Long answer type question (approx. 500 -800 words)**	**Marks**
7.	What are the differences between Search Data Structures and Allocation Data Structures in Language Processors?	**6**
8.	What is a general purpose macro processor? State and explain the algorithm for an one pass macro processor.	**6**
9.	What is the role of parser in compiler design? Differentiate between top-down parsing and bottom-up parsing.	**6**