



Motilal Nehru National Institute of Technology Allahabad

Department of Computer Science & Engineering

END SEMESTER(odd) EXAMINATION 2016

Session(july-2016)

Programme: B.Tech Computer Science + Information Technology

Semester:V

Name of Course and Course code: (OPERATIONS RESEARCH)

Course code :CS 1505

Time :3 hrs

M.M 60

Note:Answer All the Six Questions.All carry equal marks.

Q1 (a) Solve intelligently:

$$\text{Minimize } 4a + 5b + 6c$$

Subject to

$$a+b \geq 11$$

$$a-b \leq 5$$

$$c-a-b = 0$$

$$7a \geq 35 - 12b$$

$$a \geq 0, b \geq 0, c \geq 0$$

(b) Construct the dual of the given problem. Write the relation in general between optimal solutions of primal and dual problems.

$$\text{Maximize } Z = 3x_1 + 10x_2 + 2x_3$$

$$\text{Subject to } 2x_1 + 3x_2 + 2x_3 \leq 7$$

$$3x_1 - 2x_2 + 4x_3 = 3$$

$$x_1, x_2, x_3, \text{ all } \geq 0$$

P.T.O.

Q2 Use Two Phase method to solve:

$$\text{Maximize } z = 3x_1 - x_2 + 2x_3$$

subject to

$$x_1 + 3x_2 + x_3 \leq 5$$

$$2x_1 - x_2 + x_3 \geq 2$$

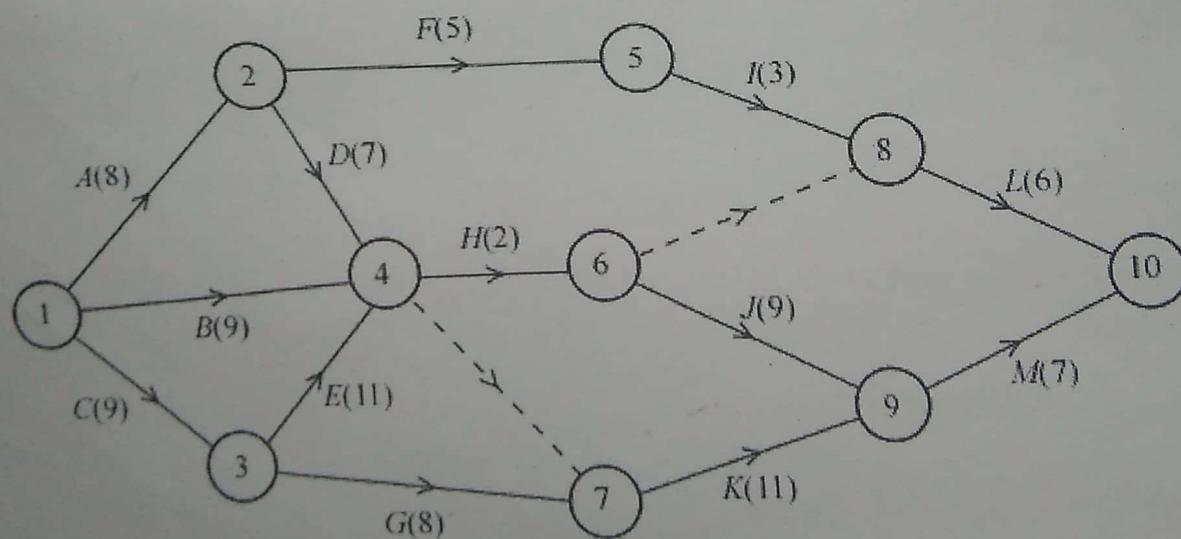
$$4x_1 + 3x_2 - 2x_3 = 5$$

$$x_1, x_2, x_3 \geq 0$$

Q3 Use Vogel's approximation for finding a feasible solution of following transportation problem. Is the solution obtained optimal? Justify your answer.

	D ₁	D ₂	D ₃	D ₄	Supply
S ₁	11	13	17	14	250
S ₂	16	18	14	10	300
S ₃	21	24	13	10	400
Demand	200	225	275	250	

Q4 Write the difference between CPM and PERT. Answer the questions a-e written below:



A project is modelled by the activity networks shown above. The activities are represented by the arcs. The number in brackets on each arc gives the time, in hours, to complete the activity. The numbers in circles are the event numbers. Each activity requires one worker.

- a. Explain the purpose of the dotted line from event 6 to event 8.
- b. Calculate the early time and late time for each event.
- c. Calculate the total float on activities D, E and F.
- d. Determine the critical activities.
- e. Minimum time to complete the project.

Q5 An automobile manufacturer uses about 60,000 pairs of bumpers (front bumper and rear bumper) per year, which it orders from a supplier. The bumpers are used at a reasonably steady rate during the 240 working days per year. It costs \$3.00 to keep one pair of bumpers in inventory for one month, and it costs \$25.00 to place an order. A pair of bumpers costs \$150.00.

- a. Which inventory model should be used here: the instantaneous model, the noninstantaneous model, or the single-period model? How do you know?
- b. Write the annual carrying cost function.
- c. Write the annual ordering cost function.
- d. Write the annual total cost function.
- e. What is the EOQ?
- f. What is the significance of the EOQ?
- g. What is the total annual expense of ordering the EOQ every time?
- h. How many orders will be placed per year?
- i. What is the total annual expense of ordering 600 pairs of bumpers every time?
- j. How much is saved per year by ordering the EOQ?

Q6 Answer any **FIVE** of following:

(a) Write mathematical formulation of assignment problem. Write the differences between transportation and assignment problem.

(b) Write max flow min cut theorem. Illustrate its application with example for finding max flow in a network

(c) How revised simplex is different from simplex?

(d) Write the applications of game theory? Differentiate between pure and Mixed strategies.

(e) Write application of normal distribution in PERT.

(f) Write the difference between sensitivity analysis and postoptimality Analysis.

Motilal Nehru National Institute of Technology
Department of Computer Science & Engineering

End Semester Examination 2016-17

Subject- Cryptography (CS 1506), B. Tech (CS/IT) - 5th Sem.

Duration- 3:00 h

Max. Marks: 60

Note: Assume if something missing.

Attempt all questions:

1. Discuss the importance of Galois Field in cryptography? Briefly define the properties of a Field. [4]
2. What are the essential ingredients of an asymmetric cipher? What is difference between an unconditional secure cipher and a computational secure cipher? [4]
3. Using the Chinese remainder theorem, compute $f^{-1}(3, 5, 2)$ assuming $N=210$, $n_1 = 5$, $n_2 = 6$ and $n_3 = 7$. Show all the computations. [4]
4. Construct a Play fair matrix with the key "occurrence". Make a reasonable assumption about how to treat redundant letters in the key. Encrypt the message, "the enemy must be stopped at all costs. Do whatever is necessary." using the constructed Play fair matrix. [4]
5. Show encryption and decryption for the message "MN", using the RSA public key crypto system? List and briefly discuss the three security attacks over an RSA algorithm. [4]
6. What are the five principal services provided by PGP? Discuss in brief. Why does PGP generate a signature before applying compression? [4]
7. Write short notes on the following: [4]
 - a. Firewall
 - b. Meet-in-the-middle attack
 - c. IP security (IPsec)
 - d. Virus and worms
8. Suppose Bob receives a message signed by Alice, but suspects that the message received might be a replay of an older message sent by Alice in the past. Bob therefore requests from the sender (who claims to be Alice) to sign the message again and resend the result. Explain why this scheme can be used with Digital Signature Standard (DSS) to increase Bob's trust of the message, but not with RSA signatures. [6]

9. Design a protocol that achieves mutual authentication and key agreement between two parties using the minimum number of messages. Assume that both sides share a secret. Also, assume that both sides have the ability to compute cryptographic hashes but have no support for performing symmetric key or asymmetric key encryption/decryption. [6]

10. What problem was Kerberos designed to address? Consider the given scenario to answer the following questions? [10]

Once per user logon session

- a. $C \rightarrow AS: ID_C || ID_{tgs}$
- b. $AS \rightarrow C: E(K_c, Ticket_{tgs})$

Once per type of service

- c. $C \rightarrow TGS: ID_C || ID_v || Ticket_{tgs}$
- d. $TGS \rightarrow C: Ticket_v$

Once per type of service

- e. $C \rightarrow V: ID_C || Ticket_v$

$$Ticket_{tgs} = E(K_{tgs}, [ID_C || AD_C || ID_{tgs} || TS_1 || lifetime_1])$$

$$Ticket_v = E(K_v, [ID_C || AD_C || ID_v || TS_2 || lifetime_2])$$

Where, C: client, AS: Authentication server, TGS: Ticket granting server, AD: Network address, TS: time stamp and lifetime: ticket lifetime

1. How a security attack is possible using the lifetime of ticket-granting ticket?
2. How servers authenticate themselves to the users?

Clearly write the fresh conversation after resolving the above two problems.

11. Consider the following conversations and answer the following questions: [10]

$A \rightarrow KDC : "A", "B"$

$KDC \rightarrow A : E_A(K_{AB}, E_B("A", K_{AB}))$

$A \rightarrow B : E_B("A", K_{AB}), E_{AB}(R_1)$

$B \rightarrow A : E_{AB}(R_1 + 1, R_2)$

$A \rightarrow B : E_{AB}(R_2 + 1)$

1. List at least two possible security attacks on the above given conversations.
2. Clearly draw a fresh conversion at each step after resolving the listed security attacks.

Note: There are 5 questions. First Question is of 20 marks. Rest are 10 marks each.

1. Suppose you are hired as a networking consultant to some institute. Institute currently operates separately in four departments, each having four sections with 100 (can be increased by 100% in 5 years) hosts. The departments are located in neighboring buildings and sections are at different floors of a building. Management wants to interconnect the departmental networks and to connect the resulting institute network to the Internet through a single gateway.
 - (a) List the name and number of devices required to configure the network described above.
 - (b) Your task is to plan the network and deliver a graph of the topology and set of instructions for system administrators on how to configure the routing tables. Also give a plan of addressing scheme and route summarization.
 - (c) Based on your design, also state the sequence of actions performed at every layer of the devices involved:
 - When two interdepartmental nodes want to have telnet session.
 - When two intra-departmental nodes want to have telnet session.
 - When user from any department wants to check his/her Gmail.
2. Suppose we have a Chord DHT with 5-bit key space and there are 7 nodes in the network, with node ID equal to 2, 5, 8, 13, 19, 20, 26. Further, there are 11 content objects with hashed IDs 00,01,05,08,10,12,19,21, 26, 30,31 already stored on DHT. Answer the following questions:
 - (a) Draw a ring to represent the DHT key space; indicate where the 7 peers are situated on this ring.
 - (b) Give the finger table for each peer.
 - (c) Show the distribution of content objects.
 - (d) Suppose you are at peer with ID=8. You have a query for content object that hashes to value 2. Indicate the routing steps that leads you to find the peer that stores the desired content object.
 - (e) Suppose now a new node with ID=29 joins the node, write ALL the changes in each peer (finger, successor, predecessor and stored keys).
 - (f) Now node 08 wants to unjoin (informed leave) the overlay, write ALL the changes in each peer (finger, successor, predecessor and stored keys), considering the changes already made by part (e).
3. Consider the network shown in Figure.1 on the next page.
 - (a) Show the operation of Dijkstra's (LinkState) algorithm for computing the least cost path from E to all destinations.
 - (b) From these results, show the least cost path from E to A, and briefly describe (in 1-2 sentence) how you got that answer from your work in part (a)
 - (c) What are distance vectors in node E,D and C ? In two or three sentences, explain how least cost path from E to A is determined by E based on these three distance vectors. Note: You do not have to run Distance Vector Algorithm. You should be able to compute distance vectors by inspection
 - (d) Let us focus again on node E and distance vector routing. Suppose all distance vectors have been computed in all nodes and now suppose that link from E to B goes down. Approximately how many distance vector messages will be sent by node E as a result of this link going down? Explain

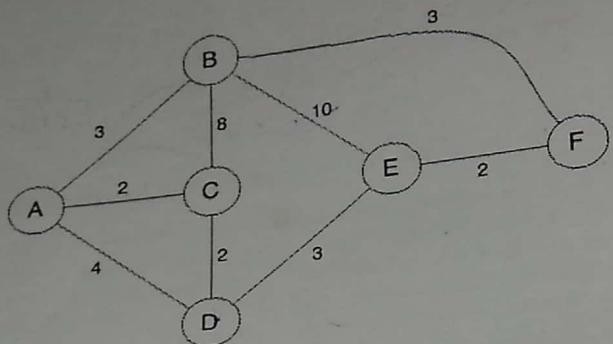


Figure 1: Figure for Question.3

4. (a) Assume that in the network shown in Figure.2, two parallel TCP connections are performed. TCP1 connection (between Source A and Sink A) uses TCP Tahoe (fast retransmit) whereas TCP2 connection (between Source B and Sink B) uses TCP Reno (fast retransmit and fast recovery). Initial $ssthresh$ for both connection is set to 32. In this specific scenario, no additional delay is introduced. Thus the RTT is only composed of the sums of the delay indicated on each link times two. (a) For the TCP1 transmission, draw the graph of resultant congestion window with respect to time assuming that a packet loss (triple duplicate ACKs) is detected at time 900 ms. (b) For the TCP2 transmission, draw the graph of resultant congestion window with respect to time assuming that a packet loss (triple duplicate ACKs) is detected at time 650 ms.

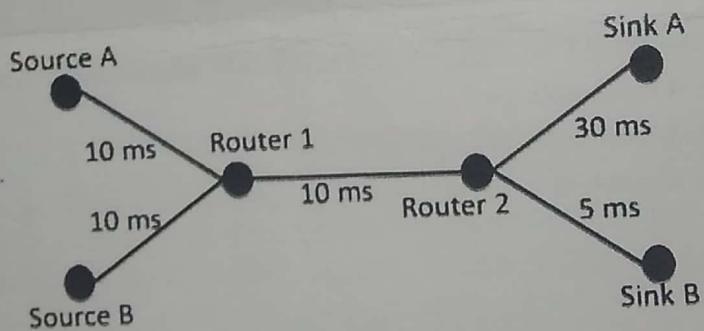


Figure 2: Figure for Question.4

- (b) Suppose that s bits are used to represent the sequence number. In class we said that the maximum window size W for Go-Back-N protocol is $W = N - 1$, where $N = 2^s$. The claim is that this is correct only when the packets cannot be re-ordered by the network during the retransmission, i.e., a packet, P_1 , sent before another packet, P_2 , by the sender cannot show up at the receiver later than P_2 ! Use an example (say, use $s = 2$) to show why $W = N - 1$ will not work correctly if the network can indeed re-order the packets.
5. Write short technical notes on:
- Working of Self-learning layer-2 switch.
 - Collision avoidance in IEEE 802.11
 - Border Gateway Protocol with description of eBGP and iBGP connections.
 - Concept of control plane, data plane and management plane in computer networks.

Soln
 Time 3 Hour
 All questions are compulsory. Assume any missing data and mention it at the top of answer.

M.M. 60

Q 1 Suppose that you wish to design a virtual memory system with the following characteristics:

- The size of a page table entry is 4 bytes.
 - Each page table must fit into a single physical frame.
 - The system must be able to support virtual address spaces as large as 256 GB.
1. Suppose that you decide to use a multi-level paging scheme with no more than two levels of page tables. What is the minimum page size that your system must have?
 2. Suppose instead that you are willing to use a three-level paging scheme. What is the minimum page size that your system must have in this case?

3*2
marks

Q 2 Consider the following code. The two processes, P0 and P1, share the following variables:

boolean flag[2]; /* initially false */

```
int turn;
do {
    flag[i] = TRUE;
    while (flag[j]) {
        if (turn == j) {
            flag[i] = false;
            while (turn == j); // do nothing
            flag[i] = TRUE;
        }
    }
    //critical section
    turn = j;
    flag[i] = FALSE;
    //remainder section
} while (TRUE);
```

5*2
marks

The structure of process P_i ($i = 0$ or 1) is shown in the above code, the other process is P_j ($j = 1$ or 0). The structure of process P_i ($i = 0$ or 1) is shown in the above code, the other process is P_j ($j = 1$ or 0). The structure of process P_i ($i = 0$ or 1) is shown in the above code, the other process is P_j ($j = 1$ or 0). The structure of process P_i ($i = 0$ or 1) is shown in the above code, the other process is P_j ($j = 1$ or 0).

- Justify whether the algorithm satisfies all the requirements for the critical-section.
- Does the code depict deadlock? Explain.

2*3
marks

Q 3 Consider a system with memory mapping done on a page basis and using a single level page table.

Assume that the necessary page table is always in memory.

1. If a memory reference takes 200 ns, how long does a paged memory reference take?
2. Now we add an MMU that imposes an overhead of 20 ns on a hit or a miss. If we assume that 85% of all memory references hit in the MMU TLB, what is the Effective Memory Access Time (EMAT)?
3. Explain how the TLB hit rate affects the EMAT.

marks

Q 4 A process contains eight virtual pages on disk and is assigned a fixed allocation of four page frames in main memory. The following page trace occurs:

1, 0, 2, 2, 1, 7, 6, 7, 0, 1, 2, 0, 3, 0, 4, 5, 1, 5, 2, 4, 5, 6, 7, 6, 7, 2, 4, 2, 7, 3, 3, 2, 3

1. Show the successive pages residing in the four frames using the LRU replacement policy.

Compute the hit ratio in main memory. Assume that the frames are initially empty.

2. Repeat part (a) for the FIFO replacement policy.
3. Compare the two hit ratios and comment on the effectiveness of using FIFO to approximate LRU with respect to this particular trace.

2*3
marks

Q 5 Consider a paged virtual memory system with 32-bit virtual addresses and 1K-byte pages. Each page table entry requires 32 bits. It is desired to limit the page table size to one page.

1. How many levels of page tables are required?

2. What is the size of the page table at each level?

3. The smaller page size could be used at the top level or the bottom level of the page table hierarchy. Which strategy consumes the least number of pages?

3*2
marks

Q 6 Due to the Mother's Day rush, you have been hired by the Marshal Field's departmental store to provide synchronization for their revolving door. The door is pictured in Figure 1. Your job is to keep people flowing in both directions through the door. Here are the constraints.

marks

- The door has four (4) compartments. Each compartment can hold, at most, one (1) person. The door only revolves in one direction.
- People wait in line on either side of the door until an empty compartment is available. A person must exit from a compartment before the next person can enter it.
- If people are waiting both inside and outside, then one person from each direction should move through the door at each turn.
- You have available to you (already written) a procedure called TurnDoor(), which rotates the door by 90 degrees. You have no idea how long this procedure takes to execute. If you rotate the door while a person is getting in or out, you will squash them.
- You also have available to you (already written) procedures called EnterDoor() and LeaveDoor(), which moves a person calling this routine into and out of the revolving door. You have no idea how long these procedures take to execute.
- When your program starts, assume that the door is completely empty and that open compartments are facing the inside and outside. Also, assume that no one is waiting in line.

Using synchronization mechanism, you are to write the code for EnterStore() and LeaveStore() procedures. These procedures are called by a person (process) when they (it) want to enter or leave the store. These procedures will return when the person (process) has safely entered or exited the store.

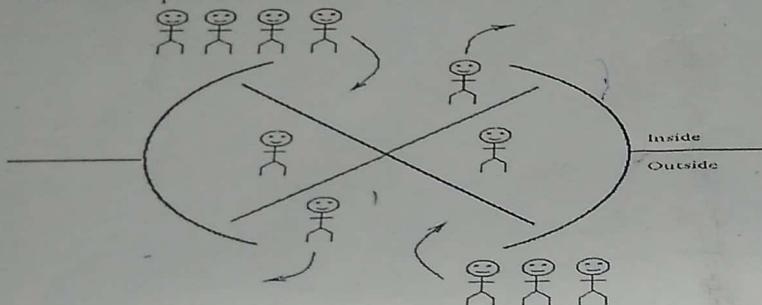


Figure 1

Q 6 Consider a demand-paged computer system where the degree of multiprogramming is currently fixed at 3*2 marks
 four. The system was recently measured to determine utilization of the CPU and the paging disk. The results are one of the following alternatives. For each case, what is happening? Can the degree of multiprogramming be increased to increase the CPU utilization? Is the paging helping?

- CPU utilization 13 percent; disk utilization 97 percent
- CPU utilization 87 percent; disk utilization 3 percent
- CPU utilization 13 percent; disk utilization 3 percent

Q 7 A scheduling algorithm assigns priority proportional to the waiting time of a process. Every process 4 starts with priority zero (the lowest priority). The scheduler re-evaluates the process priorities every T marks time units and decides the next process to schedule. Justify the scheduling algorithm depicted by the given scenario assuming no I/O operations and that all processes arrive at time zero?

Q 8 Consider the following information about resources in a system:

- There are two classes of allocable resource labelled R1 and R2.
 - There are two instances of each resource.
 - There are four processes labelled P1 through P4.
 - There are some resource instances already allocated to processes, as follows:
 - one instance of R1 held by P2, another held by P3
 - one instance of R2 held by P1, another held by P4
 - Some processes have requested additional resources, as follows:
 - P1 wants one instance of R1
 - P3 wants one instance of R2
- Draw the resource allocation graph for this system.
 - Is the system in a deadlocked state? If so, state the processes which are involved. If not, give an execution sequence that eventually ends, showing resource acquisition and release at each step.

Shift
Department of Computer Science and Engineering
Motilal Nehru National Institute of Technology
Allahabad, Uttar Pradesh, India

Object Oriented Modeling
B.Tech. V Sem (CS+IT)

End Semester Exam

Max Marks: 60

Max Time: Three Hour

- If you need to make any assumptions, state them clearly.
- **Do not copy solutions from others or indulge in unfair means.**
- **Questions Carry marks shown against them.**

Q1.(a) Describe two kinds of reuse in object oriented modeling, which supports higher reuse and [05]
why?

(b) How it is decided, what messages can be invoked over an object reference and which [05]
method will be dispatched for that invocation from the class hierarchy? Explain through
an example.

Q2, Define an interface in object oriented modeling. Explain through an example how they [10]
support reusable, flexible and extendible software development.

Q3.(a) Describe the pattern that provides a mechanism for traversing the elements of a collection [03]
without exposing the underlying representation of the collection.

(b) What are the hook methods, describe the pattern that uses them extensively and how they [03]
(hook methods) support the framework development.

(c) Open closed principle states that classes are closed for modification and open for [05]
extension. Suppose that a class is a final and requirement is such that we have to add some
operations later on and that is known to the designer, explain through an example class
diagram how it can be done. Identify the pattern which solves this problem.

(d) Consider a method being used in an application class as Serve(Serviceable x). We have [04]
an interface Serviceable which has methods f() and g(). A totally unrelated class X has methods
m() and n() already implemented which has behavior of f() and g(). Design all solutions which
make use of m() and n() methods for Serviceable and let method call Serve(x) working without
any error in application class.

P.T.O.

Q4. You are required to design a class hierarchy supporting the polymorphic code reuse for printing the details of a student that varies with the type of student i.e. whether he is UG, PG, PhD or some other type of student added in future. You should clearly bring out the differences among the design of class hierarchy, application code where polymorphic code reuse is supported and client code which exploits reuse supported through above design. Explain various advantages obtained through above design. Implement above design using Java/C++. (Student details for UG may be student name, roll-no, department, SPI, CPI, ..., For PG some fields like UG degree, UG institution may be added, further for PhD the name of supervisor(s) may be added.) [10]

Q5. You are required to develop a small stock-trading system. Customers place buy and sell orders and securities transfer with service representative; then, the service representative enter those orders into the system. The system is closed, meaning that all buy orders are matched with sell orders within the system. (This system does not use orders placed with any other system.)

A security transfer moves stock or cash into or out of the system. Each transfer includes the customer's account number and either the amount of cash, or stock name and number of shares that is being transferred. A service representative also creates the accounts at customers' requests.

Each order includes the customer's account number, the name of the stock and the number of shares to be bought or sold, whether the order is buy or sell and the price customer is willing to pay or receive. (Orders must include a price because this system does not employ market prices.) Optionally, an order may include an expiration time indicating the date and time after which the order is no longer valid.

When an order is entered in the system, the service representative is given a unique order number for that order. Orders have a status. When they are placed, buy and sell orders are registered as open. When a buy order is matched with one or more sell orders, the involved buy and sell orders are registered as executed. An order that expires without being exercised is registered as expired. An order that is cancelled is registered as cancelled. By supplying an order number, a service representative may request the status of an order and any other relevant information about the order.

This system does not employ settlement period or short sales. To execute the buy or sell order, the customer's account must have sufficient fund or stock to cover the trade. You may match any number of buy orders to any number of sell orders. The only requirements are that in any match: the total number of buy orders shares equals the total number of sell order shares (That is, you do not match partial orders), and the asking price of any sell orders is no higher than offering price of any buy order. (When the two prices do not match, the final price may be anything between asking and the offering prices.) Design the Use-case, Class and Sequence Diagram for the above stock trading system. [15]

1. Attempt any FIVE (05) questions including Q.No.(1) which is COMPULSORY to ALL.Q.No.1 Carries 20 Marks and rest questions carry 10 Marks each.

2. All parts of a question should be answered in one attempt serially NOT here & there.
 3. Write to the point, exactly what is asked.

Q.No.1(A) Define the following terms in brief:

- (i) Computer Graphics (ii) GUI (iii) Simulation (iv) Image Processing (v) Virtual Reality
- (vi) Snap Shot (vii) Frame (viii) Frame Buffer (ix) Pixel (x) Video Clip (xi) Raster-Scan Systems (xii) Persistence (xiii) Resolution (xiv) Brightness (xv) Intensity
- (xvi) Daisy Wheal (xvii) Toner (xviii) Dot Matrix (xix) Anti-Aliasing (xx) Ray Casting

$(20 \times \frac{1}{2} = 10)$

(B) Derive the Transformation Matrix for 2-D rotation about an Arbitrary POINT.

(C) Compare point wise DDA Line Tracing Algorithm Vs Bresenham's Line Tracing Algorithm.

In which case the Line traced will be smoother & why? Justify Properly.

(D) Explain point wise the working of the following :

- (i) Laser Printer (ii) Image Scanner (iii) Touch Screen

$(10 + 02 + 02 + 3 \times 2 = 20)$

Q.No.2 (A) Compare point wise the followings :

- (i) LCD Monitors Vs CRT Monitors (ii) Dot Matrix Printer Vs Ink Jet Printer

(B) Consider a Raster System with Resolution 1280 by 1024. What size of Frame buffer is needed for given system to store 24 bits per pixel? How many colors are possible in given system? What is the access time per pixel if refreshing rate is 60 frames per second?

(C) If a TV screen has 525 scan lines & an Aspect Ratio of 3 : 4, and if each pixel Contains 8-bits worth of Intensity Information, how many bits per second are required to show 30 Frames each second?
 $(2 \frac{1}{2} \times 2 + 03 + 02 = 10)$

Q.No.3 (A) How long would it take to load a 1280 by 1024 Frame Buffer with 12 bits per pixel if Transfer Rate is 1 MBPS?

(B) How much memory is needed for Frame Buffer to store a 640 X 400 display 16 gray levels?

(C) How much time is spent scanning across each row of pixels during screen refreshing a Raster System with a Resolution of 640 X 480 and refresh raster of 60 frames per second?

(D) In a 600 X 400 pixel, how many K bytes does a Frame Buffer need?

(E) Compute the Resolution of an 4 X 4 inch IMAGE that has 256 X 256 pixels.

$(02+02+02+03+01=10)$

(Contd. on PAGE No.2)

Q.No.4(A) Explain point wise the **Mid Point Circle Tracing Algorithm**.

(B) Compute & Tabulate points to be illuminated for tracing a Circle with Radius $r = 10$ in the circle Octant in the first Quadrant from $x=0$ to $x=y$ using **Mid Point Circle Tracing Algorithm**.

(C) Using **Bresenham's line drawing Algorithm** compute the points to be illuminated for tracing a line from $P_1(11, 21)$ to $P_2(18, 25)$. (03+03+03 +01=10)

(D) What is a blurred IMAGE?

Q.No.5 (A) What is Transformation? Define in brief ALL the 2-D Transformations & write their relevant transformation Matrix.

(B) Why exactly we need **Homogeneous Coordinate System** in 2-D Transformations?

(C) How exactly the two successive 2-D Rotations about origin are Commutative? Prove.

(D) What is **Parallel Projections**? What are its applications? Explain in brief. (03+02+03+02=10)

Q.No.6(A) Show how reflection in line $y=x$ & in the line $y= -x$ can be performed by a scaling operation followed by a Rotation.

(B) Show that 2D reflection through X axis followed by 2D reflection through the line $Y= -X$ is equivalent to a pure Rotation about the Origin.

(C) Magnify Triangle ABC with vertices A(0,0), B (1,1) , C(5, 2) to thrice its size, while keeping B(1,1) fixed. Finally find out the vertices of the magnified Triangle.

(D) What is **Perspective Projections**? What are its applications? Explain in brief. (03+03+02+02=10)

Q.No.7(A) Define: **Image Space & Object Space Algorithm** for Back face removal.

(B) Write down point wise the **Depth Buffer Algorithm** for detecting visible Surfaces. Why it is called **Z-Buffer Algorithm** too? What are its limitations?

(C) Write down point wise the **A- Buffer Algorithm** for detecting visible Surfaces. How it may also work for Transparent surfaces?

(D) Explain point wise **Painters Algorithm**. What are its limitations? (01+03+03+03=10)

Q.No.8 (A) Write down point wise the "**Cohen-Sutherland Algorithm**" Line Clipping Algorithm.

(B) Use **Cohen-Sutherland Algorithm** to find the visible portion of the line P(40,80) Q(120,30) inside the window. The Window is defined as ABCD:A(20,20),B(60,20),C(60,40) & D(20,40).

(C) Out of the Clipping Algorithms studied by you which one of them you find easy to implement? Justify your reply. (04+04+02=10)

Q.No.9 Write Short notes on any five of the followings:

(A) RGB Color Model (B) Bezier Curves (C) B-Spline Curves (D) Working of Optical

Mouse (E) Working of Bar Code Reader (F) Working of Magnetic Stripe (F) WARNOCK's

Algorithm (G) HSV Color Model (H) CMY Color Model (I) Plasma Panel Display (05 X 02 = 10)

* END *