उत्तरप्रदेशराजर्षिटण्डनमुक्तविश्वविद्यालय,इलाहाबाद

Master of Computer Science　　　　　कार्यक्रमअधिन्यास सत्र **2023.24**

कोर्सकोड : Course Code: **MCS 111**	कोर्स शीर्षकः— (Course Title) **Design and Analysis of Algorithm**	अधिकतमअंक : 30 **Maximum Marks : 30**

खण्ड अ　　　　　　　　　　　　　　　　　　　　अधिकतमअंक : 18
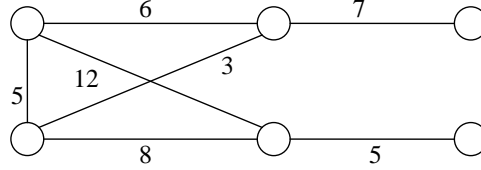**Section-A**　　　　　　　　　　　　　　　　　　**Maximum Marks: 18**

नोट—(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>all three questions</u> from this section.

प्रश्न संख्या 1 से 3 तकदीर्घउत्तरीय प्रश्नहैजिनकाउत्तर 800 से 1000 शब्दोंमेंलिखनाहै।

1. Explain the divide and conquer strategy to solve a problem? What are the various applications of divide and conquer strategy.
2. Find the minimum spanning tree using Prims algorithm for the following graph.

3. Explain greedy algorithms with suitable example. How is dynamic programming different from greedy algorithms?

खण्ड ब　　　　　　　　　　　　　　　　　　　　अधिकतमअंक : 12
Section –B　　　　　　　　　　　　　　　　　　**Maximum Mark : 12**

नोट—(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>all four questions</u> from this section.

प्रश्न संख्या 4 से 7 तकलघुउत्तरीय प्रश्नहैजिनकाउत्तर 200 से 300 शब्दोंमेंलिखनाहै।

4. What do you understand by minimum spanning tree? Explain how minimum cost spanning tree is computed?
5. Suppose we are comparing implementations of insertion sort and merge sort on the same machine. For inputs of size n, insertion sort runs in 8n2 steps, while merge sort runs in 64 n lg n steps. For which values of n does insertion sort beat merge sort?
6. Discuss the differences between stable and in-place sorting techniques.
7. Compare and contrast quick sort and merge sort?

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Master of Computer Science　　　　　कार्यक्रमअधिन्यास सत्र **2023.24**

कोर्सकोड : Course Code: **MCS 112**	कोर्स शीर्षकः– (Course Title) **Java Programming**	अधिकतमअंक : 30 **Maximum Marks : 30**

खण्ड अ　　　　　　　　　　　　　　　　　　　　अधिकतमअंक : 18
Section-A　　　　　　　　　　　　　　　　　**Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt all three questions from this section.

प्रश्न संख्या 1 से 3 तकदीर्घउत्तरीय प्रश्नहैजिनकाउत्तर 800 से 1000 शब्दोंमेंलिखनाहै।

1. What is a constructor? Write a Java program to explain how super class constructors are called in their subclasses.
2. What is Object Oriented Paradigm? Explain why Object Oriented Programming is preferred over structured programming?
3. What is inheritance? Explain two benefits of inheritance, with an example of each.

खण्ड ब　　　　　　　　　　　　　　　　　　　　अधिकतमअंक : 12
Section –B　　　　　　　　　　　　　　　　　**Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt all four questions from this section.

प्रश्न संख्या 4 से 7 तकलघुउत्तरीय प्रश्नहैजिनकाउत्तर 200 से 300 शब्दोंमेंलिखनाहै।

4. What is static method? Explain why main method in Java is always static
5. What is package in Java? Explain how to decide the need of package(s) in a system.
6. What is the difference between Overloading and Overriding? Is it possible to override a inner classes.
7. What is multithreaded programming? Explain how threads are created in Java.

उत्तरप्रदेशराजर्षिटण्डनमुक्तविश्वविद्यालय,इलाहाबाद

Master of Computer Science कार्यक्रमअधिन्यास सत्र **2023.24**

कोर्सकोड : Course Code: **MCS 113**	कोर्स शीर्षकः– (Course Title) **Theory of Computation**	अधिकतमअंक : 30 **Maximum Marks : 30**

खण्ड अ अधिकतमअंक : 18
Section-A **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>all three questions</u> from this section.

प्रश्न संख्या 1 से 3 तकदीर्घउत्तरीय प्रश्नहैजिनकाउत्तर 800 से 1000 शब्दोंमेंलिखनाहै।

1. Distinguish NFA and DFA with suitable examples.
2. 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.
3. Convert the following grammar into CNF
    S ->aBa|abba
    A -> ab | AA
    B ->aB| a

खण्ड ब अधिकतमअंक : 12
Section –B **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>all four questions</u> from this section.

प्रश्न संख्या 4 से 7 तककलघुउत्तरीय प्रश्नहैजिनकाउत्तर 200 से 300 शब्दोंमेंलिखनाहै।

4. What are the difference between decidable and undecidable problems?
5. Construct a DFA for the language 'all strings with 011 as a substring', over alphabet {0, 1}.
6. Obtain CFG for the language L = {wwR | w ϵ {a, b}* }, wR is the reversal of w }.
7. What is Push Down Automata? Give an example of a language accepted by a PDA but not by DPDA.

उत्तरप्रदेशराजर्षिटण्डनमुक्तविश्वविद्यालय,इलाहाबाद

Master of Computer Science　　　　　कार्यक्रमअधिन्यास सत्र **2023.24**

कोर्सकोड : Course Code: **MCS 114**	कोर्स शीर्षकः— (Course Title) **Multimedia Technology**	अधिकतमअंक : 30 **Maximum Marks : 30**

खण्ड अ　　　　　　　　　　　　　　　　　　　　　　　अधिकतमअंक : 18
Section-A　　　　　　　　　　　　　　　　　　　　**Maximum Marks: 18**

नोट—(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>all three questions</u> from this section.

प्रश्न संख्या 1 से 3 तकदीर्घउत्तरीय प्रश्नहैजिनकाउत्तर 800 से 1000 शब्दोंमेंलिखनाहै।

1. List the hardware and software components essential for professional multimedia development. Also, justify purpose and need of each of the hardware components.
2. How image is stored in vector format? Explain its advantages.
3. What are the authoring tools? List out some silent features of a good authoring tool.

खण्ड ब　　　　　　　　　　　　　　　　　　　　　　　अधिकतमअंक : 12
Section –B　　　　　　　　　　　　　　　　　　　　**Maximum Mark : 12**

नोट—(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>all four questions</u> from this section.

प्रश्न संख्या 4 से 7 तकलघुउत्तरीय प्रश्नहैजिनकाउत्तर 200 से 300 शब्दोंमेंलिखनाहै।

4. What are the differences between the GIF and JPEG?
5. What do you mean by Animation? List the all Animation Tools.
6. What are the various component of hypertext? Discuss the application of hypertext in multimedia.
7. Explain the process involved in planning of Multimedia Application.

कोर्सकोड : Course Code: **MCS 116**	कोर्स शीर्षकः– (Course Title) **Operating System**	अधिकतमअंक : 30 **Maximum Marks : 30**

खण्ड अ   अधिकतमअंक : 18
Section-A   **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>all three questions</u> from this section.

प्रश्न संख्या 1 से 3 तकदीर्घउत्तरीय प्रश्नहैजिनकाउत्तर 800 से 1000 शब्दोंमेंलिखनाहै।

1. Why there is need of process synchronization? Explain how semaphores can be used to deal with n-process critical section problem.

2. 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?

3. 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?

खण्ड ब   अधिकतमअंक : 12
Section –B   **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>all four questions</u> from this section.

प्रश्न संख्या 4 से 7 तकलघुउत्तरीय प्रश्नहैजिनकाउत्तर 200 से 300 शब्दोंमेंलिखनाहै।

4. How does thrashing occurs? Explain with an example.
5. What is a TLB? How does it improve effective access time of data?

6. What are the minimum requirements that should be satisfied by a solution to critical section problem?
7. What are the schemes used in operating system to handle deadlocks?

उत्तरप्रदेशराजर्षिटण्डनमुक्तविश्वविद्यालय,इलाहाबाद

Master of Computer Science   कार्यक्रमअधिन्यास सत्र **2023.24**

कोर्सकोड : Course Code: **MCS 117**	कोर्स शीर्षकः– (Course Title) **Soft Computing**	अधिकतमअंक : 30 **Maximum Marks : 30**

खण्ड अ   अधिकतमअंक : 18
Section-A   **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>all three questions</u> from this section.

प्रश्न संख्या 1 से 3 तकदीर्घउत्तरीय प्रश्नहैजिनकाउत्तर 800 से 1000 शब्दोंमेंलिखनाहै।

1. Illustrate the various steps involved in the back propagation algorithm with a suitable diagram.

2. Explain the different types of crossover operations and survivor selection methods used in genetic algorithm.

3. Explain the fuzzy rule based system with help of a block diagram?Illustrate various types of defuzzification techniques.

खण्ड ब   अधिकतमअंक : 12
Section –B   **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>all four questions</u> from this section.

प्रश्न संख्या 4 से 7 तकलघुउत्तरीय प्रश्नहैजिनकाउत्तर 200 से 300 शब्दोंमेंलिखनाहै।

4. Distinguish between hard and soft computing.
5. Apply the binary and bipolar sigmoid function for the below figure and find its output.
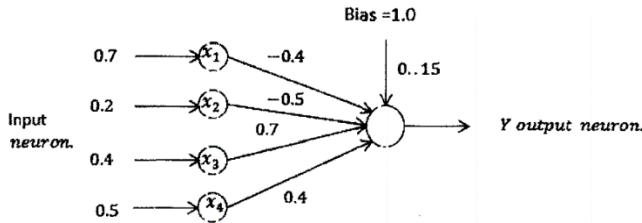
6. What is deep leaning? What are the applications of a Convolutional Neural Network (CNN)?
7. Discuss how recurrent neural network is different from convolutional neural network.

उत्तरप्रदेशराजर्षिटण्डनमुक्तविश्वविद्यालय,इलाहाबाद

Master of Computer Science   कार्यक्रमअधिन्यास सत्र **2023.24**

कोर्सकोड : Course Code: **MCS 119**	कोर्स शीर्षकः– (Course Title) **Information and Network Security**	अधिकतमअंक : 30 **Maximum Marks : 30**

खण्ड अ   अधिकतमअंक : 18
Section-A   **Maximum Marks: 18**

नोट–(Instructions): **Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>all three questions</u> from this section.**

प्रश्न संख्या 1 से 3 तकदीर्घउत्तरीय प्रश्नहैजिनकाउत्तर 800 से 1000 शब्दोंमेंलिखनाहै।

1. Generate public key and private key in case of RSA algorithm if two prime numbers are 5 and 7 and p=5, q=7.

2. Explain different types of attacks. Discuss various security approaches.

3. Explain the following

   (a) Replay attack (b) Denial of service attack (c) authentication (d) integrity (e) confidentiality (f) nonrepudiation

खण्ड ब   अधिकतमअंक : 12
Section –B   **Maximum Mark : 12**

नोट–(Instructions): **Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>all four questions</u> from this section.**

प्रश्न संख्या 4 से 7 तकलघुउत्तरीय प्रश्नहैजिनकाउत्तर 200 से 300 शब्दोंमेंलिखनाहै।

4. What is digital certification? How it can be achieved?
5. Describe DES symmetric key cryptography algorithm.
6. What is the need of firewall? Explain virtual private network.
7. What is a virus? Explain various types of viruses.

उत्तरप्रदेशराजर्षिटण्डनमुक्तविश्वविद्यालय,इलाहाबाद

Master of Computer Science   कार्यक्रमअधिन्यास सत्र **2023.24**

कोर्सकोड : Course Code: **MCS 120**	कोर्स शीर्षकः– (Course Title) **System Software**	अधिकतमअंक : 30 **Maximum Marks : 30**

खण्ड अ   अधिकतमअंक : 18
Section-A   **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>all three questions</u> from this section.

प्रश्न संख्या 1 से 3 तकदीर्घउत्तरीय प्रश्नहैजिनकाउत्तर 800 से 1000 शब्दोंमेंलिखनाहै।

1. What are the differences between Search Data Structures and Allocation Data Structures in Language Processors?

2. What is a general purpose macro processor? State and explain the algorithm for an one pass macro processor.

3. What is the role of parser in compiler design? Differentiate between top-down parsing and bottom-up parsing.

खण्ड ब   अधिकतमअंक : 12
Section –B   **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>all four questions</u> from this section.

प्रश्न संख्या 4 से 7 तकलघुउत्तरीय प्रश्नहैजिनकाउत्तर 200 से 300 शब्दोंमेंलिखनाहै।

4. What do you understand by Machine Dependency of System Software?

5. What is a loader? How loader is different from linker?

6. What is the regular expressions that denotes a language comprising all possible strings of even length over the alphabet (0 , 1)?

7. What are different code optimization techniques?