उत्तर प्रदेश राजर्षि टण्डन मुक्त विश्वविद्यालय,इलाहाबाद

अधिन्यास 2020-21

Master of Computer Application

कोर्स कोड : Course Code: **MCA-01**	कोर्स शीर्षकः— (Course Title) **Discrete Mathematics**	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. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

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
4. Construct truth tables for
   (i) [(P => Q) /\ (Q => R)] => (P => R)
   (ii) ~ (P => Q) V [(-P) /\ Q] V Q.
5. How many 3 digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9 which are divisible by 5 and none of the digits is repeated?
6. Show that the relation (x,y) R (a,b) □ x2 + y2 = a2 + b2 is an equivalence relation on the plane. Also describe the equivalence classes.
7. Find the PDNF and PCNF of [(p^q) v(¬ p^r)v(q ^r).
8. 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++.

9. 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. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.**

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

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

2. In any boolean algebra show that
   (a + b) (b + c) (c + a) = ab + bc + ca.
3. Define with examples of NAND and NOR gates.
4. Briefly explain the Pigeonhole principle.
5. Define tautologies and contradictions with examples.
6. Construct the truth table for P v (q ^ r) ⇔ q^ (p v r).
7. What is Lattice? Explain the properties of Lattice.
8. A bag contains 2 white balls, 3 black balls and 4 red balls. In how many ways can 3 balls be drawn from the bag, if at least one black ball is to be included in the draw?
9. Let R and S be two relations on a set A. Then if R and S are reflexive then prove that R∩S is reflexive.
10. Define Cartesian product of two sets and prove that
    A x (B∩C) = (AXB) ∩ (AXC).
11. Prove that [(p v q) ^ (p -> r) ^ (q -> r)] -> r is a tautology.
12. How many 3 digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9 which are divisible by 5 and none of the digits is repeated?

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कोर्स कोड : Course Code: **MCA-02**	कोर्स शीर्षकः— (Course Title) **Programming through 'C'and Data Structures**	अधिकतमअंक : 30 **Maximum Marks : 30**

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

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

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय पश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is a stack? What operations are associated with a stack?
2. (a) Discuss about arithmetic operators and relational operators.
   (b) Differentiate between break and continue statements in C language with example.
3. Define AVL tree. Is the statement "Every Binary Tree is an AVL tree" correct? Justify your answer.
4. (a) A company insure its drivers in the following case.
   - If the drivers is married.
   - If the drivers is unmarried, male and above 30 year of age.
   If the driver is unmarried female and above 25 year of age.
   In all other case, the driver is not insured. Write a C program without using logical operator to determine whether the driver
   is insured or not.
   (b) Differentiate between the nested..... if and the switch statement in C language with suitable example.
5. Sort the following list of numbers using Quick Sort in descending order:
   1, 3, 2, 5, 4, 6, 12, 10, Show all the passes.
6. What are various data types used in C? Write its range and format also?
7. 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.
8. 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.
9. 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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 भाब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Write any five advantages of Pointers over Arrays.
2. Define "Binary Tree". How does a Binary Tree differ from a Tree?
3. Define "Graph". When can it be said that two vertices of a Graph are connected?
4. Write an algorithm for the addition of two matrices.
5. What is the difference between call by value and call by reference parameter passing techniques.
6. Write a function int power (int x, int n) to return x^n
7. Write a function to return the sum of N number.
8. Write a program to find maximum and minimum elements of an array of size N.
9. What do you mean by storage classes in C language. Writ the difference between static and automatic storage class.
10. Write a program in C language to generate the given series upto terms less than 200.
    1 - 4 + 9 - 16 + 25 .....
11. Differentiate between write and do-while loop with example.
12. Write the output/error of the following code with explanation.

```
Main ( )
{
        static int var = 5;
        printf ("%d",  var);
        if (var)
        main ( );
}
```

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कोर्सकोड : Course Code: **MCA-03**	कोर्स शीर्षकः– (Course Title) **Computer Organization and Assembly Language 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 <u>any three questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Discuss and Differentiate Hardware and Micro-programmed control unit with their advantages and disadvantages.
2. 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. Design a Synchronous Modulus-Six Counter Using SR Flip-Flop The modulus six counter will count 0, 2, 3, 6, 5, and 1.
4. What do you mean by Flip-Flop? Discuss the functions and circuits diagram of different type of flip flop?
5. What is Interrupt? Explain the types of Interrupts.
6. Draw the connections between memory module and processor and explain how data transfer takes place between them.
7. What is Register? Draw and explain any one shift register in detail.
8. What is the difference between combinational and sequential circuit? Explain with appropriate example.
9. What is input-output interface? Draw and explain block diagram of input-output interface.

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>any four questions</u> from this section.

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 भाब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Distinguish between horizontal and vertical microprogram control unit.
2. What is instruction cycle? When will be any interrupt processed during the instruction cycle?
3. Briefly describe what are Special purpose registers and General purpose registers in CPU.
4. Write an assembly language program to find factorial of 10 using loop.
5. What is DMA? Explain DMA transfer modes in detail.
6. Differentiate between RISC and CISC.
7. Explain the key differences between Compiler and Interpreter.
8. Write a assembly language program to compare values of the three variables and print them in descending order as: Largest = %d, Medium = %d, Smallest = %d.
9. What is the difference between isolated I/O and memory mapped I/O?
10. What do you mean by memory hierarchy? Why registers are present in CPU?
11. Explain the differences among microoperation and microprogram?
12. Write down the micro operations involves in fetch cycle.

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कोर्स कोड : Course Code: **MCA-05**	कोर्स शीर्षकः– (Course Title) **Object oriented programming 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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.**

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

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.
4. Highlight the difference between pure virtual functions and virtual function.
5. Write a program using a try block to detect and throw an exception if the condition "divide by zero" occurs.
6. Explain why Object Oriented Programming approach is better than Structured Programming Approach.
7. What is polymorphism? What are different forms of polymorphism? Explain implementation of polymorphism with the help of a C++ program.
8. 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.
9. 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. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.**

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 भाब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. What do you mean by "this" function? What are the applications of "this" pointer?
2. What are pure virtual functions?
3. What do you mean by container classes?
4. What is a Use case? Also explain with example.
5. What is reusability? Which things can be reused?
6. What is friend function? How it is implemented in C++ ?
7. What is template? Explain with suitable example.
8. What are different types of inheritance?
9. What is operator overloading?
10. Write C++ program to create Matrix class.
11. List the features of Object oriented programming.
12. What are input and output streams. Explain.

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कोर्स कोड : Course Code: **MCA-06**	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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Suppose you are given the following requirements for a simple database for the National Hockey League (NHL):
   The NHL has many teams, each team has a name, a city, a coach, a captain, and a set of players, each player belongs to only one team, each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records, a team captain is also a player, a game is played between two teams (referred to as host_team and guest_team). (i) Draw an E-R diagram.
   (ii) Transform the E-R diagram to a Relational Schema.
2. How distributed database different from client server database? Discuss them with their advantages and disadvantages.
3. Explain different type of locking protocols for concurrency control. How does you ensure both conflict serialzability and freedom from deadlock?
4. What is three-tier client/server architectures? Also differentiate between logical data independence independence. And physical data.
5. What is entity and attribute? Give some examples of entities and attributes in a manufacturing environment. Why are relationships between entities important?
6. What do you mean by data redundancy? What is the difference between controlled and uncontrolled redundancy? What is data independence?
7. Explain the purpose of checkpoints mechanism. How often should checkpoints be performed? How does the frequency of checkpoints affect:
   a) System performance when no failure occurs?
   b) The time it takes to recover from a system crash?
   c) The time it takes to recover from a disk failure?
8. Consider the two sets F and G with their FDs as below :
   F: A→C, AC→D, E→AD, E→H
   G: A→CD, E→AH
   Check whether two sets are equivalent or not.
9. 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. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 भाब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. How does a deadlock occur in a computer system? How can you prevent deadlock happening in DBMS?
2. R(ABCDEF) F = {A→B, B→C, C→D, E→F} decomposed into D = R1(AB), R2(BCD), R3(DEF). Find whether D is Lossless or Lossy?
3. What is index file? What are the differences between B+ tree and B tree index file?
4. What is data? What do you mean by information? What are the differences between data and information?
5. Who is a DBA? What are the responsibilities of a DBA?
6. What is a transaction? Which are the properties of a transaction and explain each.
7. What is a database trigger? Which are the different kinds of triggers?
8. 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.
9. When is it preferable to use a dense index rather than a sparse index? Explain your answer.
10. 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.
11. Discuss two phase locking protocol. Give relevant example.
12. Discuss the advantages of DBMS over traditional file processing system.

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कोर्स कोड : Course Code: **MCA-07A**	कोर्स शीर्षकः– (Course Title) **Computer Fundamental**	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. Attempt <u>any three questions</u> from this section.**

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

1. Explain different types of Memories.
2. With the help of a diagram explain the components of a computer system.
3. Explain the difference between flow chart and pseudo-code with the help of an example.
4. Explain the working of a laser printer.
5. Explain any three types of ROM.
6. Explain Virtual memory.
7. Explain working of a magnetic disk.
8. What do you mean by flip flop? Describe its working with example.
9. Describe any three computer input units.

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. Attempt <u>any four questions</u> from this section.**

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 भाब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. What is a light pen? Briefly explain its working.
2. Differentiate between seek time and latency.
3. What is Data Transfer rate? Explain.
4. Explain signed 1's complement representation of integers with the help of an example.
5. Discuss some popular character codes used for representing characters in computer.
6. How are floating point numbers represented in computer? Explain.
7. List the characteristics of computer.
8. Discuss the units of memory.
9. Find (1001101 - 10101001) using 1's complement?
10. Find 2's complement of the following
    a. 1001 b. 0101010
11. Explain how to convert decimal representation of an integer into binary.
12. Briefly discuss error detection codes.

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Master of Computer Application

कोर्स कोड : Course Code: **MCA-09**	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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

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.
4. What are project metrics? Explain different types of project metrics with an example for each.
5. What is prototyping? Explain the problems and advantages of prototyping in detail.
6. Explain various testing techniques.
7. Describe in detail, debugging strategies.
8. How is software configuration management done in software?
9. 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. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Explain four differences between alpha & Beta testing.
2. Explain the task in value at in Requirements Engineering.
3. Define software reliability and software availability.
4. Explain four approaches to handle the software sizing problem.
5. Explain the features of SCM.
6. What are the steps involved in software project estimation?
7. Discuss the Waterfall Model.
8. What is Cohesion? What are the different types of Cohesion?
9. What are the different testing levels? What is the difference between the verification and validation process?
10. What is data dictionary? What do you mean by Coupling?
11. What is Risk Management and what will risk management do for any business?
12. Briefly describe the golden rule for interface design.

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कोर्स कोड : Course Code: **MCA-10**	कोर्स शीर्षकः— (Course Title) **Data Communication and 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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

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?
4. What is the difference between a frame and a packet? Why framing is required? What is the significance of padding used in some of frame format? Explain.
5. Write the short note on following:
   i) Multiplening ii) TCP Congestion Control Techniques.
6. What is switching? Explain the circuit switching with delay diagram.
7. What is cryptography? Explain the model for network security.
8. Name two well known data transport protocols provided by the Internet Transport Layer. Provide a description of each service and indicate what type of application might use that service.
9. 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. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. How BGP is different from other distance vector routing protocols?
2. What do you mean by digital signature?
3. What do you mean by Baud rate? How is it different from Bit rate?
4. What is Analog data transmission?
5. Why do we need modulation?
6. What is Hamming distance and write about minimum Hamming distance?
7. What is flow and error control?
8. What is topology? Explain basic topology with advantage and disadvantage.
9. Explain the Distance Vector Routing algorithm.
10. Explain the working of simple parity check code for error detection.
11. Explain different notation of IPv4 addressing?
12. Explain classful addressing.

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Master of Computer Application

कोर्स कोड : Course Code: **MCA-11**	कोर्स शीर्षकः– (Course Title) **Java 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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is inheritance? Explain two benefits of inheritance, with an example of each.
2. What is a constructor? Write a Java program to explain how super class constructors are called in their subclasses.
3. What is multithreading? Explain this with an example of how interthread communication takes place in Java.
4. How Access Control Mechanism is implemented in Java?.What Method does subclass inherit from superclass.
5. Write down a java program to display number in word format, for Example: 123 will be shown as "One Two Three".
6. What is an applet?. List the methods you must extend to design an applet. What is the purpose of <PARAM …..>tag in Applet?
7. What is Object Oriented Paradigm? Expain features of Object Oriented Paradigm.
8. What is static method? Explain why main method in Java is always static and What are different bitwise operators avaialble in Java? Write a Java program to explain the use of bitwise operators.
9. 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. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Write down C++ features that are not supported by Java.
2. What is multithreading? Explain with example for removing the synchronicity behavior of a thread.
3. What is the difference between Overloading and Overriding? Is it possible to override a inner classes.
4. (a) What is Servelet ? What are the different methods for running the Servelets?
   (b) Why servlet is preferred over CGI script. Write the life cycle of a servlet.
5. What is a global variable?
6. What is encapsulation?
7. What is multithreaded programming ? Explain how threads are created in Java.
8. What is JDBC?
9. What is an exception?
10. What is an instance variable? Explain how an instance variable of a class can have different value for each object of that class.
11. What is overloading of methods? Explain with an example how overloading of methods is different from overriding of methods.
12. Briefly explain why Object Oriented Programming is preferred over structured programming?

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कोर्स कोड : Course Code: **MCA-13**	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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. (a). Construct the deterministic finite automata for accepting the set of all strings with three consecutive 0's.
2. Distinguish NFA and DFA with examples.
3. 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.
4. (i). What are P, NP, NP-complete, and NP-hard?
   (ii). How to prove that a given problem is NP complete?
   (iii). What is polynomial time reduction?
5. Obtain the following grammar in CNF
   S -> aBa|abba
   A -> ab | AA
   B -> aB| a
6. Construct a Mealy machine which is equivalent to the Moore machine given in table:

Present State	Next State		Output
	a=0	a=1	
q0	q3	q1	0
q1	q1	q2	1
q2	q2	q3	0
q3	q3	q0	0

7. Find regular expression for the following languages on {a,b}:
   $L = \{a^2n\ b^2m : n \geq 0, m \geq 0\}$
8. Design a DFA to accept the binary numbers which are divisible by 5.
9. 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. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Give regular set for the following expression: 1(01)*(10)*1
2. For the grammar G defined by S->AB, D->a,A->Aa,A->bB,B->Sb, give derivation tree for the sentential form babab.
3. Give an example of a language accepted by a PDA but not by DPDA.
4. Mention the difference between decidable and undecidable problems with examples of each.
5. What is meant by halting problem and post correspondence problem?
6. Mention any two undecidability properties for recursively enumerable languages.
7. Explain how TM can be simulated by a production system?
8. What do you meant by parse Tree?
9. Construct a DFA for the language 'all strings with 011 as a substring', over alphabet {0, 1}.
10. Obtain CFG for the language L = $\{ww^R \mid w \epsilon \{a, b\}^* \}$, w^R is the reversal of w }.
11. What do you meant by parse Tree?
12. What are P, NP, NP-complete, and NP-hard?

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कोर्सकोड : Course Code: **MCA-14**	कोर्स शीर्षकः– (Course Title) **RDBMS**	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>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

खण्ड अ — अधिकतमअंक : 18

Section-A — Maximum Marks: 18

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. How do you create a table and query in Microsoft Access? Write down the steps involved.
3. Explain the differences between the strong entity and weak entity set with suitable example.
4. FLIGHT Table
   Flight-No Text
   Destination Text
   Fare Numeric
   Departure-Time Date~Time

   With reference to the FLIGHT table:
   a) Write down the steps for changing the field contents for the field 'Destination' from "DEL" to "DELHI" and from "CAL" to "CALCUTTA" for all the records.
   b) Create a Filter which will display only those records where Destination is equal to "DELHI" and Fare is greater than 10,000. (Just the steps).

5. a) Write a query in sql to 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 client_no must start with ‘c’.
   Data values being inserted into the column name balance due should be greater than 0?
   c) Add a new column in your table:AGE?

   d) Delete a row from client master where age is greater then 60?

6. What are the multivalue attribute? How do the RDBMS handle the multivalueattribute.
7. Writes down the steps to create a table in MS Access named 'TRANS' having following fields
   - Trans_No which is numeric type and unique.
   - Item_No, Which will store alphanumeric data.
   - Trans_Date which will store transaction date.

8. 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.

9. Consider the following relational schema:

   Suppliers(sid:integer, sname:string, city:string, street:string)
   Parts(pid:integer, pname:string, color:string)
   Catalog(sid:integer, pid:integer, cost:real)

   The highest normal form of this relation scheme is? Justify your answer

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Identify the Normal Forms of the relation R(ABCDEF) Functional dependencies given by {AB → C, C → D, B → E, B → F}
2. Let R(ABCDEF) is a relational schema having FDs {A→BCDEF, BC→ADEF, B→C, D→E} Find out the Candidate Key ?
3. What is derived attribute? Explain the differences between single-valued attributes and multi-valued attributes.
4. What are query wizard used for in MS Access? What is the difference between all of the Queries provided by MS-Access?
5. How many Views does a Form Window have? What is the difference between these views?
6. Write a query in sql for the following database:
   Employee(empno,ename,deptno,job,hiredate)
   a) Create a table employee and make the empno as primary key of the table.
   b) Give list of employee name & their job spec who are working in deptno 20?
7. What are Forms used for? Write down the steps for changing the font of Label and Text Box.
8. What is normalization and why do we use it?
9. Write down the steps involves in creating a report. Also writes steps for Preview, Print, and save the report.
10. Discuss the advantages of DBMS over traditional file processing system.
11. What is referential integrity and why is it important?
12. Explain different referential integrity constraints violations with suitable examples.

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कोर्सकोड : Course Code: **MCA-15**	कोर्स शीर्षकः— (Course Title) **Operating System Concepts**	अधिकतमअंक : **30** **Maximum Marks : 30**

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

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

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Why there is need of process synchronization? Explain how semaphores can be used to deal with n-process critical section problem.
3. What is the need for disk scheduling? Explain the differences between the C-LOOK and C-SCAN disk scheduling algorithms.
4. Define thread. Differentiate user threads and kernel threads.
5. Distinguish between preemptive and non-preemptive scheduling. Explain each type with an example.
6. 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?
7. How does process different from program? Explain different states of process in process state transition with a neat diagram.
8. Discuss how scheduling algorithms are selected for a system. What are the criteria considered?
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?

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. Attempt <u>any four questions</u> from this section.**

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चारप्रश्नों के उत्तर दें।

1. Mention the circumferences that would a user be better off using a time-sharing system rather than a PC or a single user workstation?
2. How does thrashing occurs? Explain with an example.
3. What is a TLB? How does it improve effective access time of data?
4. How does a deadlock happens in a system?
5. Explain the scenario when the page fault occurs?
6. What is the purpose of swap space?
7. List out the important services of an operating system.
8. What is purpose of Process Control Block?
9. Describe the differences among long-term scheduling, short-term and medium-term.
10. What are the schemes used in operating system to handle deadlocks?
11. What is a critical section? Give examples.
12. What are the minimum requirements that should be satisfied by a solution to critical section problem?

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कोर्स कोड : Course Code: **MCA-17**	कोर्स शीर्षकः– (Course Title) **Unix Shell 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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 भाब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

1. Explain the time-sharing and client-server environment of the Unix operating system.
2. Explain the role of default files and directories in the Unix Operating system.
3. Explain the procedure of mounting and un-mounting a file in a Unix operating system. What is the significance of this process?
4. Explain the term *globbing* with examples.
5. What do you mean by *escape characters*? Explain their usage through echo command.
6. What is the use of the *bc* command? Explain a few functions that are associated with it.
7. Explain the command used to exploit terminal capabilities.
8. Briefly explain how the file access permissions are handled in the Unix operating system.
9. Explain how a file is sorted.

अधिकतम अंक : 12

खण्ड ब **Maximum Mark : 12**

Section –B

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

प्र2न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. Write the command to get the list of the processes of all users who are logged in to the system.
2. Write the command to suspend a foreground job.
3. Compare threads with processes.
4. Explain how the priority of a job can be changed?
5. What are signals and their types?
6. Which system call is used in opening a file? List all its flags and modes.
7. What is the difference between fork() and vfork() system calls?
8. Explain the difference between calloc() and malloc().
9. Explain the following:
   Deadlock b. File Locking
10. Write short notes on following:
    Inode block b. Pipes
11. What is a shell? What are the different types of commonly used shells?
12. What is the difference between soft and hard link?

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Master of Computer Application

कोर्स कोड : Course Code: **MCA-18**	कोर्स शीर्षकः– (Course Title) **Numerical and Statistical Computing**	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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

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. Explain Regula Falsi method with suitable examples.
3. Find a real root of the equation x Sin x + Cos x = 0 between (2,3) by Bisection method.
4. Using Newton – Raphson method find an iterative scheme to compute the cube root of a positive number.
5. What do you mean by Binomial Distribution? Explain with suitable example.
6. Define lines of Regression. Derive the formula for angle between two lines of regression.
7. Use Lagrange‟s interpolation to find the value for x=3 in the following table:
   x: 3.2 2.7 1.0 4.8
   f(x): 22.0 17.8 14.2 38.3
8. The equations of two lines of regression are as follows:
   2x + 3y-8 = 0 and
   x + 2y-5 = 0
   Obtain the value of correlation coefficient and variance of y given that the variance of x is 12.
9. Solve the following system of equation by Gauss Elimination method:
   4x1+ x2+ x3= 4
   x1+4x2— 2x3=4
   3x1+2x2- 4x3= 6

अधिकतम अंक : 12

खण्ड ब **Maximum Mark : 12**

Section –B

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

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. Explain floating point representations with suitable examples.
2. Evaluate the integral $\int_0^2 \frac{1}{1+x} dx$ by using Simpson's 3/8 rule with h = 1/3.
3. Show that the mean and Variance of the Poisson distribution are each equal to the parameter λ.
4. Explain Runge-Kutta method for fourth order.
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. Define the followings :
    a. Coefficients of Kurtosis.
    b. Moments about mean.
    c. Coefficients of Skewness.
    d. Skewness of a distribution.
7. Which of the iterative methods for solving linear system of equations converge faster? Why?
8. A card is drawn from a well shuffled pack of playing cards. Find the probability that it is either a diamond or a king.
9. A student obtained the mean and the standard deviation of 100 observations as 40 and 5.1. It was later found that one observation was wrongly copied as 50, the correct figure being 40. Find the correct mean and the S.D.
10. Solve the following equation using Newton Raphson method:
    a. $x^2 - 4x^2 + 4 = 0$
11. Calculate the value of integral by Trapezoidal rule:
    a. $\int_4^{5.2} logx\, dn$ by using
    Trapezoidal Rule and (b). Rule
12. Calculate the integral given in Q.11 by Weddl's rule.

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कोर्स कोड : Course Code: **MCA-19**	कोर्स शीर्षकः– (Course Title) **Design and Analysis Of Algorithms**	अधिकतम अंक : **30** **Maximum Marks : 30**

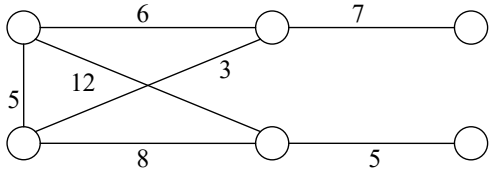
खण्ड अ **Section-A**

अधिकतम अंक : **18** **Maximum Marks : 18**

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

प्रश्न संख्या 1से 10 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

1. Prove that the minimum degree of any node in an n node binomial.
2. 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.
3. Prove that if the weights on the edge of the connected undirected graph are distinct then there is a unique minimum spanning tree. Give an example in this regard. Also discuss Kruskal's algorithm for finding minimum spanning tree in detail.
4. Solve the recurrence relation by iteration
   $T(n) = T(n-1) + n^4$
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 $8n^2$ steps, while merge sort runs in 64 n lg n steps. For which values of n does insertion sort beat merge sort?
6. Find the minimum spanning tree using Prim's algorithm for the following graph.



7. Using Dynamic Programming Approach, find the minimum number of scalar multiplications to multiply the chain of matrices given below.

M1	*	M2	*	M3
10*20		20*50		50*1

8. Explain P, NP, NP-Complete and NP-Hard class problems.
9. Explain Satisfiability Problem?

अधिकतम अंक : 12

खण्ड ब **Maximum Mark : 12**

Section –B

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

प्र2न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. Solve the following recurrence. :
   i. T(I) = 1
   ii. $T(n) = 4T(n/3) + n^2$ for x <= 2
2. Show the trace of heapsort algorithm for following input data :
   i. 30, 50, -100, 200, 50, 30, 60, 80, 200 in order.
3. Write an algorithm for inserting a node into Fibonacci Heap.
4. Give an algorithm for Strassens's multiplication. Explain how a divide and conquer strategy is applicable to it? Also analyze your algorithm.
5. Give single source shortest path algorithm. Give the time complexity.
6. Give the non-deterministic algorithm for sorting elements in non-decreasing order.
7. Define Generic Random Access Machine. What assumptions does it have?
8. Explain principle of Optimality.
9. Explain why the statement, "The running time of algorithm A is at least $O(n^2)$," is meaningless.
10. 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

11. State the significance of θ, Ω and O notations.
12. Define Hamiltonian Circuit problem.

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Master of Computer Application

Course Code:	***Course Title:***	***Maximum Marks : 30***
Course Code: **MCA-22**	***Probability and Distribution***	

Section- A

Long Answer Questions

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

Maximum Marks: 18

1. State and prove central limit theorem.
2. Write down the axiomatic definition of probability. Let A, B and C be three events.
3. Define characteristic function of random variable. State some of its important properties.

Section - B

Short Answer Questions

Maximum Marks: 12

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

1. State and prove Jensen inequality.
2. Discuss about the random variable and its type.
3. Let $\{X_n\}$ be a strictly decreasing sequence of random variables which assume positive values only and suppose that $X_n \xrightarrow{a.s.} 0$
4. State and prove Jenson's inequality.

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कोर्स कोड :	कोर्स शीर्षकः– (Course Title)	अधिकतम अंक : 30
Course Code: **MCA-23**	**Web Technology**	**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.

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 **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.

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?

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Master of Computer Application

कोर्स कोड : Course Code: **MCA-24**	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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Master of Computer Application

कोर्स कोड : Course Code: **MCA-E1**	कोर्स शीर्षकः– (Course Title) **Computer Architecture**	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. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What are the similarities and distinctions between multiprocessor and multicomputer system? Explain the classification of multiprocessor system.
2. Explain the Pipeline scheduling in detail.
3. Discuss the utility of RISC and CISC Architecture by comparing their various features.
4. Explain the interrupt driven mode of data transfer and the DMA driven data transfer, elaborating on how they are accomplished and their relative merits and demerits.
5. Explain the importance of different addressing modes in computer architecture with suitable example. What are the different addressing modes?
6. I) What do you mean by instruction cycle and interrupt cycle?
   II) Distinguish between hardwired and micro-programmed control unit.
7. Define the following:
   a. Micro operation and b. Micro instruction
8. Explain the sequence that takes place when interrupt occurs.
9. A computer uses RAM chips of 1024 * 1 capacity. How many chips are needed to provide a memory capacity of 16 KB? Explain in words how the chips are to be connected to the address bus.

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. Describe the role of system software to improve the performance of a computer.
2. What are the special registers in a typical computer? Explain their purposes in detail.
3. Discuss hit-rate and miss penalty
   i) Distinguish between auto increment and auto decrement addressing mode
   ii) Under what situations the micro program counter is not incremented after a new instruction is fetched from micro program memory?
4. What is virtual memory? What are its benefits?
5. How many memory chips are needed to construct 2 M x 16 memory system using 512 K x 8 static memory chips?
6. Explain How interrupt requests from multiple devices can be handled?
7. Explain the difference between Horizontal and Vertical Microinstructions
8. An address space is specified by 24 bits and the corresponding memory space by 16 bits:
9. How many words are in the
   (a) virtual memory (b)main memory
10. Specify the different I/O transfer mechanisms available.
11. What is DDR SDRAM? What is TLB?
12. What is the role of cache in pipelining? What would be the effect, if we increase the number of pipelining stages?

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Master of Computer Application

कोर्स कोड : Course Code: **MCA-E2**	कोर्स शीर्षकः– (Course Title) ***Microprocessor and its Applications***	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. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. List the components of computers and explain each in brief. What is the difference between a microprocessor and a CPU?
2. Discuss the features of 8085 interrupts. Also explain the SIM and RIM formats.
3. Explain the architecture of 8086 in detail with neat block diagram.
4. Explain I/O addressing scheme used in 8086 with neat block diagram.
5. With block diagram describe the working of a DMA controller.
6. Explain the layout and operation of the PCI bus.
7. What is serial data transfer? Explain with neat diagram.
8. Assume that the accumulator contents data bytes 88 hand instruction MOV C, A 4FH is fetched. List the steps decoding and executing the instruction.
9. Explain 8085 Stack in detail.

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. What do you understand by DMA?
2. What is the function of SI and Di Registers?
3. What do you mean by Conditional Flag?
4. What do you understand by Addressing mode?
5. What are the advantages of segmentation?
6. List the feature of 8086 Microprocessor?
7. What are the advantages of segmented memory scheme?
8. What is the use of ALE?
9. List the operating mode of 8259.
10. What are the flags in machine status word?
11. Explain the following.
    a. Data Bus.
    b. Address Bus.
12. What are the advantages of microprocessor based system?

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Master of Computer Application

कोर्स कोड : Course Code: **MCA-E3**	कोर्स शीर्षकः– (Course Title) ***Data Warehouse and Mining***	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. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is data mining (D.M.)? Define and describe relationship and pattern detected in data mining. What is the scope of data mining?
2. Explain structure of the data warehouse? Discuss in detail all the steps involve in making a data ware house.
3. Explain OLTP and OLAP and also discuss difference between them?
4. Explain basic data mining tasks with an example.
5. Give details on data mining versus knowledge discovery in databases.
6. Discuss data mining issues and data mining metrics.
7. Define the terms: **confidence, cleaning, consequent, cross validation**
8. Discuss issues to consider during data integration.
9. Explain about concept hierarchy generation for categorical data.

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. What are the requirements of cluster analysis?
2. What type of processing takes place in a data ware house?
3. What are the various types of metadata? Explain in detail?
4. What do you mean by knowledge discovery process?
5. What is Classification?
6. What do you mean by data cleaning?
7. Explain various data reduction techniques.
8. Briefly discuss the forms of Data preprocessing with neat diagram.
9. Draw and explain the architecture of typical data mining system.
10. Explain data mining as a step in the process of knowledge discovery.
11. Give an overview of applications of data mining.
12. What is text mining? Describe about basic measures for text retrieval.

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Master of Computer Application

कोर्सकोड : Course Code: **MCA-E4**	कोर्स शीर्षकः– (Course Title) **System Analysis and Design**	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>any three questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 स 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. Define Software Development life cycle (SDLC). What is spiral model? List the advantage and disadvantage of waterfall model.
3. What is Software Testing? What are the various characteristics of a good testable software?
4. Explain prototype model of software development. Is prototype model a suitable
5. Model for courier company management system? Justify your answer.
6. What is function point analysis? List four features of it.
7. Explain the following:
   a) Project b) Project scheduling c) Critical Path d) Milestones e) Checkpoints f) Project review.
8. What is strategic planning? Relate strategic planning to management control and operational control.
9. With respect to purchasing and inventory control systems explain any three of the following:
   a) Why do retail outlets carry inventory b) Inventory carrying cost. c) Procurement lead time d) Bill of material.

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. What are the differences between Black Box Testing" and "White Box Testing"?
2. What do you mean by Software Configuration Management?
3. Discuss the role of PERT Chart in software development.
4. What is coupling and Cohesion? What are the different type of Cohesion?
5. Differentiate between decision table and decision tree.
6. What are the attributes of good analyst?
7. Explain the system development life cycle.
8. Distinguish between hierarchical structure and network structure.
9. Define Bench Mark?
10. What is brain storming?
11. What is system analysis? Describe the importance of system analysis in software System development.
12. List any five responsibilities of a System Analyst.

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Master of Computer Application

कोर्स कोड : Course Code: **MCA-E5**	कोर्स शीर्षकः– (Course Title) ***Mobile 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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 10 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Explain various generation of wireless networks.
2. What is mobile computing? Draw architecture of mobile computing with various applications of mobile computing.
3. Explain IPv4. What are the advantages of IPv6 over IPv4.
4. Explain the concept of IP packet delivery in a mobile system.
5. What is Mobile TCP? What are the disadvantages of conventional TCP to incorporate in wireless environment?
6. What is Mobile TCP? Explain selective retransmission.
7. Explain the Dynamic Source Routing in Ad-hoc network with an example.
8. Describe in detail about HIPERLAN.
9. What are the main reasons for using cellular system? And also describe the dynamic channel allocation in cellular system.

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. Explain about the IP mobility support concept.
2. List the differences between IPv4 and IPv6.
3. Explain about the selective retransmission.
4. Define GSM Architecture.
5. Define HLR and VLR.
6. Explain about the handover concept.
7. What are the benefits of location information for routing in ad-hoc network.
8. What is snooping TCP?
9. How does CSMA minimize fading?
10. Is directional antenna useful for mobile phones? Why?
11. Explain the concept behind the Wireless Transaction Protocol.
12. What is meant by MANET?

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कोर्स कोड : Course Code: **MCA E6**	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. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 10 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Define Array processing. Why an array processor called as SIMD array computers?
2. State and Explain Gustafson"s Law for measuring speedup performance of paralleled system. Explain with the help of an example.
3. Define the cluster computing. Explain the memory organization in a cluster computing.
4. Explain the Flynn's Taxonomy in detail.
5. Explain the major issues of concern in the effective utilization of a parallel computer architecture.
6. 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.
7. Explain the basic concepts of dataflow computing and describe various applications of parallel computing.
8. Define array processing. Why are array processors called as SIMD Array computers? With the help of a Block diagram. Explain the architecture of an SIMD array processor.
9. Explain the concept of permutation Network with an 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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. What do you mean by Fat Tree?
2. What is systolic array?
3. What is parallel virtual machine (PVM)?
4. What do you mean by Data parallel programming?
5. What is synchronization latency problem in multithread process?
6. What is permutation Network?
7. List the classification of vector instruction.
8. Explain cube-connected cycles and de Bruijn networks.
9. Explain the RAM and the PRAM models.
10. Define the transformation used in a shuffle network giving an example using eight processors.
11. Explain the Amdahl's law for measuring speed up performance with the help of an example.
12. Write short notes on Parallelism versus Pipelining.

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कोर्स कोड : Course Code: **MCA-E7**	कोर्स शीर्षकः– (Course Title) **Artificial Intelligence**	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. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 10 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

1. Write a function division which divides a number X by Y such that if Y = O then the function returns the symbol "infinity" else it returns the quotient X/Y.
2. Write a LISP program expo to compute i raise to power j where i and j are natural numbers.
3. What is the structure of Agents? Also explain Goal Based Agents and utility Based Agents.
4. Explain water jug problem using state space tree.
5. Explain unification algorithm used for reasoning under predicate logic with an example.
6. Describe in detail the steps involved in the knowledge Engineering process.
7. Explain the method of handling approximate inference in Bayesian Networks.
8. Explain AO* algorithm with an example
9. What factors determine the selection of forward or backward reasoning approach for an AI problem? Explain

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चारप्रश्नों का उत्तर दें।

1. Explain the difference between forward chaining system & Backward chaining system?
2. Explain MYCIN and COMPASS.
3. Write down application areas of expert systems. List down the characteristics of intelligent agent.
4. The variable X is bound to 5 and the variable Y is bound to 7. Further the value (5 + 5) * (7 + 7) is evaluated to 140.
5. In order to explain the use cut, we write a program to find the factorial (N) using cut as follows
    a. fact (N, 1) : n < = 1, !
    b. fact (N, F) : - M is N - 1, !
        i. fact (M, F1),
        ii. F is F1 * N.
6. Draw cons-cell structure for list ((A B) (C D)).
7. What do you mean by local maxima with respect to search technique?
8. List down the characteristics of intelligent agent. Explain the concept of learning from example.
9. What do you mean by local maxima with respect to search technique? What are the differences and similarities between problem solving and planning?
10. What are the limitations in using propositional logic to represent the knowledge base? Explain with the help of example.
11. Explain reinforcement learning with the help of an example.
12. Explain the properties of a good knowledge representation system.

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कोर्स कोड : Course Code: **MCA-E8**	कोर्स शीर्षकः– (Course Title) **Embedded 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. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 10 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

1. Explain the design challenges in Embedded Systems.
2. What are the branching operations supported by 8051 microcontroller? Explain with example.
3. Explain the process of address translation.
4. Explain the interrupt handling mechanism.
5. What are the advantages and dis-advantages of programming embedded system in C and assembly language programming?
6. Write about memory devices in detail.
7. Explain in-detail inter-process communication.
8. Explain in detail about performance issues in embedded systems.
9. What are the interrupts of 8051? How to enable and disable 8051 interrupt?

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. What are Embedded systems? Give the classification of Embedded systems.
2. Explain various interfaces for external communication.
3. What is sequential circuit? Explain some sequential circuits.
4. What is buys-wait I/O? Differentiate between static and dynamic RAM.
5. What are the differences between a local and a global variable? Differentiate between task and process.
6. List any three embedded systems. What are the benefits of platform-based design?
7. Explain the following:
   Polling b. Masking c. Cache hit d. Cache miss
8. What are the addressing modes of 8051?
9. Write a short note on device drivers.
10. Explain few digital electronic components.
11. Briefly discuss about the structural units in a processor.
12. Discuss the important differences between RISC and CISC computer architecture.

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Master of Computer Application

कोर्सकोड : Course Code: **MCA-E9**	कोर्स शीर्षकः— (Course Title) **Computer Graphics**	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>any four questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. List the hardware and software components essential for professional multimedia development. Also, justify the need of each of the hardware components.
2. What is the method of storing image in vector format? Explain its advantages.
3. Explain the important features of Flash Software.
4. What do you understand by multimedia? What are the commercial tools available for developing multimedia?
5. Explain the benefits and problems in multimedia with multimedia system components?
6. Discuss in detail on multimedia platforms and illustrate cross platform compatibility and standards.
7. Explain DDA line drawing algorithm with Example.
8. Describe the matrix formulation of 2D Translation, Scaling and Rotation.
9. Explain Bresenham's circle generating algorithm.

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. Explain the various digital movie tools.
2. What is meant by Image Compression?
3. How is animation useful in multimedia?
4. How much time is spent scanning across each row of pixels during screen refresh on a raster system with a resolution of 1280 x 1024 and a refresh rate of 60 frames/second?
5. Write short note on: (a) MPEG (b) MP3
6. What do you understand by the term Multimedia and Hypermedia.
7. Explain any two multimedia features which can be used in business.
8. Define following terms:
    a) Refresh buffer/frame buffer.
    b) Pixel?
    c) Aspect ratio.
9. What are the differences between the GIF and JPEG?
10. 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?
11. List the hardware and software components essential for professional multimedia development.
12. Justify the purpose and need of each of the hardware components in multimedia.

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Master of Computer Application

कोर्स कोड : Course Code: **MCA-E10**	कोर्स शीर्षकः– (Course Title) **Operaational Research**	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. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

1. Solve graphically:
   Maximize $Z = 2x_1 + 3x_2$
   Subject to constraints:
   $x1 + x2 \leq 30$
   $x2 \geq 3$
   $0 \leq x2 \leq 12$
   $x1 - x2 \geq 0$
   $0 \leq x1 \leq 20$

2. Describe Monte Carlo method of simulation.
3. Write Short notes on:
   a. Genetic Algorithm b. Simulated Annealing Problem
4. Explain the following:
   a. Weak duality property b. Strong Duality property
5. Write any 3 key relations between primal and dual problems.
6. Use duality to solve the L.P.P.:
   Minimize $Z = 2x_1 + 2x_2$ subject to
   $2x1 + 4x2 \geq 1$, $-x1 - 2x2 \leq -1$, $2x1 + x2 \geq 1$ and $x1, x2 \geq 0$
7. Solve the following assignment problem:

	I	II	III	IV	V
A	1	3	2	3	6
B	2	4	3	1	5
C	5	6	3	4	6
D	3	1	4	2	2
E	1	5	6	5	4

8. On an average 96 patients per 24 hours day require the service of an emergency clinic. Also on an average, a patient requires 10 minutes of active attention. Assume that the facility can handle only on emergency at a time, Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average servicing time of 10 minutes and that each minute of decrease in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average six of the queue from 1 1/3 patients to ½ patient.
9. At a railway station, only one train is handled at a time. The railway yard is sufficient only for two trains to wait while other is given signal to leave the station. Trains arrive at the station at an average rate of 6 per hour and the railway station can handle them on an average of 12 per hour. Assuming Poisson arrivals and exponential service distribution, find the steady-state probabilities for the various number of trains in the system. Also find the average waiting time for a new train coming into the yard.

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. Attempt <u>any four questions</u> from this section.**

प्रश्न संख्या 1 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. What are the advantages and disadvantages of simulation?
2. Write down the steps of the graphical method to obtain an optimal solution to a linear programming problem.
3. Briefly describe the steps for solving a transportation problem.
4. Explain the steps involved in critical path method.
5. Compare between Assignment problem and Transportation problem.
6. Briefly explain Meta-heuristics.
7. Write short notes on decision trees.
8. Define the following with respect to games:
   Pay-off b. Zero-sum game
9. Give essential characteristics of queuing procedure.
10. Write short notes on simulation.
11. What is the importance of Poisson and Exponential distribution in Queuing theory.
12. Write short note on travelling salesman problem.

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Master of Computer Application

कोर्स कोड : Course Code: **MCA-E11**	कोर्स शीर्षकः– (Course Title) **Object Oriented Analysis and Design**	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. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

1. What is object design? Explain the steps of object design with suitable example.
2. What is multiplie inheritance? Discuss its role in object oriented analysis and design.
3. What is design optimization? Explain with suitable example.
4. Describe in detail the major and minor elements of object model. Give suitable examples.
5. What are the approaches used for identification of classes and attributes? Explain.
6. What is the relationship between cohesion and coupling? Identify the type of coupling in the following. How can it overcome?
7. What do you mean by "Object Oriented". Explain the characteristics of object-oriented approach.
8. Explain Aggregation & Generalization in detail with suitable example.
9. 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. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 10 से 21 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. Name the UML diagrams used for the following:
   a) Modelling behaviour of an object.
   b) Interaction between groups of objects.
2. How does object relational database differ from object databases? Explain
3. Explain the design axioms applied to object-oriented design.
4. Give the sequence diagram for making a telephone call.
5. Describe the activities involved in an ATM transaction.
6. What do you mean by the State Diagram and the Event Trace Scenario? Draw the Event Trace Scenario for a Phone Call and the State Diagram for Phone Line.
7. Explain what is cohesion and coupling? What is the relationship between them?
8. How does object relational database differ from object databases?
9. What are the shortcomings in structured approach? Why generally, does an object granted system use a relational DBMS?
10. Explain the steps for converting state diagram to code.
11. Differentiate between Class diagram & Instance diagram
12. Differentiate between Links & association.

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कोर्स कोड : Course Code: **MCA-E12**	कोर्स शीर्षकः– (Course Title) **Information and Network Security**	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. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है। इस खंड से किसी भी तीन प्रश्नों का उत्तर दें।

1. What are the fundamental differences between symmetric and asymmetric cryptography.
2. Define the following terms in cryptography:
   a. Algorithm
   b. Key
   c. Plain Text
   d. Work Factor
   e. Key Space
   f. Steganography
3. Write and define different levels of controls in security Architecture.
4. What is a VPN? Explain the two modes of a VPN.
5. Explain the firewall rules.
6. Explain the format of ESP packet in IP security.
7. What are the differences between digital signature and digital certificate?
8. Explain any two methods of encrypting plain text.
9. Explain with the help of a diagram the digital signature service provided by PGP.

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. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 10 से 21 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों का उत्तर दें।

1. Discuss any four types of attacks on a cryptosystem.
2. Explain Host based intrusion detection system.
3. Explain substitution cipher technique.
4. Mention the applications of IPSec.
5. Briefly explain the different MIME content type.
6. 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).
7. Discuss in detail block cipher mode of operation.
8. Explain the Kerberos ticket granting approach.
9. List four possible approaches to attack RSA algorithm.
10. Decode the following Caesar cipher using frequency analysis with shift +6 “KGYEZUHXKGQ”
11. What are the differences between passive and active security attacks?
12. Give the differences between Hash function and message authentication code.