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II Semester M.C.A. Degree Examination December - 2024**COMPUTER SCIENCE****Operating Systems****(CBCS Scheme Y2k20)****Paper : 2MCA1****Time : 3 Hours****Maximum Marks : 70****Instructions to Candidates :**

1. Answer any Five questions From Part - A.
2. Answer any Four sub questions from Part - B.

PART-A**Answer any Five questions :****(5×6=30)**

1. Define operating system. Explain the functions of operating system.
2. Explain dual mode operation with a neat diagram.
3. What are system calls? Briefly point out its types.
4. What is Deadlock? Explain the necessary conditions for deadlock to occur.
5. What is thrashing? How can it be controlled?
6. Describe both internal and external fragmentation problems encountered in a contiguous memory allocation scheme.
7. Draw the logical view of segmentation and explain.
8. Write the Need and Goals of protection in OS.

**PART - B****Answer any Four questions :**

9. a) Explain all the information associated with a specific process in PCB. (4)
b) What are Monitors? Explain Dining Philosopher's problem with solution using monitor. (6)
10. a) Define Process. Explain the states of process. (5)
b) Define semaphores. Explain Reader-Writer problem with semaphore in detail. (5)

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11. a) Consider the following page reference stream : 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. How many page faults would occur for LRU and FIFO replacement algorithms assuming Three Frames? Which one of the above is most efficient? (7)
- b) What are Virtual machines? Explain the benefit of creating virtual Machines. (3)
12. a) Explain various techniques of Disk Management in mass storage structure. (3)
- b) Define Paging. Explain the Address Translation in paging. (7)
13. Consider the following snapshot of a system:

Processes	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	1	1	2	4	3	3	2	1	0
P1	2	1	2	3	2	2			
P2	4	0	1	9	0	2			
P3	0	2	0	7	5	3			
P4	1	1	2	1	1	2			

- a) Calculate the content of the need matrix? (4)
- b) Is the system in a safe state? (3)
- c) Determine the total amount of resources of each type? (3)
14. a) Consider the processes P1, P2, P3, P4 given in the below table, arrives for execution in the same Order, with arrival time 0 and given burst time. Find the Average waiting time and Turnaround Time using FCFS scheduling algorithm. (5)

Process	Burst Time
P1	21
P2	3
P3	6
P4	2

- b) Write a short notes on : Context Switch and Access Matrix. (5)



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II Semester M.C.A. Degree Examination, December - 2024
COMPUTER SCIENCE
Software Engineering
(CBCS 2020-21Y2K20 Scheme)
Paper - 2MCA4

Time : 3 Hours**Instructions to Candidates :****Maximum Marks : 70****Answer All the Parts****PART-A****Answer any FIVE questions.****(5×6=30)**

1. Discuss the three perspectives on Software Engineering.
2. Develop a Use case diagram for a travel and tourism management system.
3. Explain Stephen Covey's "First Things First" framework for prioritising tasks based on urgency.
4. What is the purpose of using measures in software development projects? Explain various measures used in the context of Agile software development.
5. Discuss the Game Theory Perspective in Software Development.
6. What challenges arise in global software development, and how can they be addressed?
7. Explain the retrospective facilitator's roles and responsibilities in agile software development.
8. Discuss the Henry Plotkin's notion of change

PART - B**Answer any FOUR questions .****(4×10=40)**

9. a) Discuss four core values of the Agile Manifesto. **(5)**
- b) Explain the role scheme in agile teams. **(5)**
10. a) Explain customer collaboration in Agile development. **(5)**
- b) What are User stories ? Explain their usage in Agile with examples. **(5)**

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11. a) Explain the Agile approach to Quality Assurance. (5)
b) What is Test-Driven Development , and how does it work? (5)
12. a) How does Agile software Development support Learning Processes? (5)
b) Define refactoring. Explain how refactoring is used in Agile development. (5)
13. a) Discuss the Software Engineering code of Ethics and Professional practice. (5)
b) Define leadership . Explain the change leader model. (5)
14. a) Explain how Agile principles can be applied to non-software projects. (5)
b) Describe the key activities involved towards the end release in Agile. (5)



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II Semester M.C.A. Degree Examination December - 2024
COMPUTER SCIENCE
The Design and Analysis of Algorithm
(CBCS Scheme Y2K20)
Paper : 2MCA5

Time : 3 Hours**Maximum Marks : 70****Instruction to Candidates:**

Answer any Five questions from Section A and any Four question from Section B.

SECTION-A

- L Answer any Five questions. Each question carries 6 marks. (5×6=30)**

- 1. What is the time complexity of following function func(). Explain.**

```
Int fun (int n)
{
    For(int i=1;i<n;i++)
    {
        For (int j=1;j<=n;j+=i)
        {
            Sum =sum+i*j;
        }
    }
    Return (sum)
}
```



- 2. Define Algorithm. List out the characteristics of an algorithm.**
- 3. Trace the bubble sort algorithm for the following data 40, 50, 30, 20, 10 and write bubble sort algorithm.**
- 4. Describe All-pairs shortest path algorithm and derive its time complexity.**
- 5. Explain P, NP and NP complete problems.**
- 6. Using backtracking technique solve the following instance for the subset problem.**

S={1, 9, 7, 5, 18, 12, 20, 15} and d=35.

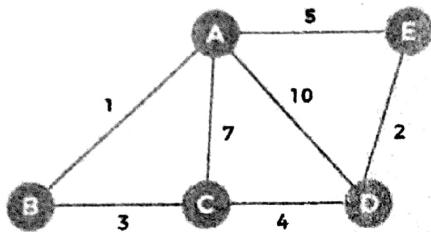
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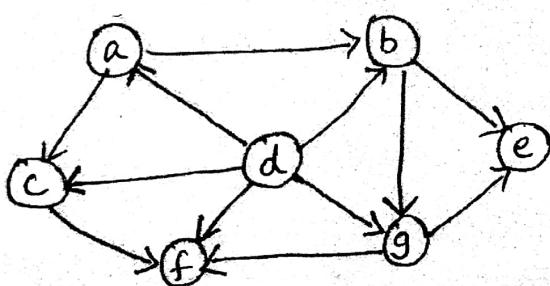


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7. Find the minimum spanning tree using Kruskal's algorithm.



8. Using any method. Solve the topological sorting problem for the following graph.

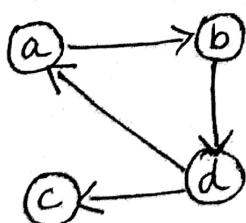


SECTION-B

- II. Answer any Four of the following questions. Each question carries 10 marks.

(4×10=40)

9. a) Write the steps for mathematical analysis of non-recursive algorithm. (4)
 b) Design an algorithm for performing sequential search and compute the best case, worst case and average case efficiency. (6)
10. a) Apply Warshall's algorithm to compute transitive closure for the graph. (6)



- b) Write brute-force string matching algorithm. (4)

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11. a) Sort the list of the elements 10, 5, 7, 6, 1, 4, 8, 3, 2, 9 using merge algorithm and find its time complexity. (7)
- b) Give the differences between BFS and DFS. (3)
12. a) Solve the following Knapsack problem using dynamic programming if the capacity of the knapsack is 7. (6)

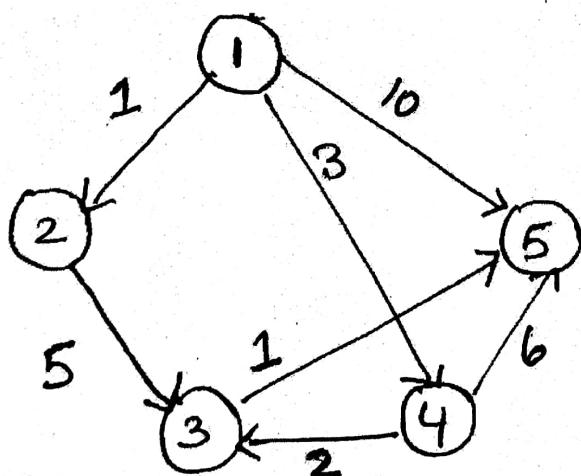
Item	Weight	Value
1	1	1
2	2	6
3	3	10
4	4	12

b) Text: e o v a d a b c d f t o y

Pattern: a b c d

Find the pattern a b c d in the given text using the horspool pattern matching Algorithm. (4)

13. a) Using Dijkstra's method find the single source shortest - paths of the following graph. Use vertex 1 as source. (6)



- b) Explain principle of optimality. (4)

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II Semester M.C.A. Degree Examination December - 2024**COMPUTER SCIENCE****Artificial Intelligence****(CBCS Scheme Non-NEP - y2k20)****Paper : 2MCA6****Time : 3 Hours****Maximum Marks : 70****Instructions to Candidates :** Answer both the sections.**SECTION -A****Answer any Five questions. Each question carries 6 marks.****(5×6=30)**

1. Define rational agents. Discuss the different types of environment in which they operate.
2. Explain the Minimax search procedure with an example.
3. What is a knowledge-based agent? Explain the Wumpus World problem.
4. Express the following using FOPL:
 - a) All birds except ostrich can fly.
 - b) Not all students like both Maths and Science.
 - c) Some children do not like chocolates.
 - d) Students who either work hard or are lucky pass the exams.
 - e) Not everyone believes in God.
 - f) People who exercise and eat nutritious food are healthy.
5. Explain STRIPS and K-STRIPS.
6. What is Decision tree learning? Explain.
7. Explain with a neat figure, architecture of Expert Systems.
8. What do you understand by deep learning networks? Discuss the applications of CNN and RNN.

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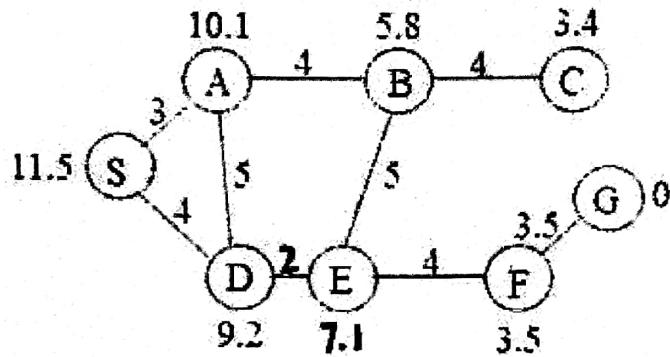
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SECTION - B

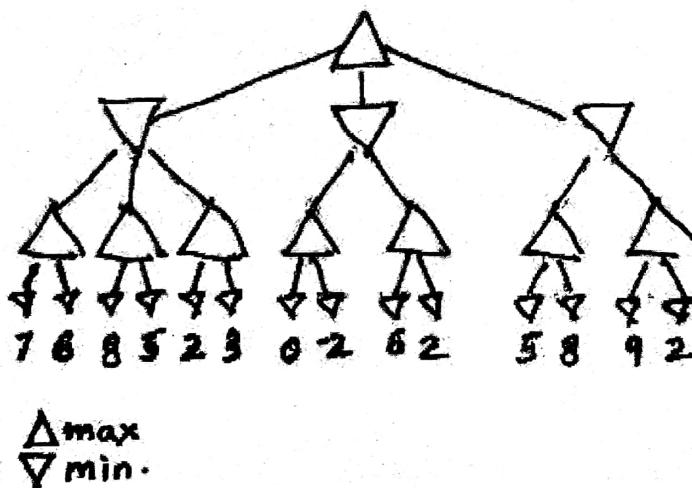
Answer any Four questions. Each question carries 10 marks.

(4×10=40)

9. a) Solve the following using the A* algorithm. (6)



- b) What is Constraint satisfaction problem? Explain with example. (4)
10. a) What is Alpha-Beta pruning? Solve the following Alpha-Beta pruning problem. (6)



- b) Explain briefly on-line search agents in AI. (4)
11. a) Compare Propositional Logic and First Order Predicate Logic. (5)
b) What is Truth Maintenance (TMS)? Explain. (5)



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12. a) Differentiate between Forward Chaining and Backward chaining. (5)
b) What is proof by resolution? Explain with an example. (5)
13. a) What is ensemble learning? Explain briefly the ensemble techniques. (5)
b) With respect to Uncertainties discuss i) Probabilistic learning ii) Fuzzy logic. (5)
14. a) What is NLP? State the relevance of Natural Language Processing (NLP) in AI? (4)
b) Draw the parsing tree defining your own grammar rules for the sentence "The boy ate a popsicle". (6)



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II Semester M.C.A. Degree Examination, December - 2024**COMPUTER SCIENCE****Computer Networks****(CBCS Scheme Y2K20)****Paper:2MCA3****Time : 3 Hours****Maximum Marks : 70****Instructions to Candidates :**Answer any **FIVE** from Section - A and any **FOUR** from Section - B**SECTION - A****Answer any FIVE questions . Each question carries 6 marks.****(5×6=30)**

1. What is computer Network? Explain different types of Computer network based in size.
2. Explain the causes of transmission impairments.
3. Explain the operation of CSMA/CD.
4. What is the transmission message for the bit stream 1101011111 using the generator polynomial $g(x) = x^4 + x + 1$.
5. Explain Packet switching techniques for data transmission.
6. Briefly explain ICMPV4 Error Messages.
7. Explain the IPv6 data gram format with neat sketch. Mention the significance of each field.
8. Explain the service provided by the Transport Layer.

SECTION - B**Answer any FOUR questions. Each question carries 10 marks.****(4×10=40)**

9. With a neat diagram explain the functions of each layer in the OSI reference model. **(10)**

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10. a) Explain working of Pure ALOHA and slotted ALOHA protocols. (6)
b) Explain HDLC frame Format. (4)
11. a) With neat diagram explain how the connection is established in TCP using three-way handshaking. (6)
b) Differentiate between UDP and TCP. (4)
12. What is the purpose of DNS ? Explain the steps for mapping host name to IP address.(10)
13. a) What is Mobile IP ? Explain different component of Mobile IP. (6)
b) What is Routing ? Explain different categories of Routing Algorithms. (4)
14. Write short note on: (10)
a) WWW.
b) E-MAIL.
c) POOLING
d) FDMA



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II Semester MCA Degree Examination December- 2024**COMPUTER SCIENCE****Data Base Management System****(CBCS Scheme Non NEP Y2K20)****Paper : 2 MCA 2****Time : 3 Hours****Maximum Marks : 70****Instruction to Candidates:**

- 1) Answer All Sections.
- 2) Answer any Five questions from Section - A, each carries Six marks.
- 3) Answer any Four questions from Section - B, each carries Ten marks.

SECTION-A**L Answer any Five of the following questions. Each carries 6 marks. (5×6=30)**

1. What is database instance? Explain advantages and disadvantages of DBMS.
2. Define data model? Discuss different types of data model with examples.
3. What is an attribute? Describe different types of attributes with examples.
4. Illustrate Hash index and Bit map index.
5. Write a note on outer join and its types in relational algebra with examples.
6. Consider a schema $S = (U, V, W, X, Y, Z)$ on which the following functional dependencies hold $\{U \rightarrow V, VW \rightarrow X, Y \rightarrow W, X \rightarrow U\}$. Find how many no. of candidate keys in S.
7. Define the term transaction. Demonstrate different states of transaction with a neat diagram.
8. Explain validation concurrency control protocol with an example.

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SECTION-B

II. Answer any Four full questions. (4×10=40)

9. a) What is data independence ? Write short notes on types of data independence.
b) Explain roles and responsibilities of DBA.
10. a) Explain hashing techniques with examples.
b) Draw an E-R diagram for Bank database with four entities having six attributes each.
11. a) Explain division operator and cartesian product operator with a suitable example.
b) Discuss the following keys with an appropriate example.
 - i) Candidate key
 - ii) Primary key
 - iii) Foreign key
12. a) Briefly explain any five aggregate functions in SQL with examples.
b) Explain fourth normal form and fifth normal form with table example
13. Consider the following schema and answer the queries.

EMPLOYEE

NAME	VARCHAR (30)	NOT NULL,
EID	VARCHAR (10)	NOT NULL,
DEPTNO	INT (5)	NOT NULL,
HODEID	VARCHAR (10),	
SALARY	INT (10),	

PRIMARY KEY (EID),

FOREIGN KEY (HODEID) REFERENCES EMPLOYEE (EID),

FOREIGN KEY (DEPTNO) REFERENCES DEPARTMENT (DID);

DEPARTMENT

DID	INT (5)	NOT NULL,
DNAME	VARCHAR (30)	NOT NULL,
HODID	VARCHAR (10)	NOT NULL,
HODNAME	VARCHAR (30),	

PRIMARY KEY (DID),

UNIQUE (DNAME)

FOREIGN KEY (HODID) REFERENCES EMPLOYEE (EID);

PROJECT WORK

EMPID VARCHAR (10) NOT NULL,
PROJNO INT (5) NOT NULL,
PROJECTLOC VARCHAR (30) NOT NULL,
PRIMARY KEY (EMPID, PROJNO),
FOREIGN KEY (EMPID) REFERENCES EMPLOYEE (EID);

- a) Retrieve the distinct employee ID (EMPID) of all employees of university who are working on project No.20, 30 and 40.
 - b) To find the sum of salaries of all employees of the English department as well as the maximum, minimum and average salary in English department.
 - c) Return the employee ID and name of employees whose salary is greater than the salary of all employees in department number 20 of university. Order result by employee ID
 - d) Drop the 'SALARY' column from 'EMPLOYEE' table.
 - e) Write a query for this scenario that University decided to give all employees in the 'SCIENCE' department a 20% rise in salary.
14. a) Explain time stamp ordering protocol with example
b) Explain database backup and recovery from catastrophic failures