उत्तर प्रदेश राजर्षि टण्डन मुक्त विश्वविद्यालय, प्रयागराज

अधिन्यास सत्र 2019–20

Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSC-CS-01**	कोर्स शीर्षकः– (Course Title) **Discrete Mathematical Structure**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. 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.
2. 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 and who knows C++.
   b) There is a student at your school who can speak Russian but who doesn‟t know C++.
   c) Every student at your school either can speak Russian or knows C++.
   d) No student at your school can speak Russian or knows C++.
3. Determine whether the relation R on the set of all Web pages is reflexive, symmetric, antisymmetric, and/or transitive, where (a, b) ∈ R if and only if
   a) everyone who has visited Web page a has also visited Web page b.
   b) There are no common links found on both Web page a and Web page b.
   c) There is at least one common link on Web page a and Web page b.
   d) There is a Web page that includes links to both Web page a and Web page b.

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. Find using Karnaugh maps a minimal form for the boolean function.
   a. f (x, y, z) = xyz + xyz' + x'yz' + x'y'z'.
5. Define tautologies and contradictions with examples.
6. Construct the truth table for P v (q ^ r) ⇔ q^ (p v r).
7. What is planar graph? Also explain Euler's formula.

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSc-CS-02**	कोर्स शीर्षकः– (Course Title) **'C' Programming**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is a structure? Create a suitable structure for storing the information about the Technical Institutions in India (Assume appropriate attributes to store the information). List all the institutes for a given state.

2. Suppose A is a header circular list in memory. Write a program in C which deletes the last node from A.
3. Convert the following infix expression into postfix expression using stack.
   (i) (a-b*(f+g * h)) * (d/e-f)
   (ii) (ii) (a + b ↑ d) /(e-f) + g

खण्ड ब अधिकतम अंक : 12

Section –B **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. With the help of an example explain how dynamic memory allocation can be done in C.
5. Write a short note on call by value and call by reference parameter passing method with example.
6. Write a program in C to check whether a given string is a palindrome or not? Also give the total number of characters in the string.
7. What is Recursive Function? Explain with suitable Example.

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSC-CS-03**	कोर्स शीर्षकः– (Course Title) **Digital Computer Fundamentals and Assembly Language Programming**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Explain the following addressing modes with an example and suggest a use for those addressing modes:
   i. Register Indirect
   ii. Auto increment
   iii. Indirect address
   iv. Base address
   v. Indexed address
3. What do you mean by Flip-Flop? Discuss the functions and circuits diagram of different type of flip flop?
4. What is input-output interface? Draw and explain block diagram of input-output interface.

खण्ड ब अधिकतम अंक : 12

Section –B **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

10. What is instruction cycle? When will be any interrupt processed during the instruction cycle?
11. Briefly describe what are Special purpose registers and General purpose registers in CPU.
12. Write down the micro operations involves in fetch cycle.
13. What is the difference between isolated I/O and memory mapped I/O?

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSC-CS-05**	कोर्स शीर्षकः– (Course Title) **Theory of Computation**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Construct the deterministic finite automata for accepting the set of all strings with three consecutive 0's.
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. State pumping lemma for regular languages.

खण्ड ब — अधिकतम अंक : 12
Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. Give an example of a language accepted by a PDA but not by DPDA.
5. Mention the difference between decidable and undecidable problems with examples of each.
6. Obtain CFG for the language L = $\{ww^R \mid w \in \{a, b\}^* \}$, w^R is the reversal of w }.
7. What are P, NP, NP-complete, and NP-hard?

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कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **Msc-CS-06**	**System Analysis and Design**	**Maximum Marks : 30**

खण्ड अ — अधिकतम अंक : 18

Section-A — **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is Risk Management and what will risk management do for any business? How does software risk management related to Software process improvement?
2. What is function point analysis? List four features of it.
3. Explain the following:
   a) Project b) Project scheduling c) Critical Path d) Milestones e) Checkpoints f) Project review.

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. What are the differences between Black Box Testing" and "White Box Testing"?
5. Discuss the role of PERT Chart in software development.
6. When it is beneficial to use spiral model?
7. What is brain storming?

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSC-CS-07**	कोर्स शीर्षकः– (Course Title) **Software Engineering**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

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. What is (SQA)? What are the components of Software Quality Assurance (SQA)?

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. Explain four differences between alpha & Beta testing.
5. Define software reliability and software availability.
6. What are the steps involved in software project estimation?
7. Briefly describe the golden rule for interface design.

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSC-CS-08**	कोर्स शीर्षकः– (Course Title) **Object Oriented Programming through 'C++'**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Explain why Object Oriented Programming approach is better than Structured Programming Approach.
2. Explain the usage of the following C++ operators with the help of an example program.
   (a) sizeof operator (b) Logical Operators (c) Scope resolution operator.
3. Declare an abstract class ***"Shape"*** with methods **'area'** & **'volume'**. Refine this super class to subclasses like ***"cone"***, ***"cylinder"*** & ***"Rectangular Box."*** Then, Calculate area and volume for the subclasses.

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. What do you mean by "this" function? What are the applications of "this" pointer?
5. What do you mean by container classes?
6. What is reusability? Which things can be reused?
7. What is friend function? How it is implemented in C++ ?

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कोर्स कोड : Course Code: **MSC-CS-09**	कोर्स शीर्षकः– (Course Title) **Computer Networks**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is data communication? Discuss the different mode of Data communication.
2. 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?
3. Describe the token bucket mechanism for congestion control. With which other technique is token bucket usually combined to achieve complete flow control. What problems in the simpler approach are addressed by using a token bucket mechanism?

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. How BGP is different from other distance vector routing protocols?
5. What is Hamming distance and write about minimum Hamming distance?
6. What is flow and error control?
7. Explain the Distance Vector Routing algorithm.

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSc-CS-11**	कोर्स शीर्षकः– (Course Title) **Introduction to System Software**	अधिकतम अंक : 30 **Maximum Marks : 30**

खण्ड अ **Section-A** अधिकतम अंक : 18 **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What are necessary conditions to hold a deadlock in a system? Explain the resource allocation Graph algorithm to deal with deadlock problem. What are the limitations of this approach?
2. Define the following terms :
   a. Dispatchers b. Scheduling c. Swapping d. Context switching
3. How is a process different from a program? What information is contained within a Process Control Block (PCB)?

खण्ड ब **Section –B** अधिकतम अंक : 12 **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. Discuss the paging system for memory management; also give its advantages and disadvantages.
5. What do you understand by page replacement? Name the algorithm available for page replacement.
6. What do you mean by Multitasking operating system?
7. What is a scheduler? Explain any two types of schedulers.

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कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **MSC-CS-12**	**Object Oriented Analysis and Design**	**Maximum Marks : 30**

खण्ड अ — अधिकतम अंक : 18

Section-A — **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What are the approaches used for identification of classes and attributes? Explain.
2. What do you mean by "Object Oriented". Explain the characteristics of object-oriented approach.
3. Describe how class diagram, object diagram and generalization are represented with UML Diagram.

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. Give the sequence diagram for making a telephone call.
5. How does object relational database differ from object databases?
6. Explain the steps for converting state diagram to code.
7. Differentiate between Class diagram & Instance diagram

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कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **MSC-CS-13**	**Numerical and Statistical Computing**	**Maximum Marks : 30**

खण्ड अ — अधिकतम अंक : 18

Section-A — **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Using the Gauss elimination method solve the following linear system of equations:

   X + y + z = 3

   4x + 3y + 4z = 8

   9x + 3y + 4z = 7

2. Find a real root of the equation x Sin x + Cos x = 0 between (2,3) by Bisection method.
3. Using Newton – Raphson method find an iterative scheme to compute the cube root of a positive number.

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. Evaluate the integral $\int_0^2 \frac{1}{1+x}\,dx$ by using Simpson's 3/8 rule with h = 1/3.
5. Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with y = 1 for x = 0. Find y approximately for x = 0.1 by Euler's method.
6. A card is drawn from a well shuffled pack of playing cards. Find the probability that it is either a diamond or a king.
7. Solve the following equation using Newton Raphson method:
   a. $x^2 - 4x^2 + 4 = 0$

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Master of Computer Science (M.Sc. CS)

Course Code: **MSC-CS-14**	***Course Title:*** Accounting & Financial Management	***Maximum Marks : 30***

Section - A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. What are the purposes of accounting information? Explain

2. What do you mean by Balance Sheet? How does it differ from profit and loss Account?

3. Examine the role of accounting concepts in the preparation of financial statements.

Section - B

Short Answer Questions

Maximum Marks: 12

Note: Attempt any four questions. Answer should be given in 200 to 300 Words.

4. Why do we prepare the trial balance?

5. Distinguish between management accounting and financial accounting?

6. What do you mean by working capital?

7. Differentiate between „Fixed Cost" and „Variable Cost"

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Master of Computer Science (M.Sc. CS)

Course Code: **MSC-CS-15**	*Course Title: Probability & Distribution*	*Maximum Marks : 30*

Section - A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Define Binomial Distribution. Also calculate its moment generation function.

2. Each of n urns contains four white and six black balls, while another urn contains five white and five black balls. An urn is chosen at random from these intel urns and two balls are drawn from it both being black. The probability that five white and three black balls remain in the chosen urn is 1/7. Find the value of n.

3. For three mutually independent events A, B and C, verify if A^C, B^C, C^C are also mutually independent or not?

Section - B

Short Answer Questions

Maximum Marks: 12

Note: Attempt any four questions. Answer should be given in 200 to 300 Words.

1. If X ~ B (10, ¼). Then calculate the mean and variance of the distribution.

2. What is mathematical expectation? Also calculate the values of E $(ax_1 + bx_2)$ and V $(ax_1 + bx_2)$ where X_1 and X_2 be the iid random variables.

3. State and Prove Baye's theorem.

4. Give the all Definitions of Probability.

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSC-CS-16**	कोर्स शीर्षकः– (Course Title) **DBMS**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is entity and attribute? Give some examples of entities and attributes in a manufacturing environment. Why are relationships between entities important?
2. What do you mean by data redundancy? What is the difference between controlled and uncontrolled redundancy? What is data independence?
3. Consider the following requirements of a staff management system of an organization :
   a) The basic information that needs to be stored about the staff includes staff-id, name, address, date of birth, date of employment, post held.
   b) It keeps dependent information of employees. An employee can have many dependents.
   c) Pay details of the employees are also kept.
   d) It also keeps track of the various departments and employees of those departments.

   Draw the E-R diagram for the organization. Make suitable assumptions, if any.

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. What is index file? What are the differences between B+ tree and B tree index file?
5. What is a transaction? Which are the properties of a transaction and explain each.
6. You are given the following relational schema:

   Person(PersonID, Name, Sex, CityOfBirth)

   Parent(ParentID, ChildID)

   ParentID and ChildID are foreign keys referring to Person.PersonID.

   Write the following queries in SQL:

   Find the names of all people who were born in the same city as their father.
7. Discuss on the various ways in which we can arrive at a good database design. Discuss the ACID properties of a transaction. Give relevant example.

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Master of Computer Science (M.Sc. CS)

कोर्सकोड : Course Code: **MSC-CS-17**	कोर्स शीर्षकः– (Course Title) **Operating System**	अधिकतमअंक : 30 **Maximum Marks : 30**

खण्ड अ अधिकतम अंक : 18
Section-A **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions from 1 to 3. Answer should be in 800 to 1000 words.
प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is the need for disk scheduling? Explain the differences between the C-LOOK and C-SCAN disk scheduling algorithms.
2. 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?
3. 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?

खण्ड ब अधिकतम अंक : 12
Section –B **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.
प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. What is a TLB? How does it improve effective access time of data?
5. Explain the scenario when the page fault occurs?
6. What is purpose of Process Control Block?
7. What are the minimum requirements that should be satisfied by a solution to critical section problem?

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSc-CS 18**	कोर्स शीर्षकः– (Course Title) **Core Java**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

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 features of Object Oriented Paradigm. Why Object Oriented Programming are preferred over structured programming?
3. What is package in Java? Explain how to decide the need of package(s) in a system which is to be developed using Java.

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. What is the difference between Overloading and Overriding? Is it possible to override a inner classes.
5. Why servlet is preferred over CGI script. Write the life cycle of a servlet.
6. What is an instance variable? Explain how an instance variable of a class can have different value for each object of that class.
7. Explain with an example how overloading of methods is different from overriding of methods.

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code: **MSC-CS-20**	कोर्स शीर्षकः– (Course Title) **Computer Graphics**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is the method of storing image in vector format? Explain its advantages.
2. Explain the important features of Flash Software.
3. Describe the matrix formulation of 2D Translation, Scaling and Rotation.

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. Write short note on:
   (a) MPEG
   (b) MP3
5. Define following terms:
   a) Refresh buffer/frame buffer.
   b) Pixel?
   c) Aspect ratio.
6. What are the differences between the GIF and JPEG?
7. 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?

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code:**MSc-CS-21**	कोर्स शीर्षकः– (Course Title) **Design and Analysis Of Algorithms**	अधिकतम अंक : 30 **Maximum Marks : 30**

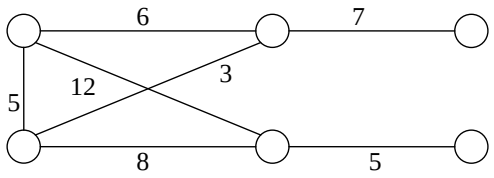
खण्ड अ — अधिकतम अंक : 18

Section-A — **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Show the results of inserting the keys : F, S, Q, K, C, L, H, T, V, W, M, R and N in order to an empty B-Tree with minimum degree 2.
2. Solve the recurrence relation by iteration
   $T(n) = T(n-1) + n^4$
3. Find the minimum spanning tree using Prims algorithm for the following graph.



खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. Show the trace of heapsort algorithm for following input data :
   30, 50, -100, 200, 50, 30, 60, 80, 200 in order.
5. Give an algorithm for Strassens's multiplication. Explain how a divide and conquer strategy is applicable to it? Also analyze your algorithm.
6. Explain Satisfiability Problem?
7. Find the optimal solution using greedy criterion for a knapsack having capacity 50 kg. The list of items having values and weight as are shown in the table:

Item	I_1	I_2	I_3	I_4	I_5
Profit	10	20	24	9	8
weight	8	14	34	5	4

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Master of Computer Science (M.Sc. CS)

कोर्स कोड : Course Code:**MSc-CS-23**	कोर्स शीर्षकः– (Course Title) **Artificial Intelligence**	अधिकतम अंक : 30 **Maximum Marks : 30**

खण्ड अ **Section-A** अधिकतम अंक : 18 **Maximum Marks: 18**

नोट–(Instructions): Section A consists of long answer questions from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Explain water jug problem using state space tree.
2. Explain the method of handling approximate inference in Bayesian Networks.
3. What factors determine the selection of forward or backward reasoning approach for an AI problem? Explain

खण्ड ब **Section –B** अधिकतम अंक : 12 **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. List down the characteristics of intelligent agent. Explain the concept of learning from example.
5. What are the limitations in using propositional logic to represent the knowledge base? Explain with the help of example.
6. Explain reinforcement learning with the help of an example.
7. What are the properties of a good knowledge representation system?

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कोर्स कोड : Course Code: **MS-CS-24**	कोर्स शीर्षकः– (Course Title) **Parallel Computing**	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 from 1 to 3. Answer should be in 800 to 1000 words.

प्रश्न संख्या 1 से 3 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Define the cluster computing. Explain the memory organisation in a cluster computing.
2. Consider a program that requires 78% of the total time to perform parallel operation while the remaining time is used for serial operations. The program consists of 25,000 operations each taking 2.5ms to complete, with 2,000operations being done sequentially. Calculate the speedup achieved.
3. With the help of a Block diagram explain the architecture of an SIMD array processor.

खण्ड ब — अधिकतम अंक : 12

Section –B — **Maximum Mark : 12**

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

प्रश्न संख्या 4 से 7 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है।

4. What do you mean by Data parallel programming?
5. Define the transformation used in a shuffle network giving an example using eight processors.
6. Explain the concept of permutation Network with an example.
7. Define array processing. Why are array processors called as SIMD Array computers?

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Master of Computer Science (M.Sc. CS)

Course Code: **MSc-CS-25**	*Course Title : Correlation, Regression & Statistical Inference*	*Maximum Marks : 30*

Section - A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Discuss about the Regression. Find out the angle between two regression lines.

2. State and Prove Rao Blackwell theorem.

3. Define non parametric tests. Also discuss about the Mann – Whitney U-test.

Section - B

Short Answer Questions

Maximum Marks: 12

Note: Attempt any four questions. Answer should be given in 200 to 300 Words.

1. Write short notes on efficiency and sufficiency.

2. Distinguish between correlation coefficient and regression coefficient.

3. Discuss in detail about Sign test and Run test.

4. Write detail notes on Significance test for "equality of means."

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Master of Computer Science (M.Sc. CS)

Course Code: **MSc-CS-26**	***Course Title:*** ***Mathematical Analysis***	***Maximum Marks : 30***

Section- A

Long Answer Questions

Note: Attempt all questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. State & Prove Riemann Stieltjes integrals.
2. State & Prove Baire's theorem.
3. Define compact spaces & compact sets.

Section - B

Short Answer Questions

Note: Answer all questions. Answer should be given in 200 to 300 Words.

Maximum Marks: 12

1. Write short notes on (a) MP tests (b) UMP tests
2. Discuss about the CRK bound.
3. Discuss in short (a) BAN estimator (b) CAN estimator
4. Discuss about the Bhattacharya bound.

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Master of Computer Science (M.Sc. CS)

Course Code: **MSc-CS-27**	*Course Title : Operation Research*	*Maximum Marks : 30*

Section - A

Long Answer Questions

Note: Attempt any three questions. Each question should be answered in 800 to 1000 Words.

Maximum Marks: 18

1. Discuss about the Linear Programming Also Define the different steps for Graphical solution to LPP.

2. Write a detailed not on classification of models used in operations research.

3. Solve the following LPP :

   Max $Z = 5x - 2y + 3z$

   subject to $2x + 2y - z \geq 2$

   $3x - 4z \leq 3$

   $y + 3z \leq 3$

   and $x, y, z \geq o$

Section - B

Short Answer Questions

Maximum Marks: 12

Note: Attempt any four questions. Answer should be given in 200 to 300 Words.

1. Discuss in brief about the Hungarian method.

2. Describe the graphical method for $2 \times n$ or $m \times 2$ games.

3. Soles the following LPP graphically (give all steps).
   Max. $Z = 3x + 2y$, subject to $x-y \leq 1$, $x+ y \geq 3$ and $x, y \geq o$.

4. Write a brief note a various types of variables used in LPP.

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कोर्स कोड : Course Code: **MSc-CS-28**	कोर्स शीर्षकः– (Course Title) **Principle of Programming Language**	अधिकतम अंक : 30 **Maximum Marks : 30**

खण्ड अ
Section-A

अधिकतम अंक : 18
Maximum Marks: 18

नोट–(Instructions): Section A consists of long answer questions from 1 to 3. Answer should be in 800 to 1000 words.

1. (a) Discuss features of programming language and its importance.
   (b) Draw the syntax tree for a+b* c/d + e-f.
2. Write short notes on:
   (a) Pointers
   (b) Polymorphism.
3. Write any four important uses of programming languages. List the design principles of imperative languages.

खण्ड ब
Section –B

अधिकतम अंक : 12
Maximum Mark : 12

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

4. Distinguish between dangling pointers and memory leakage.
5. Write two advantages of activation records.
6. List the benefits of modular development approach.
7. Give an example for fact and rules in logic programming language.

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Master of Computer Science (M.Sc. CS)

कोर्स कोड: Course Code **MSc-CS-29**	Course Title:**Web Technology**	अधिकतम अंक : 30 **Maximum Marks : 30**

खण्ड अ
Section-A
18

अधिकतम अंक : 18
Maximum Marks:

नोट–(Instructions): Section A consists of long answer questions from 1 to 3. Answer should be in 800 to 1000 words.

1. Explain the servlet API life cycle methods in brief.
2. Discuss the basic differences between Servlet and JSP.
3. Explain in detail the creation, instantiation and usage of java beans objects.

खण्ड ब
Section –B

अधिकतम अंक : 12
Maximum Mark : 12

नोट–(Instructions): Section B consists of short answer questions from 4 to 7. Answer should be in 200 to 300 words.

4. Explain the way in which a DNS server resolves addresses.
5. Give some advantages of using cascading style sheets.
6. Compare DOM and SAX in XML processing.
7. Write a CSS which adds background images and indentation?