Exam Code: 226701   Paper Code: 1283
    (30)

Programme: Master of Science (Computer Science) Semester-I

Course Title: Advanced Data Structures

Course Code: MCSL–1111

Time Allowed: 3 Hours   Max Marks: 80

Note: Attempt five questions selecting one question from
each section. The fifth question may be attempted from any
section. All questions carries equal marks.

Section A

1. How can you analyse an algorithm? Explain various
   asymptotic notations.   (16)
2. a) What is Red Black tree? Write its properties.   (8)
   b) Write an algorithm to insert element in the Red Black
   tree with cases.   (8)

Section B

3. Write various methods to implement the priority queue
   in the memory. Also mention which case is best to
   implement.   (16)
4. a) What is Fibonacci heap? How will you represent it in
   the memory?   (10)

2123   Page 1

b) Explain
i) Binary tree
ii) Complete Binary tree   (6)

Section C

5. Write any three string matching algorithms with working examples.   (16)
6. What do you understand by Amortized analysis? Explain various methods in it.   (16)

Section D

7. What do you mean by External searching. Write various methods of external searching   (16)
8. Write brief note on the following:
   a) Heap
   b) Binary Search Tree
   c) AVL tree
   d) 2-3-4 tree   (4*4 = 16)

Exam Code: 226701
(30)

Paper Code: 1284

Programme: Master of Science (Computer Science) Semester-I

Course Title: Advanced Computer Architecture

Course Code: MCSL–1112

Time Allowed: 3 Hours   **Max Marks: 80**

Note: Attempt five questions in all, selecting one question from each section. The fifth question may be attempted from any section. All questions carry equal marks.

(Section A)

1. Explain Systolic array with its applications. Solve this given matrix with the help of systolic array:-

   $A = \begin{bmatrix} 5 & 4 \\ 6 & 1 \end{bmatrix}$ and B A $= \begin{bmatrix} 5 & 8 \\ 10 & 1 \end{bmatrix}$ 16

2. Explain Flynn's classification in detail.   16

(Section B)

3. Explain various parallel computing models.   16
4. What is pipelining? What are principles of linear pipelining? Explain advantages and disadvantages of it. Explain efficiency of pipelining with suitable example.   16

(Section C)

5. a) Explain arithmetic pipelining with the help of suitable example   16
    b) Differentiate between serial and parallel processing.
6. Explain the working of multiprocessor system.   16

(Section D)

7. Explain in context of pipeling:-
    a) Prefetch and Branch Handiing
    b) Hazard Detection and Resolution   16
8. Calculate the speedup ratio and total execution time of pipelined structure that has 5 stages with execution time of 60, 50, 80, 40 and 90 ns respectively. The execution time in non-pipelined environment is 220 ns. Assuming latch delay to be zero. Also show the diagrammatical representation of execution of 10 instructions in the same pipeline.   16

Exam Code: 226701   Paper Code: 1285

Programme: Master of Science (Computer Science)

Semester I

Course Title: Network Security Practices

Course Code: MCSL-1113

Time: 3 Hrs.   **Max. Marks: 80**

Note: Attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 16 marks.

SECTION-A

1. What are the various security services available in network practices? Explain in detail. (16)

2. What is block cipher? Draw the general structure of DES and also explain its one round working in detail. (16)

SECTION-B

3. **Explain the Following:** (8+8)

   (a) How does Elliptic Curve perform encryption and decryption?

   (b) Explain Diffie Hellman Key Exchange algorithm with example.

4. What is Public Key Cryptography? Explain RSA algorithm in detail. (16)

SECTION-C

5. Explain the process to generate 160-bit message digest using SHA-1 algorithm. (16)

6. Define Message Authentication Code. How authentication is achieved in the network using MAC? (16)

SECTION-D

7. How Pretty Good Privacy concept secures the email. How can users achieve authentication and confidentiality through this concept? (16)

8. What is the difference between symmetric and asymmetric cryptography and how keys are exchanged in symmetric cryptography? (16)

2123   20

15/12/23 (६∪±)

KMV–I

Exam Code: 226701
(30)

Paper Code: 1286

Programme: Master of Science (Computer Science) Semester-I

Course Title: Discrete Structures

Course Code: MCSL–1114

Time Allowed: 3 Hours

Max Marks: 80

Note: Attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. All question carry equal marks. Use of simple calculator is allowed.

(Section A)

Q1) a) Find power set of {0, {0}, {φ}}. Also find its cardinality.

b) Prove that A X (B ∪ C) = (A X B) ∪ (A X C)

c) A room has 5 doors. In how many ways a person can enter into and exit from the room from different door?

d) Out of 1200 students at a college 582 took Physics, 627 took Chemistry, 543 took Mathematics, 217 took both Physics and Chemistry, 307 took both Physics and Mathematics, 250 took both Mathematics and Chemistry. 222 took all three courses. How many took none of these courses?

(4 X 4 = 16)
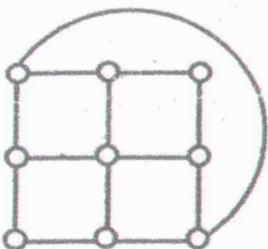
Q2) a) Give an example of relation that is POSET.

b) Find SoR if R = {(1,2), (1,3), (2,1), (2,2), (3,1), (3,3)} and S = {(1,1), (1,4), (2,1), (2,3), (3,1), (3,3), {4,1), (4,3)}. Also find RoR^{-1}.

c) let f: Z → Z$^+$ defined as f(x) = x^2, where x belongs to Z. Is function f bijection? Justify your answer.
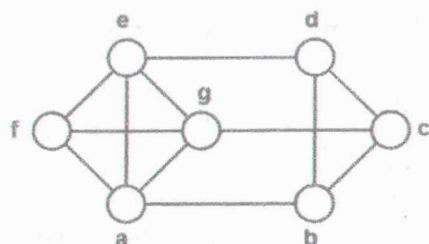
(4, 3, 4)

(Section B)

Q3) a) How many edges will be there in complete bipartite graph K$_{3, 4}$?

b) What is the chromaticity of following graph?
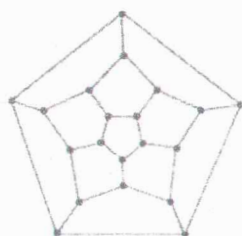
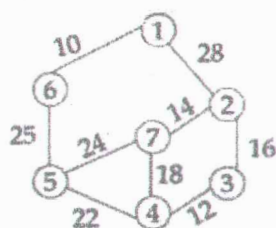c) What is Planar Graph? Is following graph planar?

(5, 5, 6)

Q4) What is Euler cycle? Find Eulerian cycle in following graph.

b) Find minimum cost spanning tree of following graph along with its cost.

(8 X 2 = 16)

(Section C)

Q5) a) How many name of 8 letters can be formed from the letters a, b, c, d, e, f, g, h and i if no letter is repeated?

b) how many different words can be made from the letters of PROCESSING?

c) In how many ways can 5 men and 5 women sit around a table if no two women are allowed to sit together?

d) In how many ways can 2 vegetables and 2 fruits be selected from a pool of 5 vegetables and 6 fruits?

(4 X 4 = 16)

Q6) Solve $T(K) - 7T(K-1) + 10T(K-2) = 6 + 8K$, where $T(0) = 1$, $T(1) = 2$.
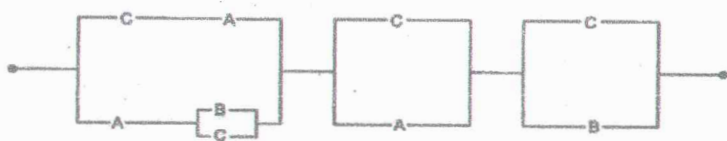
(16)

(Section D)

Q7) a) Define Quotient Ring with example.

b) Under what conditions a Ring can be considered as Field?

(8 X 2 = 16)

Q8) a) Convert $F = \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{D} + BD + ABC\bar{D}$ into standard SOP form.

b) Simplify the following circuit:-

(8 X 2 = 16)

Exam Code: 226701   Paper Code: 1287
       (30)

Programme: Master of Science (Computer Science) Semester-I

Course Title: Artificial Intelligence

Course Code: MCSL–1115

Time Allowed: 3 Hours   Max Marks: 80

Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries equal marks.

Section — I

1. Explain in detail various steps involved in problem solving in Artificial Intelligence?   16
2. What do you mean by uninformed search? What are various uninformed search algorithms?   16

Section — II

3. Explain Propositional logic in Artificial intelligence. What are its limitations?   16
4. Explain General Principles of Game playing and search. Explain Alpha Beta Pruning in detail?   16

Section - III

5. Explain basic representation of plans along With its application areas and benefits. Explain the term partial order planning and conditional planning in detail. 16

6. Describe the different properties of fuzzy sets. Prove Whether the laws of excluded middle and contradiction true for fuzzy sets. What are type2 fuzzy sets? Give example. 16

Section IV

7. Explain decision trees and rule based learning in detail. 16

8. Explain the following:
   a. Neural Networks
   b. Re-enforcement learning
   c. Genetic algorithms 16