SECTION – I

Note : This section consists of **two** essay type questions of **twenty (20)** marks each, to be answered in about **five hundred (500)** words each. **(2 × 20 = 40 marks)**

1. (a) Compare and contrast the TCP/IP Stack with the OSI model. What factor do you think will affect setting an appropriate TCP time out period before the sending host performs a retransmission ?

   (b) Briefly explain the major difference between Ethernet V2.0 and IEEE 802.3.

OR

   (a) What are the necessary and sufficient conditions for Deadlock ? Explain in brief each of them.

   (b) What is a semaphore and how it is used to prevent entry in the critical section ?

2. (a) What do you mean by a software process ? What is the difference between a methodology and a process ? What problem will a Software Development house face if it does not follow any systematic process in its software development efforts ?

(b) Which are the major phases in the waterfall model of software development ? Which phase consumes the maximum effort ?

OR

(a) Show that a static two phase locking schedule satisfies the condition for dynamic two phase locking. Is the converse true ?

(b) Propose a multi version protocol base on locking. Prove that the protocol is safe. Compare the performance of this protocol with the one based on time stemp ordering.

SECTION – II

Note : This section contains **three (3)** questions. From each of the electives/specializations, the candidate has to choose only one elective/specialization and answer all the **three** questions contained therein. Each question carries **fifteen (15)** marks and is to be answered in about **three hundred (300)** words. **($3 \times 15 = 45$ Marks)**

TOC

Elective – I

3. Suppose L$\underline{C}$E* and for some positive integer n_1 there are n strings in E* , any two of which are distinguishable with respect to L. Prove that every FA reorganising L must have at least n states.
4. If L_1 & L_2 are context free languages $L_1 \cup L_2$, $L_1 L_2$ and L_1* are also CFLs.
5. If L_1 & L_2 are recursively enumerable languages over Σ , then $L_1 \cup L_2$ and $L_1 \cap L_2$ are also recursively enumerable.

OR

Elective – II

Image Processing

3. (a) What are the kinds of degradation that can be easily restored ? Explain inverse filteration and wiener filteration method.
   (b) A source emits 6 symbols with probabilities 1/2, 1/4, 1/8, 1/16, 1/32, 1/32. Determine its Huffman code.

4. (a) State and prove Shannon channel capacity theorem.

(b) Explain sub band coding. What is the significance of down sampling and up sampling in sub band coding ?

5. (a) What is image registration ? And explain image to image registration.

(b) Explain turbo and convulsional codes.

OR

Elective – III

3. Solve the following Linear Programming Problem by the Revised Simplex Method :

Maximize $Z = 2x_1 + 2x_2$

Subject to $3x_1 + 4x_2 \leq 6$

$6x_1 + x_2 \leq 3$

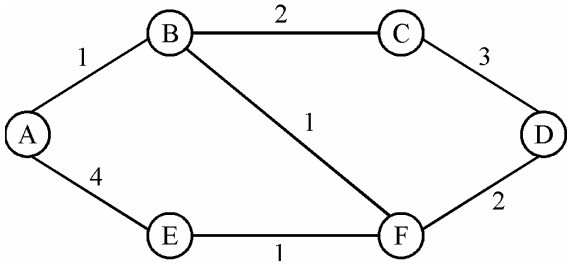
$x_1, x_2 \geq 0$

4. Goods have to be transported from source S_1, S_2 and S_3 to destination D_1, D_2 and D_3. The transportation cost per unit, capacities of the sources and requirements of the destination are given in the following table.

	D_1	D_2	D_3	Supply
S_1	8	5	6	120
S_2	15	10	12	80
S_3	3	9	10	8
Demand	150	80	50	

What schedule to be used to minimize the transportation cost ?

5. Using the Bellman – Ford Algorithm, find the shortest path.



OR

Elective – IV

3. Compare solving XOR problem using RBF and multilayer perception with one hidden layer which one would you prefer & why ?

4. A neuron j receives inputs from four other neurons whose activity levels are 10, –20, 4, –2. The respective synaptic weights of neuron j are 0.8, 0.2, –1.0 and –0.9. Calculate the output of neuron j for the following two situations :

(a) The neuron is linear.

(b) The neuron is represented by a Mc Culloch – Pitts model.

5. Let x be a linguistic variable that measures a university's academic excellence, which takes values from the universe of discourse U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}. Suppose the term set of x includes Excellent, Good, Fair and Bad. The membership functions of these linguistic labels are listed below :

- $\mu_{\text{Excellent}} = \{(8, 0.2), (9, 0.6), (10, 1)\}$
- $\mu_{\text{Good}} = \{(6, 0.1) (7, 0.5) (8, 0.9), (9,1), (10,1)\}$
- $\mu_{\text{Fair}} = \{(2, 0.3) (3, 0.6) (4, 0.9) (5, 1) (6, 0.9) (7, 0.5) (8, 0.1)\}$
- $\mu_{\text{Bad}} = \{(1, 1) (2, 0.7) (3, 0.4) (4, 0.1)\}$

Construct the membership functions of the following compound sets :

- Not Bad but Not Very Good
- Good but Not Excellent

OR

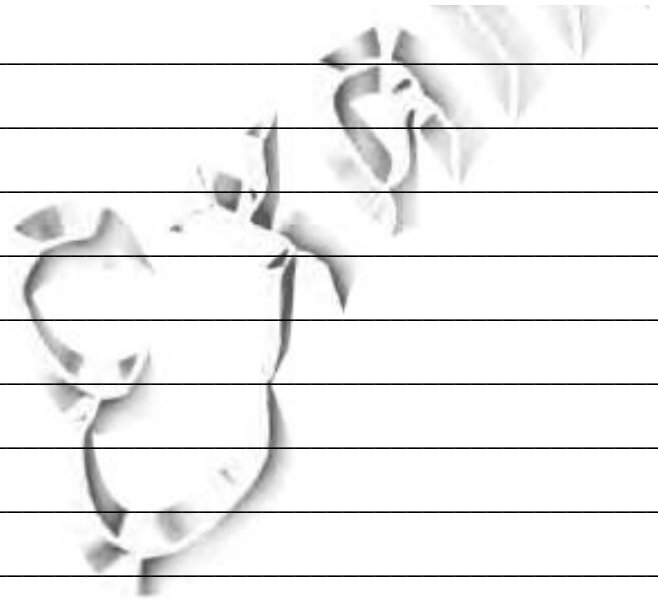
Elective – V

UNIX

3. (a) Explain terminal emulator under X windows and also explain X clip board.
   (b) What are 3 modes of Vi editor and various commands used in them ?

4. (a) What is the use of 'grep', 'egrep', 'fgrep' Command ?
   (b) How is client server environment created in X ? Explain 3 command line options handled by X client.

5. (a) Describe briefly six windows functions usually called while creating a window.
   (b) What is the difference between UNIX and Windows Navigation and directory control commands ?



SECTION – III

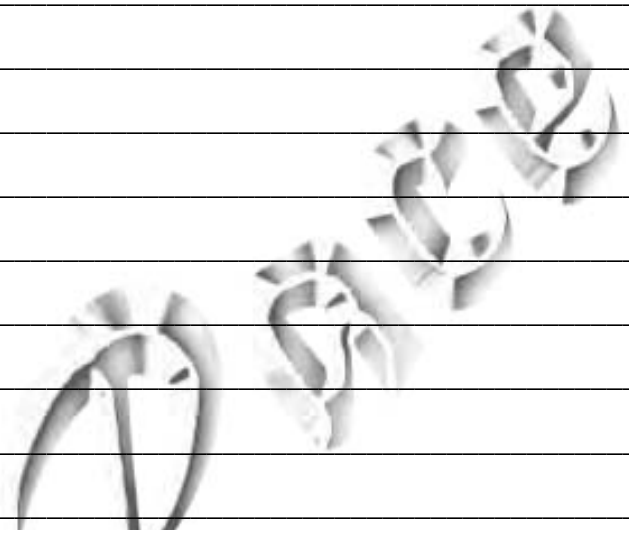
Note : This section contains **nine (9)** questions of **ten (10)** marks each, each to be answered in about **fifty (50)** words. **(9 × 10 = 90 Marks)**

6. What is the difference between centralized routing and distributed routing ?

7. Can a system detect that some of its processes are starving ? If yes, then explain how it can ? If no, then explain how the system can deal with starvation problem.

8. Show how a B_ tree and B^+ tree can be used to implement a priority queue. Also show that any sequence of n insertion and minimum deletion can be performed in o(nlogn) steps.

9. Obtain the logic diagram of a master-slave JK flip flop with AND and NOR Gates, include provision for setting and clearing the flip flop asynchronously.



10. Two binary trees are similar if they are either empty or both non-empty and have similar left and right sub trees. Write a function in C++ to decide whether two binary trees are similar. What is the running time of your function ?

11. Find the Normalization transformation that maps a windows whose lower left is at (1,1) and Upper right (3, 5) onto a view port that has lower left corner at (0, 0) and Upper right corner at (½, ½).

12. Consider the following piece of Knowledge: Mary, Micky and John are members of rotary club. Every rotary club member who is not a swimmer is a mountain climber. Mountain climber do not like rains. Any one who does not like water is not a swimmer. Micky dislikes whatever Mary likes and likes whatever Mary dislikes. Mary likes rain and water.
    (a) Represent this Knowledge as predicate statement.
    (b) Answer the query. Is there a member of Rotary club who is not a mountain climber but a swimmer using resolution method.

13. Compare the relative advantages of using the iterative waterfall model and the spiral model of software development. Explain with the help of few suitable examples, the types of problem for which you would adopt above models.

14. What is the basic difference between optimistic concurrency control and other concurrency control technique. Describe the different phases of an optimistic concurrency control scheme.

SECTION – IV

Note : This section contains **five (5)** questions of **five (5)** marks each. Each question should be answered in about **thirty (30)** words. **(5 × 5 = 25 Marks)**

15. An eight way set associative cache consists of a total of 256 Blocks. The main memory contains 8192 blocks, each consisting of 128 words.

    (a) How many bits are there in the main memory address ?

    (b) How many bits are there in TAG, SET and WORD fields ?

16. Why does LAN tend to use Broadcast Network ? Why not use Networks consisting of multiplexer and switches ?

17. How would you improve a software design that displays very low cohesion and high coupling ?

18. What are the types of collision resolution techniques and the method used in each of these types ?

19. Why are segmentation and paging sometimes combined into one scheme ?