उत्तर प्रदेश राजर्षि टण्डन मुक्त विश्वविद्यालय, प्रयागराज

Master of Science (Computer Science) कार्यक्रम अधिन्यास

कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **MCS-101**	**Discrete Mathematics**	**Maximum Marks : 30**

खण्ड अ **अधिकतम अंक : 18**

Section-A **Maximum Marks : 18**

नोट– (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words.

1. Answer the following:
   a. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?
   b. In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?
2. Rewrite the following arguments using qualifiers, variables and predicate symbols:
   a. All birds can fly
   b. Some men are genius.
   c. Some numbers are not rational
   d. There is a student who likes mathematics but not geography.
3. Explain the following terms with suitable examples –
   a. Conjuction
   b. Disjunction
   c. Contrapositive

खण्ड ब **अधिकतम अंक : 12**

Section –B **Maximum Mark : 12**

नोट– (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words.

4. Find using Karnaugh maps a minimal form for the boolean function.
   f (x, y, z) = xyz + xyz' + x'yz' + x'y'z'.

5. In any boolean algebra show that
   (a + b) (b + c) (c + a) = ab + bc + ca.
6. Define with examples of NAND and NOR gates.
7. Briefly explain the Pigeonhole principle.

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Master of Science (Computer Science) कार्यक्रम अधिन्यास सत्र

कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **MCS-102**	**C++ and Object Oriented Programming**	**Maximum Marks : 30**

खण्ड अ **अधिकतम अंक : 18**

Section-A **Maximum Marks : 18**

नोट– (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words.

1. What is operator overloading? Illustrate Operator overloading concept to concatenate strings.
2. Explain why do we need to use constructors? Explain a copy constructor with an example.
3. What are the different forms of inheritance supported by C++ ? Explain with examples.

खण्ड ब **अधिकतम अंक : 12**

Section –B **Maximum Mark : 12**

नोट– (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words.

4. What do you mean by “this” function? What are the applications of “this” pointer?
5. What are pure virtual functions?
6. What is friend function? How it is implemented in C++ ?
7. What are different types of inheritance?

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Master of Science (Computer Science) कार्यक्रम अधिन्यास सत्र 2020-21

कोर्सकोड : Course Code: **MCS-103**	कोर्स शीर्षकः– (Course Title) **Data Structures**	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. All questions are compulsory.

1. What is a stack? What operations are associated with a stack?
2. Sort the following list of numbers using Quick Sort in descending order:
   1, 3, 2, 5, 4, 6, 12, 10, Show all the passes.
3. Discuss the applications of searching techniques. Write a program in C to implement a linear search and binary search.

खण्ड ब **अधिकतम अंक : 12**

Section –B **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. All questions are compulsory.

4. Define “Binary Tree”. How does a Binary Tree differ from a Tree?
5. Define “Graph”. When can it be said that two vertices of a Graph are connected?
6. Write an algorithm for the addition of two matrices.
7. Define AVL tree. Is the statement “Every Binary Tree is an AVL tree” correct? Justify your answer.

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Master of Science (Computer Science) कार्यक्रम अधिन्यास

कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **MCS-104**	**Software Engineering**	**Maximum Marks : 30**

खण्ड अ **अधिकतम अंक : 18**

Section-A **Maximum Marks : 18**

नोट– (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words.

1. Define the following:
   (i) Software Product
   (ii) Software Engineering
   (iii) Software Testing.
2. (a) Define software risk. Explain in brief the types of software risk.
   (b) Explain the layered approach used in software Engineering.
3. Explain SDIC in detail. Also explain the framework activities involved in the software development process.

खण्ड ब **अधिकतम अंक : 12**

Section –B **Maximum Mark : 12**

नोट– (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words.

4. Explain four differences between alpha & Beta testing.
5. Explain the task in value at in Requirements Engineering.
6. Define software reliability and software availability.
7. Explain four approaches to handle the software sizing problem.

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Master of Science (Computer Science) कार्यक्रम अधिन्यास

कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **MCS-106**	**Computer Organization**	**Maximum Marks : 30**

खण्ड अ **अधिकतम अंक : 18**

Section-A **Maximum Marks : 18**

नोट– (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words.

1. (a)Implement the following Boolen Expression with NOR GATE only.
   F (A, B, C) = Π(0, 2, 4, 6, 7)
   (b) Why NAND and NOR gates are called as Universal gate.
2. What do you mean by Flip-Flop? Discuss the functions and circuits diagram of different type of flip flop?
3. What is the difference between combinational and sequential circuit? Explain with appropriate example.

खण्ड ब **अधिकतम अंक : 12**

Section –B **Maximum Mark : 12**

नोट– (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words.

4. Differentiate Hardware and Micro-programmed control unit with their advantages and disadvantages.
5. What is instruction cycle? When will be any interrupt processed during the instruction cycle?
6. What is DMA? Explain DMA transfer modes in detail.
7. What do you mean by memory hierarchy? Why registers are present in CPU?

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Master of Science (Computer Science) कार्यक्रम अधिन्यास

कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **MCS-107**	**Computer Graphics**	**Maximum Marks : 30**

खण्ड अ **अधिकतम अंक : 18**

Section-A **Maximum Marks : 18**

नोट– (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words.

1. Describe the matrix formulation of 2D Translation, Scaling and Rotation.
2. Write mid-point circle drawing algorithm and apply that algorithm to find pixel value of a circle with radius r=10 and center of circle (0, 0).
3. Write short note on following
   a) Viewing coordinates.
   b) Polygon meshes
   c) 3D display methods

खण्ड ब **अधिकतम अंक : 12**

Section –B **Maximum Mark : 12**

नोट– (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words.

4. Consider two raster systems with the resolutions of 640x480, 1280x1024, and 2560x2048. What size frame buffer (in bytes) is needed for each of these systems to store 12 bits/pixel? How much storage is required for each system if 24 bits per pixel are to be stored?
5. Differentiate between parallel projection and perspective projection.
6. Explain DDA line drawing algorithm with Example.
7. What are the differences between raster scan and random scan system?

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Master of Computer Application (MCA) कार्यक्रम अधिन्यास सत्र

कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **MCS-108**	**Data Communication and Computer Networks**	**Maximum Marks : 30**

खण्ड अ **अधिकतम अंक : 18**

Section-A **Maximum Marks : 18**

नोट– (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words.

1. What is data communication? Discuss the different made of Data communication. 6
2. What do you mean by addressing? Discuss the different type of addressing.
3. Give the ISO-OSI ref. model for Data Communication and explain the function of each layer in brief. How it is different than TCP/IP model?

खण्ड ब **अधिकतम अंक : 12**

Section –B **Maximum Mark : 12**

नोट– (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words.

4. How BGP is different from other distance vector routing protocols?
5. What do you mean by digital signature?
6. What do you mean by Baud rate? How is it different from Bit rate?
7. What is Analog data transmission?

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Master of Science (Computer Science) कार्यक्रम अधिन्यास

कोर्स कोड : Course Code: **MCS-109**	कोर्स शीर्षकः– (Course Title) **Database Management System**	अधिकतम अंक : 30 **Maximum Marks : 30**

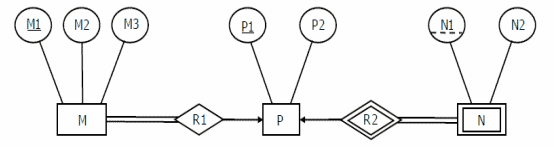
खण्ड अ **अधिकतम अंक : 18**

Section-A **Maximum Marks : 18**

नोट– (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words.

1. Consider a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.
   (i) Draw an E-R diagram
   (ii) Transform the E-R diagram to a Relational Schema.

2. Consider the following ER diagram.



Explain how many tables are needed to represent M, N, P, R1, R2?

3. Consider the relation R(A,B,C,D,E,G) with functional dependencies given by {AB->C, AC->B, AD-> E, B->D, BC->A, E-> G}. Consider the decomposition of R into {AB, BC, ABDE,EG}.
   a) Is this decomposition lossy or lossless? Explain why?
   b) Is this decomposition is dependency preserving or not? Explain why?

खण्ड ब **अधिकतम अंक : 12**

Section –B **Maximum Mark : 12**

नोट– (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words.

4. ***Identify the Normal Forms of the relation R(ABCDEF) Functional dependencies given by {AB → C, C → D, B → E, B → F}***
5. Let R (ABCDEF) is a relational schema having FDs {A→BCDEF, BC→ADEF, B→C, D→E} Find out the Candidate Key ?
6. What is derived attribute? Explain the differences between single-valued attributes and multi-valued attributes.

7. The employee information in a company is stored in the relation.

   Employee:(name,sex,salary,deptName)

   Assume name is primary key and consider the following SQL query:

   SELECT deptName FROM Employee WHERE sex='M' GROUP BY deptName

   HAVING AVG(salary)> (SELECT AVG(salary) FROM Employee);

   Explain the output of above SQL query?