

Computer Engineering Department, S V N I T, Surat.
Endsemester Examinations, November 2017
B.Tech-IV (CO) – Seventh Semester
Course: CO401 – Software Engineering

27th November 2017

Time: 15:30 to 18:30

Max Marks: 100

Instructions:

Write your B.Tech. Admission No/Roll No and other details clearly on the answer books while write your B.Tech. Admission No on the question paper, too.
Assume any necessary data but give proper justifications.
Be precise and clear in answering the questions.

[40]

Answer the following: (Any Eight)

Explain why it is particularly important to define sub-system interfaces in a precise way and why algebraic specification is particularly appropriate for sub-system interface specification.

You are a system engineer and asked to suggest the best way to develop the safety-critical software for a heart pacemaker. You suggest formally specifying the system, but your manager rejects your suggestion. You think his reasons are weak and based on prejudice. Is it ethical to develop the system using methods that you think are inadequate?

Justify your answer with suitable arguments.

Explain why it is not necessary for a program to be completely free of defects before it is delivered to its customers. To what extent a testing be used to validate that the program is fit for its purpose?

What is the difference between ontology and Object Oriented class structure? Enlist operations on ontology.

Explain the problem of ambiguity in requirement specification. Explain semantic ambiguity with example.

Give logic specification for a program that computes the integer square root of nonnegative integers.

A major requirement of a classical producer-consumer system is that, at any time, the sequence of items produced by the producer (passed to operation WRITE as parameters) coincide with the sequence of items consumed (i.e. obtained through GET); except for the most recently produced elements, which are kept in buffer. This property must always hold.

Specify the above requirement using logic specification.

Give an alternative specification for lighting up a button by using Petri Nets augmented with priorities, instead of timed PNs.

Explain with suitable example functional decomposition and balancing in Data Flow Diagram.

[20]

Answer the following:

A large pizza business makes pizzas and sells them. The pizzas are manufactured and kept in cold storage for not more than two weeks. The business is split into a number of functional units. There is Production Control, Manufacturing, Stores, Accounts, Sales, Shipping and Purchasing. Production Control are responsible for organizing which pizzas to produce in what order and in what quantity. They need to schedule the production of the pizzas according to the current and expected sales orders together with the number of pizzas already in stores. Manufacturing take the raw materials from the stores and manufacture pizzas returning the completed goods to the stores. Accounts deal with the payments for the pizzas when delivered to the customer and the payment to the suppliers of the raw materials. Sales deal with customer orders whilst Purchasing organize the buying of raw material from suppliers. Shipping manages the packing and delivery of the goods to the customer with a delivery note.

When a sales order is received by sales they record what is being ordered and by whom. They also record the details of the expected date of delivery. Production Control access this information and make sure that, if required, pizzas are produced by Manufacturing and are ready in stores for when the delivery needs to be made.

After the delivery is made Accounts make sure that the customer receives an invoice and that payment for the invoice is received at which time a receipt is issued. Purchasing look at the current stock of raw materials and by using current stock levels, supplier turnaround times and quantity to be ordered decide what needs to be ordered on a daily basis. Their aim is never to run out of an ingredient but to minimize the amount of raw material kept in stock.

Draw a context level, level-1 and level-2 Data Flow diagrams for the above software requirements.

Formalize the requirements of an Elevator system discussed in class using logic specification. Clearly explain all the predicates you have assumed for explaining the rules that govern the movement of the elevator. (Formalize any five rules of your choice)

[20]

Answer the following:

Identify the functional and nonfunctional requirements for the following:

Consider the application scenario of e-democracy and online voting. Many people consider that the Internet could replace representative democracy and enable everyone to vote on anything by online voting. Online voting can reduce cost and make voting more convenient. This type of voting can be done for e-democracy or it may be used for finalizing a solution, if many alternatives are present. Online voting makes use of authentication, hence it needs security. The system must be able to address obtaining, marking, delivering, and counting ballots via computers. Advantage of online voting is that it can increase voter turnout because of convenience and can help to reduce fraud voting.

- 2) A software application has 10 Low External Inputs, 12 High External Outputs, 20 Low Internal Logical Files, 15 High External Interface Files, 12 Average External Inquiries, and a value adjustment factor of 1.10. Answer the following with respect to the above software:
- What is the unadjusted function point count (i.e. count value)?
 - What is the adjusted function point count (i.e. functional Point)?
- 3) Following is the code for GCD computation by Euclid's method:
- ```
while (x != y) {
 if (x > y)
 x = x - y;
 else
 y = y - x;
}
return x;
```
- Draw the Control Flow Graf for the above code.
  - Find the cyclomatic complexity for the same and find the independent paths.

- 4) Given the problem statement, "determine the class average for a set of test grades, input by the user. The number of test grades is not known in advance (so the user will have to enter a special code -- a "sentinel" value -- to indicate that he/she is finished typing in grades)".

Do the Stepwise Refinement of the above problem statement.

**Q.3(B)**

- 1) A web browser is software that helps to access a resource (web page) available on the World Wide Web and identified by a URL. Whenever a user types in the URL of a web page in the browser's address bar and clicks the "Go" button, the browser sends a HTTP request to the concerned web server. If the requested resource is available and accessible, the web server sends back a HTTP response to the requesting web browser. In case of any error, a HTTP response is sent indicating the error.
- When the web browser receives a HTTP response, it displays the web page to the user. In very simple terms a web browser can be thought of consisting of the following sub-components: rendering engine, and browser control. Once a HTTP response has been obtained from the server, the rendering engine decides the layout of the contents and actually displays the requested page. This is done keeping in mind the different HTML elements that are present in the page, and corresponding CSS rules, if any.
- The browser control provides facilities like navigating across pages (by following hyperlinks), reload a page, and handles other events related to the window display, for example, resizing the browser window.

- Make a simplified Class Diagram for the web browser
- Make the Sequence Diagram for the web browser

- 2) Explain in brief:

- Static testing vs Dynamic Testing
- Scope of the Case tools

- 3) "Testing and correctness proof are not quite comparable, and the key issues are other things: inference and judgment. Development needs both. Perhaps ideally fused into 'inferential construction'".

Justify the above statement with suitable arguments.

**OR**

- 3) Create the equivalence classes for the following:

- In a system designed to work out the tax to be paid has the following requirements:  
An employee has £4000 of salary tax-free. The next £1500 is taxed at 10%. The next £28000 after that is taxed at 22%. Any further amount is taxed at 40%.
- One of the fields on a form contains a text box which accepts alphanumeric values.

# **Computer Engineering Department, S V N I T, Surat.**

**Mid Semester Examination, March 2017**

**B.Tech III (CO) - 6<sup>th</sup> Semester**

**Course: Computer Graphics (CO306)**

**Date: 2/3/2017**

**Time – 14:00 to 15:30**

**Total Marks - 30**

## **Instructions:**

1. Write your B.Tech Admission No/Roll No and other details clearly on the answer books while write your B.Tech admission no. on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

## **Q-1 ANSWER THE FOLLOWING ( Any five ) :**

**30**

1. Define and differentiate between Computer Graphics, Computer Vision and Image Processing. What are two principal applications of each?
2. Explain operating characteristics for the following display technologies :
  1. Plasma Panels
  2. LCDs
  3. LEDs
3. Show how DDA algorithm differs from Bresenham's line drawing algorithm. Illustrate this difference with a suitable example.
4. Why do we get aliasing problem on our graphics? How can we solve this using anti aliasing? What are the anti aliasing methods? Briefly explain.
5. Describe scan line seed fill method for polygon filling with suitable example. Will there be any significance of 4-connected or 8-connected approach for this method? Justify your answer.
6. Translate the square ABCD whose co-ordinates are A(0,0), B(3,0), C(3,3) and D(0,3) by 2 units in both directions and then scale it by 1.5 units in x-direction and 0.5 units in y-direction. Show the output at each step.

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**S. V. NATIONAL INSTITUTE OF TECHNOLOGY**  
**M.Sc. Mathematics - III, Semester – VI Mid-Semester Exam**  
**OPERATING SYSTEMS**

2<sup>nd</sup> March 2017  
 02:00-03:30PM

Seat No. \_\_\_\_\_

Instructions: (1) Figures to the extreme right indicate the maximum marks of the respective question.

[Total Marks: 30]

**Q-1 Answer the following[Any Five]:**

10

1. What is an operating system? State the differences between batch and time sharing operating systems.
2. Define race condition with example.
3. What is Thread? State the differences between process and thread.
4. Which scheduler maintains the Degree of Multiprogramming ? Justify your answer.
5. Explain with diagram: Preemptive and Nonpreemptive scheduling.
6. What do you mean by memory compaction and state limitations of memory compaction?
7. Differentiate between Logical address space and physical address space.

**Q-2 Answer the following:**

1. What do you mean by fragmentation? State the differences between internal and external fragmentation. 03
2. Draw and explain process state diagram. 03
3. Given memory partition of 100 K, 500 K, 200 K, 300 K and 600 K (in order). How would each of the first fit, best fit and worst fit algorithms place the processes of 212 K, 417 K, 112 K and 426 K(in order)? Which algorithm makes the most efficient use of memory? 04
4. Consider a logical address space of 8 pages of 1024 word each mapped onto a physical memory of 32 frames. How many bits are there in logical and physical addresses? Also find the size of page table in bytes. 04
5. Consider the following schedule of periodic processes: 06

| Process Name | Arrival Time | Burst Time |
|--------------|--------------|------------|
| P1           | 2            | 8          |
| P2           | 7            | 1          |
| P3           | 6            | 2          |
| P4           | 3            | 6          |
| P5           | 5            | 4          |

- a) Draw Gantt charts illustrating the execution of these processing using Preemptive Shortest Job First (SJF)
- b) What is waiting time of each process? Also calculate average waiting time.
- c) What is Turnaround time of each process? Also calculate average Turnaround time.
- d) What is Context Switching? How many times it will occur in above example?

**Computer Engineering Department, S V N I T, Surat.  
Mid-Semester Examinations, February-March 2016**

**M.sc III (Maths) – 6th semester  
Course : Operating System**

Date:03/03/2016

Time:14:00 to 15:30

Max Marks: 30

**Instructions:**

1. Write your Admission No/Roll No and other details clearly on the answer books while write your M.Sc. Admission No on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

**Q.1 Answer the following questions:[Any Seven]**

[14]

1. What is Operating System? What are the main purposes of an operating system?
2. Explain Process state diagram.
3. Give the difference between short term , medium term and long term scheduling.
4. Why Process Control Block is required? Explain with its various fields.
5. Explain the difference between internal and external fragmentation.
6. What is an inverted page table? How does it compare to a two-level page table?
7. What is memory compaction? Why it is required?
8. How Address translation is done in segmentation?
9. Differentiate between user level thread and kernel level thread.

**Q.2 Fill in the blanks:**

[03]

1. The switching between different processes is called \_\_\_\_\_.
2. Major problem with priority scheduling is \_\_\_\_\_.
3. All the processes which are ready to execute reside in \_\_\_\_\_.
4. Address generated by CPU is called \_\_\_\_\_.
5. Run time mapping from virtual to physical address is done by \_\_\_\_\_.
6. Physical memory is broken into fixed-sized blocks called \_\_\_\_\_.

**Q.3 Answer the followings:**

[13]

1. Apply the buddy algorithm to a 1-Kbyte block of memory and show the state of memory after each of the following operations: request 80k (process A); request 36k (process B); request 80k (process C); return A; request 60k (process D); request 100k (process E); return B; request 144k (process F); return D; return E; return C. [03]
2. Given that Logical Address is 32 bits,physical address space is 64 MB,page size is 4 KB,Calculate logical address space,page no.,frame No.,no of pages,no.of frames,offset. [04]

3. Consider the following set of processes, with the length of the CPU-burst time and [06]

arrival time is given in milliseconds:

a.) Draw Gantt charts illustrating the execution of these processes using Preemptive SJF and RR (Time Quantum=2) scheduling.

b.) What is the waiting time of each process for each of the scheduling algorithm? Also calculate average waiting time for both scheduling.

c.) What is the Turnaround time of each process for each of the scheduling algorithm? Also calculate average Turnaround time for both scheduling.

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 1            | 7          |
| P2      | 2            | 5          |
| P3      | 3            | 1          |
| P4      | 4            | 2          |
| P5      | 5            | 8          |

**Computer Engineering Department, S V N I T, Surat.**  
**Mid Semester Examination, March 2016**  
**B.Tech III (CO) - 6<sup>th</sup> Semester**  
**Course: Computer Graphics (CO306)**

**Date: 3/3/2016**

**Instructions:**

**Time – 14:00 to 15:30**

**Total Marks - 30**

1. Write your B.Tech Admission No/Roll No and other details clearly on the answer books while write your B.Tech admission no. on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

**Q-1 ANSWER THE FOLLOWING:**

**14**

1. Write a midpoint circle algorithm and draw the circle with radius  $R = 13$ . What are the issues in the midpoint circle algorithm? How will you resolve it? Rewrite the new midpoint circle drawing algorithm and draw the circle with the same radius. (note: Show only the points of the circle for the second octant) 6
2. Prove that two dimensional rotation and scaling are commutative if, 3
  - i)  $S_x = S_y$  and ii)  $\Theta = n\pi$

**OR**

2. Prove that two dimensional rotations above the origin are commutative i.e.:  $R_1 R_2 = R_2 R_1$ . 3
3. What is the general equation of an ellipse and what are the major and minor axes of an ellipse. Also specify the decision parameter ( $\Delta d$ ) for both the regions. 3
4. a) What are the inverse transformations for translation, rotation and scaling? 2  
b) For two dimensional transformations, represent translation, rotation & scaling in homogenous coordinate system.

**Q-2 ANSWER THE FOLLOWING:**

**16**

1. Explain efficient ordered edge list algorithm. Show how it works for the polygon with vertices  $P1(1, 1)$ ,  $P2(8, 1)$ ,  $P3(8, 6)$ ,  $P4(5, 3)$  and  $P5(1, 7)$ . 6
2. Let  $R$  be the rectangular window whose lower left-hand corner is at  $L(-3, 1)$  and upper right-hand corner is at  $R(2, 6)$ . Let the line  $AB$  has coordinates  $A(-4, 2)$  and  $B(-1, 7)$  and line  $CD$  have coordinates  $C(-1, 5)$  and  $D(3, 8)$ .
  1. Derive the visibility of line  $AB$  and  $CD$  with endpoint codes.
  2. Use Cohen Sutherland Algorithm to clip line  $AB$ .
  3. Use midpoint sub division method to clip line  $CD$ .10

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**COMPUTER ENGINEERING DEPARTMENT**  
**SARDAR VALLABHBHAI NATIONAL INSTITUTE OF TECHNOLOGY**  
**BTECH-III SEM.-VI (MID SEMESTER EXAMINATION)**  
**CO302: OPERATING SYSTEMS (CS-1)**

Time: 1  $\frac{1}{2}$  Hours

Instructions: Figures to the right indicates maximum marks

Marks: 30  
29<sup>th</sup> Feb. 2016

- Describe how an Inverted Page Table (IPT) is used to translate a virtual address into a physical address. 03
- Suppose that we have a 64-bit virtual address split as follows: 05

|              |            |            |            |            |          |
|--------------|------------|------------|------------|------------|----------|
| 6 Bits       | 11 Bits    | 11 Bits    | 11 Bits    | 11 Bits    | 14 Bits  |
| [Segment ID] | [Table ID] | [Table ID] | [Table ID] | [Table ID] | [Offset] |

- How big is a page in this system? Explain in one sentence.
- How many segments are in this system? Explain in one sentence.
- Assume that the page tables are divided into page-sized chunks (so that they can be paged to disk). How much space have we allowed for a PTE in this system?
- Assume that a particular user is given a maximum-sized segment full of data. How much space is taken up by the page tables for this segment? Explain.

*Note: you should leave this number as sum and products of powers of 2!*

- The algorithm below transposes a matrix A. Regarding each row of the matrix (row i includes the elements { A[ i ][ j ], 0 <= j < N } ) as a segment, discuss the behaviour of the algorithm for various values of N if run in a multi-programmed segmented virtual memory system which can conveniently accommodate a working set of size W, but not much more. 03

```
int A[][] = new int[N][N];
int t;
for (int i = 0; i < N; i++)
{
 for (int j = i; j < N; j++)
 {
 t = A[i][j];
 A[i][j] = A[j][i];
 A[j][i] = t;
 }
}
```

- A processor has a 32 bit address space, and combines both segmentation and paging. 4 bits for the segment, 16 for the page, and 12 for the offset. A PTE is 4 bytes. Describe in detail what happens in the MMU and OS (use generic terms not the x86 terms) when: 03

- A user process does a read of address 0xC0DEDDBAD and it is in memory.
- What different/more/less happens if it is paged out to disk?
- What different/more/less happens if it is not a valid address?

- Explain how the following algorithms decide how much memory to give a process: 04
- Page fault frequency
- Working set algorithm

- #include <stdio.h> 03  
# include <unistd.h>  
int main()  
{
 fork();
 fork() && fork() || fork();
 fork();

 printf("forked\n");
 return 0;
}

How many processes will be spawned after executing the above program? How many times "forked" will be printed? Justify your answers.

- What is the difference between pre-emptive and non-preemptive scheduling? Can Starvation occur in a non-preemptive scheduling system? Can it occur in pre-emptive one? How to resolve starvation? 03

8. Consider three processes, all arriving at time zero, with total execution time of 10, 20 and 30 units, respectively. Each process spends the first 20% of execution time doing I/O, the next 70% of time doing computation, and the last 10% of time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of time does the CPU remain idle? Justify your answer.
9. One of the major benefits of using thread is responsiveness. Explain how the use of threads can enhance responsiveness of a single program that contains a GUI and two long processes; one is calculating values and other is doing disk-related operations. What are the major benefits of using threads other than responsiveness?

Dated: 5<sup>th</sup> May 2017

Time: 12:00 to 15:00

Max Marks: 50

**Instructions:**

1. Write your Admission No/Roll No and other details clearly on the answer books while write your Admission No on the question paper, too.
2. Be precise and clear in answering the questions.
3. Support your answer with necessary diagrams and examples.

**Q-1 Answer the following questions.**

1. What is ICMP? Enlist functions of ICMP.

OR

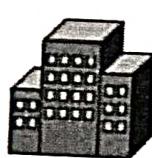
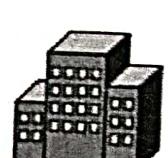
Difference between Adaptive and non-adaptive routing.

- 2 Explain Manchester encoding with example?

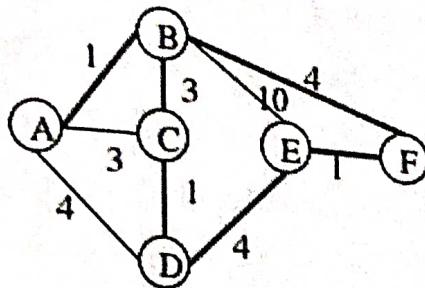
OR

Draw digital signal of data stream 101011100 for 1)Unipolar 2)NRZ 3)RZ  
4)Bipolar**Q-2 Answer the following Questions (Any Four)**

- 1 SVNIT has acquired the 150.60.130.0/24 public address from the local ISP to use in its campus network. Each building has a specific number of devices that are required to be publicly accessible, as shown in which of the following subnets would accommodate the network shown and why?

Server Farm  
100 HostsAdministration  
10 HostsCollege of Business  
20 HostsCollege of Education  
25 Hosts

- 2 What is ATM? Explain ATM architecture in detail?
- 3 What is IP addressing? How can we tell a class B network address from a class C network address? Suppose host 161.115.144.19/16 wants to send a message to host 161.115.144.120/16. What is the minimum number of routers the packets have to pass through? How is this determined?
- 4 Explain analog to digital conversation in details?
- 5 Consider the network shown below.
- (a) Show the operation of Dijkstra's algorithm for computing the least cost path from F (the rightmost node in the figure below) to all destinations. Also explicitly list all the shortest path routes from F to all destinations that are the result of the algorithm's computation.
- (b) Show the distance table that would be computed by the distance vector algorithm in B.



### Answer the following Questions.

- Q-3
- Discuss the issue of congestion in TCP? Enlist open loops and closed loop techniques for congestion control in TCP and explain any three techniques. (can include any techniques open loop or closed loop or both)
  - The following is a dump of a UDP header in hexadecimal format.

**CB84000D001C001C**

20

5

5

- What is the source port number?
- What is the destination port number?
- What is the total length of the user datagram?
- What is the length of the data?

**OR**

In Sharing Channel in CDMA,

+1

Channel 1 is sending bit 0, Channel 2 is silent, Channel 3 is sending bit 1, Channel 4 is sending bit 0

What will be the data that pass through the common channel

- Draw TCP Segment structure and justify the importance of its field values.

5

**OR**

Write a note on Carrier Sense Multiple Access with Collision Detection.

- Client is sending ASCII character H (1001000) to the receiver. Calculate the hamming code on the client side. While sending data to the receiver, due to congestion in communication channel 4<sup>th</sup> bit of the data is altered So, correct the data on the receiver side.

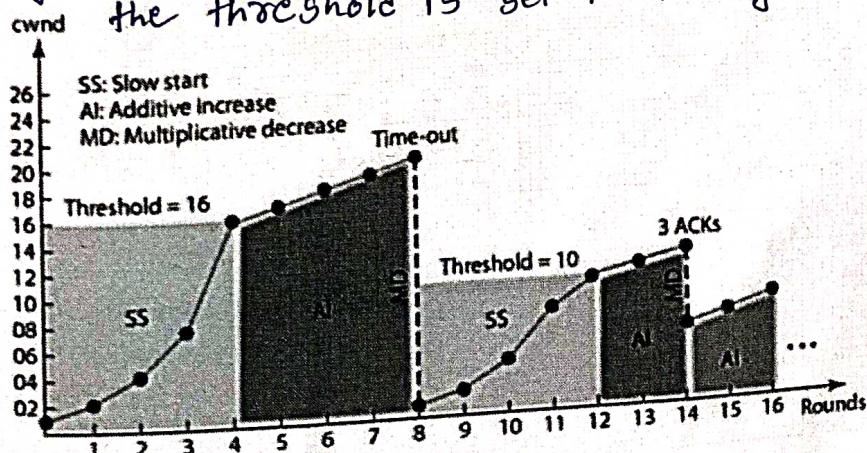
5

Q-4 Answer the following Question.

06

- Explain Additive increase technique for congestion avoidance and Multiplicative decrease technique for congestion detection in TCP. Also Discuss the following diagram of TCP congestion control in lossy wireless networks.

Assuming that the maximum window size is 32 segments.  
the threshold is set to 16 segments.



Sardar Vallabhbhai National Institute of Technology, Surat  
Computer Engineering Department  
Mid Semester Examination, September-2017

B.tech - V Semester

Course: Computer Network (CO307)

Dated: 20<sup>th</sup> September 2017

Time: 14:00 to 15:30 hrs

Max Marks: 30

Instructions:

1. Write your Admission No/Roll No and other details clearly on the answer books while write your Admission No on the question paper, too.
2. Be precise and clear in answering the questions.
3. Support your answer with necessary diagrams and examples.

**Q-1 Answer the following questions (Any Five)**

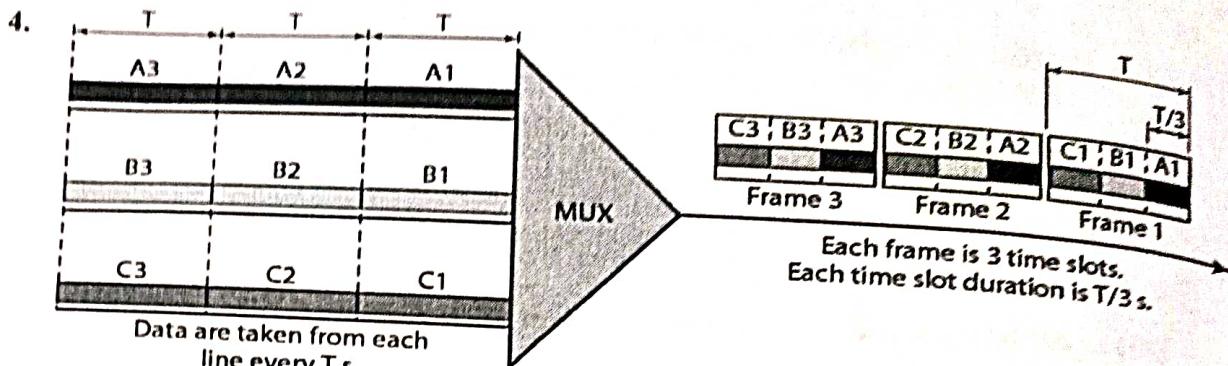
10

1. What are the various transmission impairments explains any two in brief.
2. Three stations share a 1 Mbps pure ALOHA channel. The average bit rate transmitted from each of the three stations is  $R_1=150$  kbit/s,  $R_2=200$  kbit/s and  $R_3=400$  kbit/s. The size of each packet is 2000 bits/packet. Assume that the arrival process is Poisson.
  - a) What is the normalized total traffic on the channel?
  - b) What is the normalized throughput?
3. Sketch the Manchester encoding and differential Manchester encoding for the bit stream: 0001110101. (For differential Manchester, assume the line is initially in the low state)
4. Draw digital signal of data stream 101011100 for 1) Unipolar 2) NRZ-L.
5. What is CSMA? Explain P-Persistent CSMA in brief?
6. Station A needs to send a message consisting of 9 packets to Station B using a siding window (window size 3) and go-back-n error control strategy. All packets are ready and immediately available for transmission. If every 5<sup>th</sup> packet that A transmits gets lost (but no acks from B ever get lost), then what is the number of packets that A will transmit for sending the message to B?

**Q-2 Answer the following Questions.**

20

1. Explain the principle of operation of CRC error detection method. Suppose a bit stream 10011101 is transmitted using the standard CRC method. Suppose the third bit from the left is inverted during transmission.  
Through an example show how:
  - a. What is the actual bit string transmitted?
  - b. How error is detected at the receivers end?
2. Use the generator polynomial  $X^3+1$ .
3. Explain Selective Repeat ARQ?
4. Assume that a voice channel occupies a bandwidth of 4 kHz. We need to combine three voice channels into a link with a bandwidth of 12 kHz, from 20 to 32 kHz. Show the configuration, using the frequency domain. Assume there are no guard bands between the channels to prevent interference.



What is Multiplexing? What is drawback of synchronous TDM? What is Pulse stuffing in TDM? In Figure, the data rate for each one of the 3 input connections is 1 kbps. If 1 bit at a time is multiplexed (a unit is 1 bit), what is the duration of (a) each input slot, (b) each output slot, and (c) each frame?

**Computer Engineering Department, S V N I T, Surat.**  
**End Semester Examination, April 2016**  
**B.Tech III (CO) - 6<sup>th</sup> Semester**  
**Course: Computer Graphics (CO306)**

Date: 28/4/2016

Time – 12:00 to 15:00

Total Marks - 100

Instructions:

1. Write your B.Tech Admission No/Roll No and other details clearly on the answer books while write your B.Tech admission no. on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

**Q-1 ANSWER THE FOLLOWING:**

[18]

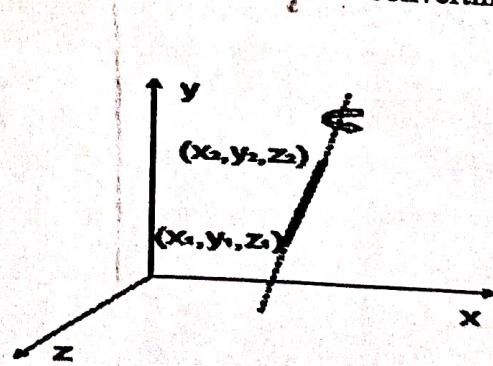
- 1 Explain the following terms:[Any Seven] [07]
  1. initGL
  2. glutInit
  3. glColor
  4. gluOrtho2D
  5. glViewport
  6. glClear
  7. glMatrixMode
  8. glLoadIdentity
- 2 Magnify the triangle with vertices A(0,0), B(1,1), and C(5,2) to twice its size while keeping C(5,2) fixed. [08]
- 3 Write the general form of matrix for rotation about a point P(h,k). [03]  
**OR**
- 3 Write the general form of scaling matrix with respect to a fixed point P(h,k). [03]

**Q-2 ANSWER THE FOLLOWING:[Any Five]**

[30]

- 1 Write the steps for the midpoint line drawing algorithm and indicate which raster locations would be chosen by midpoint algorithm when scan converting a line from pixel coordinate (1,1) to (8,5). [06]

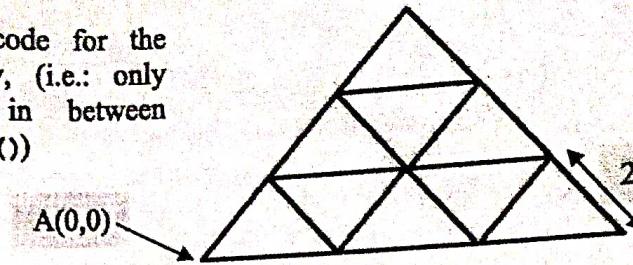
- 2 Write the steps for 3D Rotation about an arbitrary axis with suitable diagram. [06]



- 3 Describe the types of parallel and perspective projections in detail. [06]
- 4 Name the components of illumination model and explain each component in detail. [06]
- 5 Explain YIQ and HSV color model. [06]

[06]

- 6 Write an opengl code for the figure given below, (i.e.: only write the code in between `glBegin()-----glEnd()`)



[52]

**Q-3 ANSWER THE FOLLOWING:**

[12]

- 1 With suitable diagram explain following :

1. Normalized coordinates and Device coordinates
2. Grey scale ( $N=8$ ) Frame buffer for a raster scan display
3. Processes of scan converting a point
4. Scan line coherence and spatial coherence
5. Display Resolution
6. Parallel Projection

- 2 Write an Edge Flag Algorithm. Trace the entire scan line given below for a given instance of a scan line for a given polygon using the algorithm.



- 3 For the polygon filling, explain the fundamental difference between scan line method and a seed fill method. Consider a boundary-defined region with vertices  $(1,1)$ ,  $(8,1)$ ,  $(8,4)$ ,  $(6,6)$  and  $(1,6)$ . The interior hole is defined by  $(3,2)$ ,  $(6,2)$ ,  $(6,4)$ ,  $(3,4)$ . The seed pixel  $i$  is at  $(4,4)$ . Fill the region using simple seed fill method. Show the traversal of pixels.

- 4 With suitable diagram explain following :

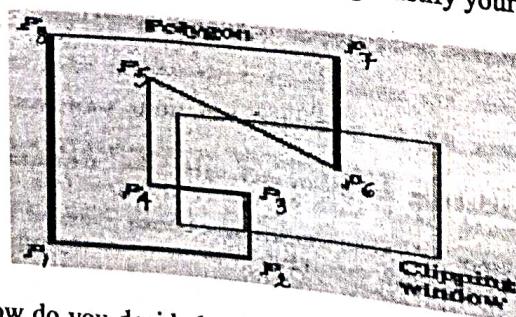
1. How do you determine visibility of a point for Sutherland Hodgeman algorithm for polygon clipping? How intersection vertices for polygon edges are decided?.
2. How do you determine visibility of a point for a 3D volume? Derive equations to determine whether a point  $p$  is inside or outside the view volume for 3-D clipping?

[08]

- 5 For weller Atherton polygon Clipping :

1. Describe the method.
2. Clip the following polygon using above method while performing the test for each edge show the result.
3. Do you have proper clipping? Justify your answer.

[08]



- 6 How do you decide back face of an object for hidden surface removal? Explain with suitable diagram scan line active edge list method to detect visible surfaces?

Computer Engineering Department, SVNIT, Surat.  
End-Semester Examinations, November 2017  
B.tech - V Semester  
Course: Computer Network (CO307)

Dated: 29<sup>th</sup> Nov 2017

Time: 12:00 hrs to 15:00 hrs

Max Marks: 50

Instructions:

1. Write your Admission No/Roll No and other details clearly on the answer books while write your Admission No on the question paper, too.
2. Be precise and clear in answering the questions.
3. Support your answer with necessary diagrams and examples.

**Q-1 Answer the following questions (Any ten)**

20

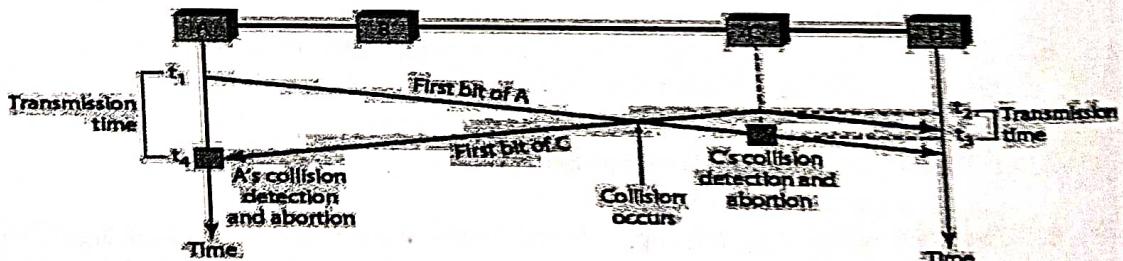
1. Sketch the Bipolar and NRZI encoding for the bit stream 0001110101. Assume that the NRZI signal starts out low.
2. What is switching? Compare switching techniques with example.
3. Calculate the Shannon channel capacity in the following cases:
  - a) i) Bandwidth = 20Khz SNRdb=40
  - b) A file contains 3 million bytes. How long does it take to download this file using 100 kbps.
4. Is it possible for an application to enjoy reliable data transfer even when the application runs over UDP? Justify your answer.
5. Suppose Host A sends two TCP segments back to back to Host B over a TCP connection. The first segment has sequence number 90; the second has sequence number 110.
  - a. How much data is in the first segment?
  - b. Suppose the first segment is lost but the second segment arrives at B. In the acknowledgement that Host B sends to Host A, what will be the acknowledgement number?
6. Suppose you are sending an email from your Hotmail account to your friend, who reads his/her e-mail from his/her mail server using IMAP. Briefly describe how your email travels from your host to your friend's host. Also, what is the application layer protocols involved?
7. For the following error detection methods discuss the case in which they fail to detect errors.
  - a) Byte stuffing b) VRC
8. Draw a timeline diagram (up to frame 7) that for the sliding window algorithm with SWS=4 frames and RWS=3 frames, when the third frame (frame 2) is lost. The receiver uses cumulative ACKs. Use a timeout interval of about  $2 \times RTT$ . Assuming that the transmit time (insertion delay) of a frame is equal to 0.25 RTT and the frames can be processed instantaneously if they arrive in order. On each data frame and ACK frame, you need to indicate the sequence number (start from 0). In addition, you need to indicate what action is taken by the receiver when it is received, for example, processed, buffered, and discarded.
9. Consider a token ring network like FDDI in which a station is allowed to hold the token for some period of time (the token holding time, or THT). Let Ring Latency denote the time it takes the token to make one complete rotation around the network when none of the stations have any data to send.
  - a) In terms of THT and Ring-Latency, express the efficiency of this network when only a single station is active.
  - b) What setting of THT would be optimal for a network that had only one station active (with data to send) at a time?
10. Differentiate between: a) ARP and RARP b) TCP and UDP

11. In a CDMA system the four chip sequences are:  
 $A = (-1 -1 -1 +1 +1 -1 +1 +1)$   $B = (-1 -1 +1 -1 +1 +1 +1 -1)$   
 $C = (-1 +1 -1 +1 +1 +1 -1 -1)$   $D = (-1 +1 -1 -1 -1 -1 +1 -1)$  in bipolar form.  
 If the received sequence is  $(-1 +1 -3 +3 +1 -1 -1 +1)$  what is the data transmitted by the four stations.

30

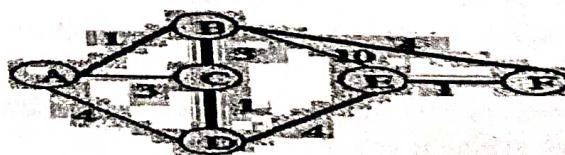
**Q-2 Answer the following Questions. (Any Six)**

1. Explain AAL reference structure.
2. What is Congestion? Explain Congestion control in TCP and Frame Relay.
3. What is the purpose of a subnet mask? Is the subnet mask 255.255.0.255 valid for a Class A address? Justify. Suppose you have sub-netted your class C network 192.168.1.0 with a subnet mask of 255.255.255.240. Please list the following: number of networks, number of hosts per network, the full range of the first three networks, and the usable address range from those first three networks.
4. Solve these with help of Polynomials.  
 Given the data word 1010011110 and the divisor 10111.  
 a) Show the generation of the code-word at the sender site using binary division.  
 b) Show the checking of the code-word at the receiver site assuming no error has occurred.  
 c) What is the syndrome at the receiver end if the data-word has an error in the 5th bit position counting from the right? Namely: data-word 1010001110 is received.
5. Explain 802.4 priority schemes with example.
6. Figure, the data rate is 10 Mbps, the distance between station A and C is 2000 m, and the propagation speed is  $2 \times 10^8$  m/s. Station A starts sending a long frame at time  $t_1 = 0\mu s$ ; station C starts sending a long frame at time  $t_2 = 3\mu s$ , if the size of the frame is long enough to guarantee the detection of collision by both stations. Repeat same for data rate 100 Mbps. Find the following.
  - a. The time when station C hears the collision ( $t_3$ ).
  - b. The time when station A hears the collision ( $t_4$ ).
  - c. The number of bits station A has sent before detecting the collision.
  - d. The number of bits station C has sent before detecting the collision.



Collision of the first bit in CSMA/CD

7. Consider the network shown below.
- (a) Show the operation of Dijkstra's (Link State) algorithm for computing the least cost path from F (the rightmost node in the figure below) to all destinations. Also explicitly list all the shortest path routes from F to all destinations that are the result of the algorithm's computation.
  - (b) Show the distance table that would be computed by the distance vector algorithm in B.



# Computer Engineering Department, S V N I T, Surat.

End-Semester Examinations, April-May 2016

MSC. 4<sup>th</sup> year (Mathematics) - 7<sup>th</sup> Semester

Computer Networks- (CO-430)

Time - 15:30 to 18:30

Total Marks - 100

Date: 29/4/2016

Instructions:

1. Write your Msc Admission No/Roll No and other details clearly on the answer books while write your MSc Admission No on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

## Q1 Answer the following

28

- A What is ISO-OSI reference model ? Compare it with TCP/IP reference model. Why TCP/IP reference model is more popular than OSI model ? Which layer is used for the following :
- (i) to route packets
  - (ii) to convert packets to frame
  - (iii) to detect and correct errors
  - (iv) to run services like FTP, Telnet etc.
- B How performance is improved in CSMA/CD protocol compared to CSMA protocol? What are the advantages of token passing protocol over CSMA/CD protocol?
- C Why do we need a DNS system when we can directly use an IP address? Which domain is used by your system ,generic or country? Why was there a need for DDNS?
- D Solve the below with the help of Diffie-Hellman Key exchange algorithm.

(1)Alice and Bob want to establish a secret key using Diffie-Hellman Key exchange algorithm. Assuming the values as  $n=11, g=5, x=2$  and  $y=3$  find out the values of A,B and Secret Key (K1 and K2).  
 (2)Next Time they choose  $n=10, g=3, x=5$  and  $y=11$ .Find out values of A,B,K1 and K2.

20

## Q2 Answer the following (Any Five)

- A List out the pros and cons of bus and ring topology.
- B How throughput is improved in slotted ALOHA over pure ALOHA?
- C What is the hamming distance ?What is the minimum hamming distance?Explain with example?
- D Determine which of the following is an FQDN and which is PQDN.
- (1)mil.
  - (2)edu
  - (3)xxx.yyy.net
  - (4)zzz.yyy.xxx.edu
- E Given two prime no P=17 and Q=29 find out N,E and D in RSA encryption.
- F Describe and distinguish between FDMA, TDMA, and CDMA.

**Q.3 Answer the following Question (Any Five)**

- A Draw the TCP header format, and explain why Urgent Pointer is used.
- B Explain the classfull IP address. Write the number of host and block size for every class.
- C Briefly explain asynchronous TDM and synchronous TDM. Which TDM techniques is better and why?
- D Explain PCM technique with proper examples.
- E What is the difference between circuit switching and virtual circuit approach?
- F What is NAT? How NAT can help in address depletion?

**Q. 4 Answer the following Questions.**

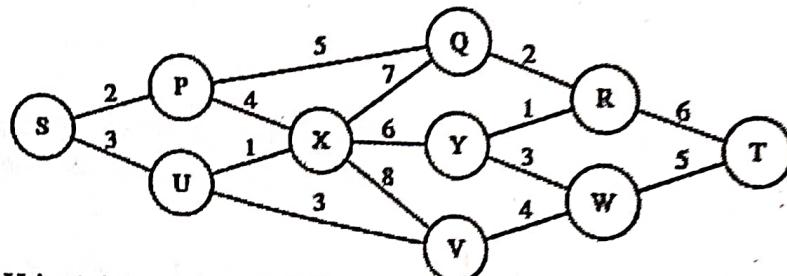
16

- A With proper diagram show the connection establishment and termination in TCP.

OR

- A Explain the Distance Vector routing algorithm in detail. What is count to infinity problem?

B



Using DijKastra's Algorithm find the optimum path between S and T.

- Q.5 An ISP is granted a block of addresses starting with 16.100.0.0/8. The ISP needs to distribute these addresses to three groups of customers as follows:
- The first group has 64 customers; each needs 256 addresses.
  - The second group has 128 customers; each needs 128 addresses.
  - The third group has 128 customers; each needs 64 addresses.
- Design the sub blocks and find out how many addresses are still available after these allocations.

6

$$\begin{aligned}
 64 \times 256 &= \frac{16384}{16384} \\
 128 \times 128 &= \underline{\underline{16384}} \\
 128 \times 64 &= \underline{\underline{8192}}
 \end{aligned}$$

$$\text{total add} = 40960$$

Date: 1<sup>st</sup> December 2017

Time: 15:30 to 18:30

- Instructions:**
1. Write your M.Sc. Admission No/Roll No and other details clearly on the answer books while write your M.Sc.. Admission No on the question paper, too.
  2. Assume any necessary data but give proper justifications.
  3. Be precise and clear in answering the questions.

[3]  
[6]

**Q1(A) Do as directed:**

Consider the following predicates for the elevator problem:

- 1) • arrival (E, F, T): arrival of elevator E at floor F at time T.
- departure (E, F, D, T) : departure of elevator E from floor F in direction D {Up, Down} at time T.
- stop (E, F, T) : Elevator E stops at floor F at time T.
- list (E, L, T1,T2) : list of floors of the elevator E is L during time T1 to T2.

Using the above predicates, specify the following rules using logic Specification:

1. Upon arrival at F, E stops if F must be serviced (F appears as first of the list)
2. When E arrives at floor F, it continues to move if there is no request for service from F and the list is empty. If the floor to serve is higher, it moves upward, otherwise it moves downward.
3. E stops at F if it gets there with an empty list

Specify the Abstract Data Type StringSpec for a system to manage strings, using algebraic specification technique. [10]

Consider the following operations in your specification:

- creating new, empty strings
- concatenating strings
- adding a new character at the end of a string
- checking the length of a given string
- checking whether a string is empty

What is the purpose of Data Flow diagrams? Draw the DFD (level 0) for Library Information System. [6]

Draw the sequence diagram of the scenario that may occur when the customer withdraws money from an ATM. [5]

**OR**

Draw the collaboration diagram of the scenario that may occur when the customer withdraws money from an ATM.

Draw an ER diagram for hospital management system. Also, show all the possible constraints on the relationships. [4]

[24]

**Answer the following: (Any Six)**

Explain the verification and validation (V & V) process.

What are the Drawbacks of RAD Model?

What is feasibility study? Discuss the contents of the feasibility report.

Discuss various requirement elicitation techniques.

How the CASE tools are classified? Discuss any two of them.

Discuss clean room engineering in brief.

“Non-functional requirements may be more critical to the system than functional requirements. If these are not met, system is useless”. Justify the statement with suitable example.

**Answer the following:**

A) If you are less than 18, you are too young to be insured.

Between 18 and 30 inclusive, you will receive a 20% discount.

Anyone over 30 is not eligible for a discount.

Identify the equivalence partitions for the above scenario.

[20]

[3]

**OR**

A program validates a numeric field as follows: values less than 10 are rejected, values between 10 and 21 are accepted, values greater than or equal to 22 are rejected. Give the boundary value analysis for this? [3]

2) 

```
void foo (float y, float a *, int n)
{
 float x = sin (y);
 if (x > 0.01)
 z = tan (x);
 else
 z = cos (x);
 for (int i = 0 ; i < x ; ++ i) {
 a[i] = a[i] * z;
 print(a [i]);
 }
}
```

Give the Control flow Graph for the above code and hence find the cyclomatic complexity .

- 3) Give a stepwise refinement for the following problem statement:-  
 "Determine winners of daily auction".

Or

Give a correctness proof for the following algorithm

**Input:** Integer[]: A   **Output:** Integer[]: sorted by increasing order  
 for  $i \leftarrow 1$  to  $A.size - 1$  do

```
for $j \leftarrow i + 1$ to $A.size$ do
 if $A[i] > A[j]$
 then $tmp \leftarrow A[i]$ $A[i] = A[j]$
 $A[j] = tmp$
 end if end for
 end for
return A
```

**Q.2(B)** Do as directed:

- 1) A government has a proposal for making a private airport.  
 In making its decision it calculates private cost at \$700m, private benefit at \$800m and external cost at \$ 200m and external benefits are 50% of private benefits. Do cost benefit analysis of this proposal and give a proper suggestion to the government to accept or reject the proposal.
- 2) Explain in detail the mechanism of version control system and its types.
- 3) What are the advantages of using software process models? Explain the prototype and spiral model in detail.
- 4) Suggest the process model for the following:
  - (i) For an Ecommerce website.
  - (ii) For air traffic management.
- 5) Write short note on
  - (i) Test case Selection
  - (ii) White Box Testing Vs. Black Box Testing

[15]

and 30<sup>th</sup> November 2016  
Marks: 100  
Instructions:

**Computer Engineering Department, S.V.N.I.T., Surat.**  
**End-Semester Examinations, Nov-Dec 2016**  
**B. Tech III (Semester V)**  
**Artificial Intelligence and Machine Learning (CO305)**  
**Time: 12:00 to 15:00 hrs.**

**B Tech Admission No:**

Write your B. Tech. Admission No/Roll No and other details clearly on the answer books while write your B. Tech. Admission No. on the question paper, too.

Assume any necessary data but give proper justifications.

Be precise and clear in answering the questions.

**Answer the following**

Heuristic evaluation function for Tic-Tac-Toe is:

- +100 for EACH 3-in-a-line for computer.
- +10 for EACH 2-in-a-line (with a empty cell) for computer.
- +1 for EACH 1-in-a-line (with two empty cells) for computer.
- Negative scores for opponent, i.e., -100, -10, -1 for EACH opponent's 3-in-a-line, 2-in-a-line and 1-in-a-line.
- 0 otherwise (empty lines or lines with both computer's and opponent's seed).

To obtain the scores: Sum each of the 8 lines (3 rows, 3 columns and 2 diagonals) scores and sum.

- 1) Show the minimax search tree for this initial state to reach the final state (Assume initial state is Max Node).

|   |   |   |
|---|---|---|
| X | O | X |
| O | X |   |
|   |   | O |

- 1) Construct by hand a neural network that computes the given below functions of two inputs. (Clearly mention all necessary assumption such as initial weight, bias, activation function, etc. then perform up to five epoch)

1.OR

2.AND

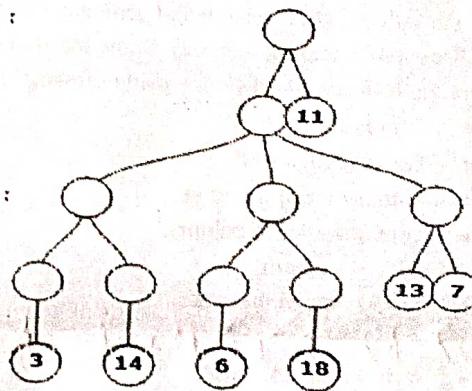
**Answer the following (Any three)**

- 1) Convert the following sentences in to predicate logic to design the knowledge base. You can assume your own predicates names.

1. All purple mushrooms are poisonous.
2. No student likes every lecture.
3. Everest is the highest mountain on Earth.
4. There are at least two apples in a barrel.
5. There are at least two apples in every barrel.
6. x is part of y just in case everything that is connected to x is also connected to y
7. No region is part of each of two disjoint regions.
8. Nothing can be inside two different boxes unless one box is inside the other.
9. Jane ate a mushroom that she had picked herself.
10. No yellow frogs are edible.
11. All students that had missed a lecture answered at least one question incorrectly.
12. Young creatures who go up in balloons are liable to giddiness.

In the given figure:

- a) Explain minimax strategy. What is the value at the root, using the minimax strategy alone?
- b) What nodes would be pruned from the search using alpha-beta pruning?
- c) In general (not just for the given tree), if the search always visits children right-to-left instead of left-to-right,
  - i. The minimax value computed at the root will be changed. (justify your answer with proper example)
  - ii. The number of nodes pruned will be changed. (justify your answer with proper example)



Consider the following map Figure. Use the A\* algorithm and Best First Search to work out a route from town

[24]

[36]

and the cost at each node. Comment on the results. You should also draw the network diagram.

Heuristic Values are given below

$$A = 56 \quad G = 14 \quad M = 0$$

$$B = 22 \quad H = 10$$

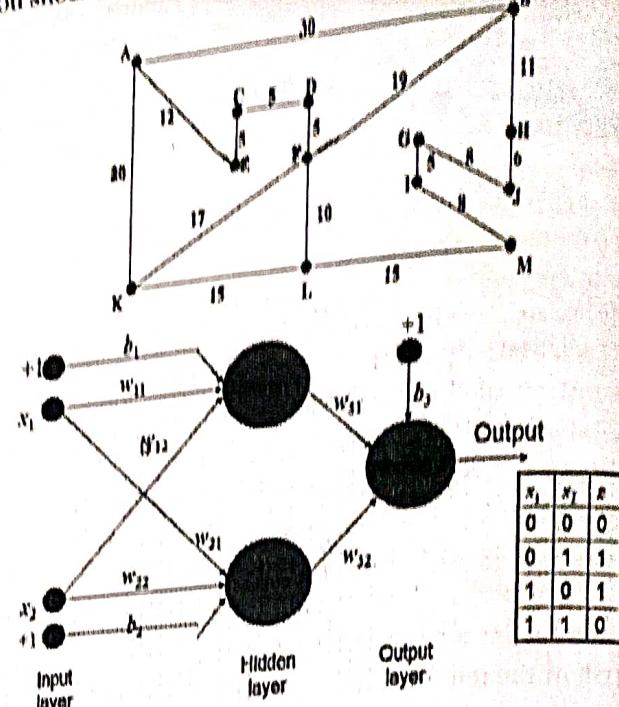
$$C = 30 \quad I = 8$$

$$D = 29 \quad J = 5$$

$$E = 29 \quad K = 30$$

$$F = 30 \quad L = 15$$

4. Consider the Following Multi-Layer feed-forward Neural Network with two input, 1 Hidden layer and 1 output layer where  $x_1$  and  $x_2$  are input vector and  $z$  output. Verify that the Network shown in the Figure solves an XOR problem for the following two different set of weights and bias.
1.  $W_{11} = W_{12} = W_{21} = W_{22} = +1, W_{31} = -2, b_1 = -1.5, b_2 = b_3 = -0.5$
  2.  $W_{11} = W_{12} = W_{21} = W_{22} = W_{32} = -1, W_{31} = -1, b_1 = 1.5, b_2 = 0.5$  and  $b_3 = -0.5$



### Q.3 Answer the following

1. What is Learning? Describe in brief the different type of Learning
2. Explain linear separable and non-separable patterns with proper example.
3. Explain the role of inference Engine in expert system
4. Explain most suitable example for Forward Reasoning and Backward Reasoning
5. State the limitation of MYCIN in terms of knowledge representation.

### Q.4 Answer the following

1. Convert these sentences into production rule based and prove using forward and backward chaining that west is criminal.

IF P is American AND P sells a W to N AND W is weapon AND N is nation AND N is hostile THEN P is a criminal

IF nono owns a W AND W is a missile THEN west sells W to nono

IF W is a missile THEN W is a weapon

IF N is an enemy of America THEN N is hostile

Initial Fact Base (working memory):

```

owns(nono, m1)
missile(m1)
american(west)
nation(nono)
enemy(nono,america)
nation(america)

```

2. Design a car failure expert system and generate a rule based for the car failure by considering three states i.e (startup, Run-stable, and Movement). Show the step by step inference process for one particular fault.
3. Represent the following knowledge using semantic network.

- Tom is a Cat
- Tom caught a bird
- Tom is owned by John
- Tom is ginger in colour
- Cats like cream
- The cat sat on the mat
- A cat is a mammal
- A bird is an animal
- All mammals are animals
- Mammals have fur

4. Explain the working of Recognize act Cycle.

15

25

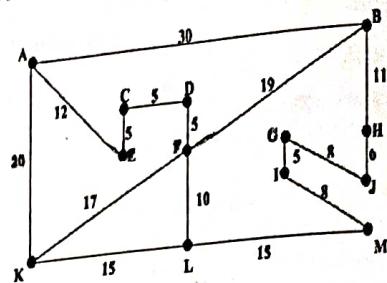
10

7

4

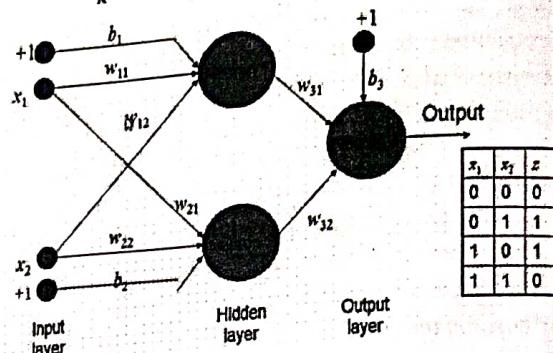
and the cost at each node. Comment on the results. You should not re-visit a town that you have just come from.  
 Heuristic Values are given below

$$\begin{array}{lll}
 A = 56 & G = 14 & M = 0 \\
 B = 22 & H = 10 & \\
 C = 30 & I = 8 & \\
 D = 29 & J = 5 & \\
 E = 29 & K = 30 & \\
 F = 30 & L = 15 &
 \end{array}$$



4. Consider the Following Multi-Layer feed-forward Neural Network with two input, 1 Hidden layer and 1 output layer where  $x_1$  and  $x_2$  are input vector and  $z$  output. Verify that the Network shown in the Figure solves an XOR problem for the following two different set of weights and bias.

1.  $W_{11} = W_{12} = W_{21} = W_{22} = +1, W_{31} = -2, b_1 = -1.5, b_2 = b_3 = -0.5$
2.  $W_{11} = W_{12} = W_{21} = W_{22} = W_{32} = -1, W_{31} = -1, b_1 = 1.5, b_2 = 0.5 \text{ and } b_3 = -0.5$



### Q.3 Answer the following

- 1 What is Learning? Describe in brief the different type of Learning
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IF W is a missile THEN W is a weapon

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Initial Fact Base (working memory):

```

owns(nono, m1)
missile(m1)
american(west)
nation(nono)
enemy(nono,america)
nation(america)

```

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- A cat is a mammal
- A bird is an animal
- All mammals are animals
- Mammals have fur

- 4 Explain the working of Recognize act Cycle.

15

21

11

7

4

**Computer Engineering Department, S V N I T, Surat.**  
**END-SEMESTER EXAMINATIONS, April-May 2019**  
**B.Tech. – III (CO)– 6<sup>th</sup> Semester**  
**Course: (CO306) Computer Graphics (CS-3)**

**Dated: 1<sup>st</sup> May, 2019**

**Time: 9:30 to 12:30**

**Max Marks: 50**

**Instructions:**

1. Write your B.Tech Admission No/Roll No and other details clearly on the answer books while write your B.Tech Admission No on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

**Q1. Answer the following : (Any two)**

**(12)**

1. Write Liang Barsky line clipping algorithm. Apply this algorithm to the line with coordinates (30,60) and (60,25) against window (Xmin, Ymin)=(10,10) and (Xmax, Ymax)=(50,50)
2. Test the visibility and then perform the clipping of line whose end points are given as P1(-3/2, 1/6) and P2(1/2,3/2) by using cohen-sutherland clipping algorithm. Window boundary (-1,-1) (1,-1) (1,1) (-1,1)
3. Show that the normalized perspective to parallel transform  $N\Gamma_p$  preserves the relationships of the original perspective transformation while transforming the normalized perspective view volume into the unit cube.

**Q2. Answer the following :**

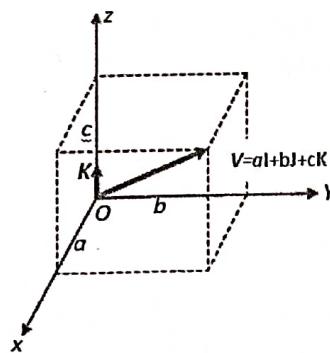
**(08)**

- a. Draw two polygons such that their extents intersect but the polygons themselves don't intersect. **(02)**
- b. Find the normalizing transformation that transforms the parallel view volume to the canonical view volume determined by planes  $x=0, x=1, y=0, y=1, z=0$  and  $z=1$  (the unit cube) **(03)**
- c. If polygon Q has the same depth value as polygon p, which polygon has priority, that is, which is painted first? **(03)**

**Q3. Answer the following :**

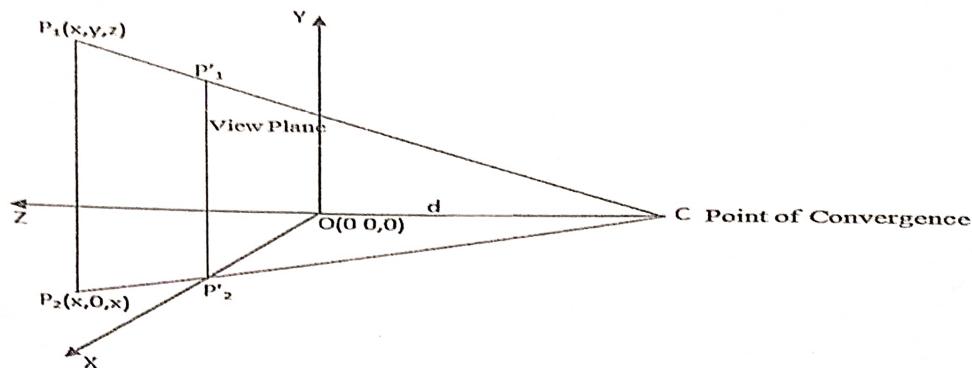
**(12)**

- a. Refer Figure a. to find a transformation  $A_v$  which aligns a given vector  $V$  with the vector  $K$  along the positive z axis



**Figure a.**

- b. The standard perspective projection is shown in figure b. Find the matrix for perspective transformation, using homogeneous coordinates.



**Figure b.**

**Q4. Answer the following :**

- a. Explain the problem of interpolation and approximation using spline. (08)
- b. Define tilting as a rotation about the x axis followed by a rotation about the y axis. Find tilting matrix. Does the order of performing the rotation matter? Explain briefly. (03)
- c. Use DDA Line Drawing Algorithm to rasterize the line for the line having endpoints from (17,14) to (12,8). (03)

**Q5. Answer the following : (Any Five)**

1. Magnify the triangle P(0,0), Q(2, 2) and R(10, 4) to four times its size while keeping R(10, 4) fixed. (10)
2. Discuss the following terms in brief:
  - Antialiasing
  - Half-toning
3. What is fractal? Explain the usage of fractals.
4. What is Oblique Projection? Discuss its types in brief.
5. Discuss 3D viewing Transformation pipeline.
6. Discuss various ways of representing a polygonal net model.

\*\*\*\*\*

Clip the polygon  $P_1, \dots, P_8$  shown in figure a. against the rectangular clipping window using the Sutherland-Hodgman algorithm.

Clip the polygon  $P_1, \dots, P_8$  shown in figure a. against the rectangular clipping window using the Sutherland-Hodgman algorithm.

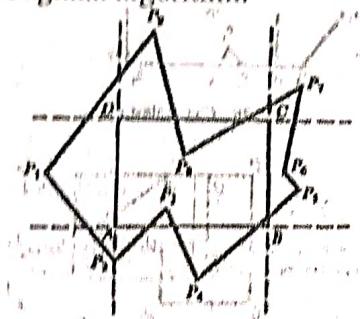


Figure a.

Transform the given position vector by the following sequence of

(4)

**Computer Engineering Department, S V N I T, Surat,  
Mid-Semester Examinations, Sept-Oct 2019  
B Tech – IV (CO)– 7th Semester  
Course: (CO-401) Software Engineering**

Dated: 30<sup>th</sup> September, 2019      Time: 16:00 to 17:30 hrs      Max Marks: 30

- Instructions:
- Write your B.Tech Admission No/Roll No and other details clearly on the answer books, while write your B.Tech Admission No on the question paper, too.
  - Assume any necessary data but give proper justifications.
  - Be precise and clear in answering the questions.

**Q1.** Consider an online email software that enable users to send, receive mail from their Web browsers. [6]

When logging into an email service, users simply enter site URL in their browser's address and can access their account by typing in a username and password.

Services offered by this software are :

- Interface: easy-to-use graphical interface through which user can access their mail service.
- Compose Mail: the ability to create new message(email)
- Delete Mail: the ability to delete mails from inbox.
- Contact Management: the ability to store data about contacts
- Inbox Files: the ability to store emails and create folder to store sorted email
- Spam Filter: An automated service that will filter spam email to a junk folder
- Files: the ability to send and receive file attachments in email messages
- Email Forwarding: allows user to forward mail.

- Prepare a use case diagram for this system.
- Prepare a sequence diagram corresponding to any two use cases that you have identified for this system.
- Model Data Flow Diagram up to level 0 for this system.

**Q2.** Answer the following:

- Consider a simple microwave oven whose behaviour is governed by the following rules:
  - The microwave has a door, a light, a power-tube, a button, a timer, and a display.
  - When the oven is not in use and the door is closed, the light and the power-tube are turned off and the display is blank.
  - When the door is open, the light stays on.
  - If the button is pushed when the door is closed and the oven is not operating, then the oven is activated for one minute. When the oven is activated, the light and the power-tube are turned on.
  - If the button is pushed when the oven is operating, one minute is added to the timer.
  - When the oven is operating, the display shows the number of seconds of cooking time remaining.
  - If the door is opened when the oven is operating, the power-tube is turned off.
  - When cooking time is completed, the power-tube and light are turned off.
  - Pushing the button when the door is open has no effect.

Model Finite State Machine for the given system.

b Consider a Vending machine described as follows :

- The vending machine dispenses two kinds of snacks, 15/- rupees snack and 20/- rupees snack.
- Only two types of coins can be inserted in the machine, 10/- rupee coin and 5/- rupee coin. The machine does not return any change.
- After insertion of each coin, machine waits for limited duration of time for the next coin.
- Machine returns inserted coins if this time limit exceeds at any moment else at the end, it dispenses the requested snack.

[5]

Model a Timed-Petri Net for the described system.

Also, State, Whether this system can be modelled using Colored Petri Nets? Justify your statement.

Q3. Answer the following:

- a. Consider the software for updates of scores of a live cricket match. The purpose of this software is to provide scores of live cricket matches (International and domestic) daily which is happening totally around the world. It consists of a database which comprises of information about all the players from different countries in all formats (Date of birth, runs scored, wickets, catches etc...).

[5]

Write down the functional and non-functional requirements of this software.

OR

- a. Consider the software for online job portal. The purpose of designing the online job portal is to give the job seekers a platform for finding a right and a satisfactory job according to their qualification. It also connects the job seekers with the major recruitment agencies.

[5]

Write down the functional and non-functional requirements of this software

- b. Consider the software for event management system. This software is designed to manage different events such as party, marriage. This will take the users requirements for the events. According to the user requirement, it estimates the cost for whole event.

What are the problems/issues faced while creating this software.

- c. Assume that you are a project manager of three projects with the following characteristics:
- **Project 1:** A complex real-time system whose requirements can be relatively easily identified and are stable.
  - **Project 2:** A web-site for a local library. Requirements are vague and are likely to change in the future.
  - **Project 3:** An order processing system with a web-site for a local business. Requirements are vague but stable (i.e. unlikely to change in the near future).

[6]

Which of models would you choose for each of your projects? Your choices should be properly justified.

\*\*\*\*\*

Computer Engineering Department, S V N I T, Surat.

Mid-Semester Examination, October 2019

B.Tech.-III – Fifth Semester

Course: Artificial Intelligence and Machine Learning (CO-305)

a8

m

Date: 3<sup>rd</sup> Oct 2019

Time: 02:00 to 03:30

Max Marks: 30

**Instructions:**

1. Write your B.Tech. Admission No/Roll No and other details clearly on the answer books while writing your B.Tech. Admission No on the question paper, too.
2. Assume and write necessary data with proper justifications, if any.
3. Be precise and clear in answering the questions.
4. Support your answer with the necessary diagrams and examples.

**Q-1 Answer the following.**

[12]

- (1) "The state space representation forms the basis of most of the AI methods for problem solving"  
Justify this statement using Water Jug Problem as described below, showing multiple sequence of solution.

Water Jug Problem: Given two jugs, a 4-gallon one and 3-gallon one. Neither has any measuring marked on it. There is a pump, which can be used to fill the jugs with water. How can we get exactly 2 gallons of water into 4-gallon jug?

- (2) Using Block Diagram Explain the Utility based Intelligent Agent for the "Smart Automatic Taxi Driver"

- (3) Write First Order Predicate Logic for the following English Statement

- a. John does not love anyone (involving negation and the existential quantifier)
- b. Someone walks and talks.
- c. Someone walks and someone talks
- d. Anyone who loves everyone loves himself.

**Q-2 Answer the following. [Any three]**

[18]

- 1) State difference between PCA and LDA and answer following. Company "AMD" produces expensive high quality chip rings. Their quality is measured in term of curvature and diameter. Result of quality control experts is given in the table below. Find the axes (direction of projection) that maximize the separation between the rings that have passed the quality control test and the rings that have not passed the quality control test in order to predict test result for future production using Discriminant analysis.

|                        |        |        |        |        |        |            |            |            |            |        |
|------------------------|--------|--------|--------|--------|--------|------------|------------|------------|------------|--------|
| Curvature              | 4      | 2      | 2      | 3      | 4      | 9          | 6          | 9          | 8          | 10     |
| Diameter               | 1      | 4      | 3      | 6      | 4      | 10         | 8          | 5          | 7          | 8      |
| Quality Control result | Passed | Passed | Passed | Passed | Passed | Not Passed | Not Passed | Not Passed | Not Passed | Passed |

(2) Consider dataset where we have features of a car and data that particular car is stolen or not. Use Naive Bayes classifier to find probability that a car is stolen or not, given car feature (i.e. Red Domestic SUV). find probability  $P(\text{Yes} | \text{Red, Domestic, SUV})$  and  $P(\text{No} | \text{Red, Domestic, SUV})$

| Sr. No. | Color  | Type   | Origin   | Stolen? |
|---------|--------|--------|----------|---------|
| 1       | Red    | Sports | Domestic | Yes ✓   |
| 2       | Red    | Sports | Domestic | No ✕    |
| 3       | Red    | Sports | Domestic | Yes ✓   |
| 4       | Yellow | Sports | Domestic | No      |
| 5       | Yellow | Sports | Imported | Yes     |
| 6       | Yellow | SUV    | Imported | No      |
| 7       | Yellow | SUV    | Imported | Yes     |
| 8       | Yellow | SUV    | Domestic | No      |
| 9       | Red    | SUV    | Imported | No      |
| 10      | Red    | Sports | Imported | Yes ✓   |

(3) Write an algorithm to design a tree based classification model based on the given historical data, to predict the characteristic of dog for the unknown data. Following your algorithm, derive the root node of the classification tree.

| Sr. No. | Colour | Body Size | Hair Type | characteristic |
|---------|--------|-----------|-----------|----------------|
| 1       | black  | big       | Poodle    | danger         |
| 2       | black  | big       | smooth    | danger         |
| 3       | brown  | big       | Poodle    | safe           |
| 4       | white  | medium    | Poodle    | safe           |
| 5       | white  | small     | Poodle    | safe           |
| 6       | white  | small     | smooth    | safe           |
| 7       | brown  | small     | smooth    | danger         |
| 8       | black  | medium    | Poodle    | safe           |
| 9       | black  | small     | Poodle    | danger         |
| 10      | white  | medium    | Poodle    | safe           |
| 11      | black  | medium    | smooth    | safe           |
| 12      | brown  | medium    | smooth    | safe           |
| 13      | brown  | big       | Poodle    | safe           |
| 14      | white  | medium    | smooth    | danger         |

(4) State Difference between K-Means and K-Medoids algorithms, and solve following clustering problem with an appropriate clustering algorithm.

Suppose we have several medicines with their weight index and pH value. Cluster medicine into two different groups based on data given below in order to minimize total squared error.

| Medicine     | Cefadroxil | Cetrizine | domperidone | Peracetamol | Crocin 650 |
|--------------|------------|-----------|-------------|-------------|------------|
| Weight index | 1.29       | 2.08      | 4.53        | 5.67        | 2.38       |
| pH           | 1          | 1         | 3           | 4           | 4          |

**Computer Engineering Department, S V N I T, Surat.**  
**End-Semester Examination, December 2019**  
**B.Tech.-III – Fifth Semester**  
**Course: Artificial Intelligence and Machine Learning (CO-305)**

Date: 4 Dec 2019

Time: 12:00 to 03:00

Max Marks: 100

**Instructions:**

1. Write your B.Tech. Admission No/Roll No and other details clearly on the answer books while writing your B.Tech. Admission No on the question paper, too.
2. Assume and write necessary data with proper justifications, if any.
3. Be precise and clear in answering the questions.
4. Support your answer with the necessary diagrams and examples.

**Q.1 Answer the following. (Any two)**

[24]

- 1) A, B and C belong to the Himalayan club. Every member in the club is either a mountain climber or a skier or both. A likes whatever B dislikes and dislikes whatever B likes. A likes rain and snow. No mountain climber likes rain. Every skier likes snow.  
 Q1: Is there a member who is a mountain climber and not a skier?

- Define the Facts and Rules
  - Draw the states space to solve the Query Q1
- 2) The puzzle consists of 8 tiles and one empty space in the form of 3 X 3 matrix. The tiles can be moved into the empty space only one tile and one step at a time.
    - Define two different heuristics for the given Puzzle [2]
    - Draw the most suitable heuristic based search space tree to reach the goal state from the initial state given below [8]
    - Which heuristic will provide optimal solution for the given states [2]

| Initial State | Goal State |
|---------------|------------|
| 1   2   3     | 2   8   1  |
| 8       4     | 4   3      |
| 7   6   5     | 7   6   5  |

- 3) Tic-Tac-Toe is a famous board game where it is X's turn to play next. The current state is shown in the figure.

|           |
|-----------|
| X   O   X |
| 0   0     |
| X         |

Evaluation function :

$$\text{Eval}(s) = 10X_3(s) + 3X_2(s) + X_1(s) - (10O_3(s) + 3O_2(s) + O_1(s)) \quad \text{Where}$$

$X_n(s)$  = number of rows, columns, or diagonals in state  $s$ , with exactly  $n$  X's and no O's

$O_n(s)$  = number of rows, columns, or diagonals in state  $s$ , with exactly  $n$  O's and no X's

- Show the entire game tree with a mark of the utility of each terminal state
- Use the Min-Max algorithm to calculate the optimal move

[24]

**Q.2 Answer Following. (Any Four)**

List major disadvantages of Hill Climbing Technique and propose solution for these problems

with suitable example.

List Major difference between Forward chaining and Backward chaining

Draw Block diagram of Fuzzy Expert System and explain each block with suitable example.

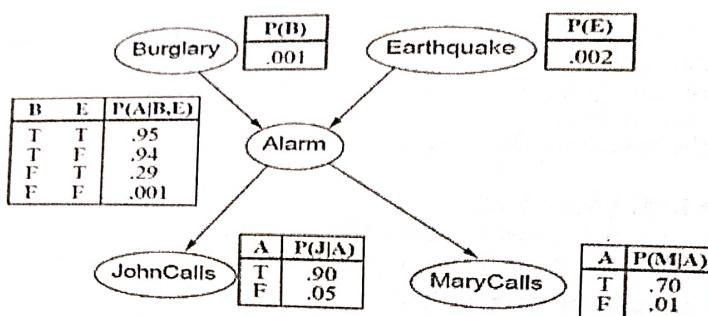
What is the importance of planning in AI problem solving? List Important steps of planning and define Goal stack planning.

“One particularly simple form of semantic network is an AND/OR Tree” Justify the statement and support your answer with proper example.

**Q.3 Answer Following. (Any Four)**

1) What is Bayes nets? Give Advantages and disadvantages of Bayes nets. Consider below given burglar alarm system and corresponding conditional probability table. Answer following

- (1)  $P(J \wedge M \wedge A \neg B \wedge \neg E) = ?$
- (2)  $P(J) = ?$



2) Define following with respect to Performance evaluation.

- a. Precision vs Recall
- b. True Error vs Sample Error
- c. Confusion matrix.

3) We have data from questionnaires survey (to ask people opinion) and objective testing with two attributes (Acid durability and strength) to classify whether a special paper tissue is good or not. Here is four training examples given below. Now factory produces a new paper tissue that passes laboratory test with  $x_1=3$  and  $x_2=7$ . Without another expensive survey, can we guess what the classification of this new tissue is? Use 3NN algorithm to solve this.

| Sr.no | Acid durability ( $X_1$ seconds) | Strength ( $X_2$ kg/square meter) | Classification (Y) |
|-------|----------------------------------|-----------------------------------|--------------------|
| 1     | 7                                | 7                                 | Bad                |
| 2     | 7                                | 4                                 | Bad                |
| 3     | 3                                | 4                                 | Good               |
| 4     | 1                                | 4                                 | Good               |

4) List and Explain different types of Artificial neural networks.  
5) Explain Linear and Non Linear SVM.

**Q.4 Answer Following. (Any Four)**

- 1) What is Back propagation? Explain Back propagation training algorithm with the help of one hidden layer feed forward Neural network.
- 2) What is Neural learning? Construct a Neural network that computes XOR function and NOR Function for two inputs (Mention all necessary assumptions such as initial weights bias, activation function, etc.)
- 3) What is Ensemble learning? Discuss Bagging and boosting.
- 4) Compare Linear regression and Logistic regression. Explain Linear regression with appropriate example.
- 5) What are the two types of feature reduction? Explain feature selection methods.

**Sardar Vallabhbhai National Institute of Technology**  
**Computer Engineering Department**  
**Supplementary End Semester Exam, July 2019**  
**M.Sc. – IV Mathematics**  
**Course: Computer Networks (CO 430)**

Date: 12/07/2019

Time: 2:00 PM to 5:00 PM

Total Marks: 50

**Instructions:**

1. Write your Admission No/Roll No and other details clearly on the answer books while write your Admission No on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

**Q-1 Answer the following:** [15]

1. What are the responsibilities of the transport layer in the internet model? [3]
2. Suppose a computer sends a packet using network layer to another computer somewhere in the internet. The logical destination address of the packet is corrupted. What happens to the packet? How can the source computer be informed of the situation? [3]
3. Differentiate between circuit switching and packet switching. [3]
4. Calculate the Hamming distance for the following cases:
  - a)  $d(10000, 01000)$  [3]
  - b)  $d(10101, 10010)$  [3]
5. Enlist the steps involved in DNS name resolution by taking your institute domain name as an example. [3]

**Q-2 Answer any three of the following:** [15]

1. Consider an instance of TCP's Additive Increase Multiplicative Decrease(AIMD) algorithm where the window size at the start of the Slow start phase is 2 MSS and the threshold at the start of the first transmission is 8 MSS. Assume that a time out occurs during the fifth transmission. Find the congestion window size at the end of the tenth transmission. [5]
2. An IP router with a Maximum Transmission Unit (MTU) of 200 bytes has received an IP packet of size 520 bytes with an IP header of length 20 bytes. Find the values of the below relevant fields.
  - a) Number of fragments possible
  - b) Header length
  - c) Length of the data
  - d) Efficiency [5]
3. Explain Multiplexing and its types in detail with diagram. [5]
4. A TCP connection is using a window size of 12000 bytes, and the previous acknowledgement number was 22001. It receives a segment with acknowledgement number 24001 and window size advertisement of 12000. Draw a diagram to show the situation of the window before and after. [5]

**Q-3 Answer the following:**

[14]

1. If the bandwidth of the channel is 8 Kbps, how long does it take to send a frame of 200000 bits out of the device? [2]
2. What is a URL and What are its components? [2]
3. What is the significance of twisting in twisted-pair cable? [2]
4. State the difference between intra-domain and inter-domain routing. [2]
5. What is the purpose of RIP? [2]
6. In BOOTP, when the sender knows neither its own IP address nor the server's IP address. What would be the source and destination address in IP datagram? [2]
7. We send digital signal from one station on a LAN to another station. Is that baseband or broadband transmission? [2]

**Q-4 Answer the following (Any 2)**

[6]

1. Define fragmentation and explain why IPV4 and IPv6 protocols need to fragment some packets. [3]
2. Find the class of the following IP addresses.
  - a) 237.14.2.1
  - b) 208.35.54.12
  - c) 129.14.6.8
3. Find the range of addresses in the following blocks.
  - a) 200.17.21.128/27
  - b) 17.34.16.0/23
  - c) 123.56.77.32/29

SARDAR VALLABHBHAI NATIONAL INSTITUTE OF TECHNOLOGY  
BTECH.-III SEM.-VI (SUPPLEMENTARY EXAMINATION) – JULY - 2019  
OPERATING SYSTEMS (CO-302)

Marks: 50  
9<sup>th</sup> July 2019

10-00 to 01-00  
Questions: Figures to the right indicates maximum marks

Answer to the following:

- a. Explain with diagram various I/O Buffering techniques. 05
- b. Given a disk with 200 tracks, where track requests are received in the following order: 55, 58, 39, 18, 90, 160, 150, 38, and 184. The starting position for the arm is track 100. Calculate the number of tracks crossed when the following algorithms are used: (i) The elevator algorithm starting in the direction (a) UP (b) DOWN. 04
- c. Consider the following page reference string : 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms assuming three, and four frames? Remember that all frames are initially empty, so your first unique pages will all cost one fault each. (i) LRU replacement (ii) Optimal replacement. 04
- d. What is the working set of a program, and how can an operating system use it in the management of virtual memory? 03
- e. Explain: (i) Why RAID 0 increases read performance but decreases fault tolerance? (ii) How RAID 1 increases both read performance and fault tolerance (surviving any single fault) at the cost of doubling disk usage? 04
- f. Explain with diagram scheme for Intel IA-32 Paging Architecture. 04
2. a. What are the advantages of threads over multiple processes? Suggest one application that would benefit from the use of threads, and one that would not. 03
- b. Briefly explain how messages can be used to achieve mutual exclusion. What is the main advantage of messages compared to semaphores and monitors? 03
- c. If the wait and signal operations are not executed atomically, then mutual exclusion may be violated. Explain with suitable example. 04
- d. Consider a variant of the RR scheduling algorithm where the entries in the ready queue are pointers to the PCBs. What would be the effect of putting two pointers to the same process in the ready queue? What would be the major advantages and disadvantages of this scheme? 04
- e. Explain following terms with example: monitor, race condition, live lock, and starvation. 04
- f. Explain deadlock avoidance with suitable example using banker's algorithm. 04
- g. Compare and contrast different classes of Real time scheduling algorithms with suitable examples. 04

**Computer Engineering Department, SVNIT, Surat.**  
**End Semester Examinations, December 2019**  
**B.Tech III – Fifth Semester**  
**Course: Computer Networks (CO-307)**

Date: 5<sup>th</sup> Dec 2019

Time: 12:00 to 15:00

Max Marks: 50

**Instructions:**

1. Write your B.Tech Admission No/Roll No and other details clearly on the answer books while write your B.Tech Admission No on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

[10]

**Q-1 Answer the following (any five)**

- (1) If the bandwidth of the channel is 5 Kbps, how long does it take to send a video content of 20s. Frame rate is 25fps and each frame has a resolution of 600 by 400 pixels, each pixel uses 1024 colors.
- (2) Compare the telephone network and the Internet. What are the similarities and the differences? Which has higher jitter and why?
- (3) Assume that, in a Stop-and-Wait ARQ system, the bandwidth of the line is 5 Mbps, and 1 bit takes 10 ms to make a round trip. What is the bandwidth-delay product? If the system data frames are 2500 bits in length, what is the utilization percentage of the link?
- (4) Is an ARP reply broadcast, unicast or multicast? Explain briefly.
- (5) What are the uses of netstat and ifconfig utilities?
- (6) In TCP, if the value of HLEN is  $(0110)_2$ , how many bytes of option are included in the segment? Can HLEN value be equivalent to  $(0010)_2$ ? Give suitable reason.

[09]

**Q-2 Answer the following (any three)**

- (1) A beam of light moves from one medium to another medium with less density. The critical angle is  $55^\circ$ . Do we have refraction or reflection for each of the following incident angles? Show the bending of the light ray in each case.

- a)  $35^\circ$   
b)  $55^\circ$   
c)  $75^\circ$

At  $1,0 \text{ m}^2/\text{L}$

- (2) How does NAT work (answer briefly with a neat diagram)? State two problems of NAT.  
*Outgoing - straight line  
Table 7.2*
- (3) Explain the architecture of World Wide Web (WWW) with suitable diagram.

(4) What is the maximum size of the send and receive windows for each of the following protocols? [14]

a) Go-Back-N ARQ, using 8-bit sequence number

b) Stop-and-Wait ARQ, using 10-bit sequence number

→ c) Selective-Repeat ARQ, using 12-bit sequence number

Q-3 Answer the following (any three)

[12]

(1) Suppose we want to transmit the message 1101 0110 0110 1001 and protect it from errors using the CRC-8 polynomial  $x^8 + x^2 + x^1 + 1$ .

a) Use polynomial division to determine the message that should be transmitted.

b) Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receiver's CRC calculation? How does the receiver know that an error has occurred.

(2) Neatly draw the waveforms resulting from NRZI and AMI signalling for transmitting the bit stream "00100100". What is advantage and disadvantage of using asynchronous transmission over synchronous transmission? Is connection of a keyboard to a computer, application for synchronous, asynchronous or isochronous? Justify your answer.

(3) The dump of a UDP header in hexadecimal format is " 06 32 00 0D 00 1C E2 17 ".

a) What is the source port number and destination port number?

b) What is the length of the data and total length of the user datagram?

c) Is the packet directed from a client to a server or vice versa? What is the client process?

d) What are the types of source and destination port numbers?

(4) What are the deficiencies of IP protocol and how ICMP protocol compensates the deficiencies? Write short note on two broad categories of ICMP messages.

Q-4 Answer the following

[09]

(1) Explain connection establishment and termination using Three-way handshaking in TCP connection. Briefly explain half close and simultaneous open situations in TCP. 05

(or)

Explain Lost segment scenario (RTO has lower value and retransmission occurs after RTO) and Fast Retransmission scenario (RTO has higher value and retransmission occurs after three duplicate ACK segments) in TCP error control. What is SYN flooding attack and what are the strategies to alleviate the effects of a SYN attack?

- (2) State two problems of the IntServ scheme? How does DiffServ remove them? Write a short note on traffic conditioner used in DiffServ using neat diagram. 04

Q-5 Answer the following

[10]

- (1) An ISP is granted a block of addresses starting with 150.80.0.0/16. The ISP wants to distribute these blocks to 2600 customers as follows, 07

The first group has 200 medium-size businesses; each needs 128 addresses.

The second group has 400 small businesses; each needs 16 addresses.

The third group has 2000 households; each needs 4 addresses.

Design the sub-blocks and give the slash notation for each sub-block. Find out how many addresses are still available after these allocations.

- (2) Explain distance vector routing protocol by considering 3 nodes x,y and z. The weights x-y, y-z and z-x are 1, 2 and 5 respectively. 03

\* \* \*

- (4) What is the maximum size of the send and receive windows for each of the following protocols?
- Go-Back-N ARQ, using 8-bit sequence number
  - Stop-and-Wait ARQ, using 10-bit sequence number
  - Selective-Repeat ARQ, using 12-bit sequence number

**Q-3 Answer the following (any three)**

- Suppose we want to transmit the message 1101 0110 0110 1001 and protect it from errors using the CRC-8 polynomial  $x^8 + x^2 + x^1 + 1$ .
  - Use polynomial division to determine the message that should be transmitted.
  - Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receiver's CRC calculation? How does the receiver know that an error has occurred.
- Neatly draw the waveforms resulting from NRZI and AMI signalling for transmitting the bit stream "00100100". What is advantage and disadvantage of using asynchronous transmission over synchronous transmission? Is connection of a keyboard to a computer, application for synchronous, asynchronous or isochronous? Justify your answer.
- The dump of a UDP header in hexadecimal format is " 06 32 00 0D 00 1C E2 17 ".
  - What is the source port number and destination port number?
  - What is the length of the data and total length of the user datagram?
  - Is the packet directed from a client to a server or vice versa? What is the client process?
  - What are the types of source and destination port numbers?
- What are the deficiencies of IP protocol and how ICMP protocol compensates the deficiencies? Write short note on two broad categories of ICMP messages.

**Q-4 Answer the following**

- Explain connection establishment and termination using Three-way handshaking in TCP connection. Briefly explain half close and simultaneous open situations in TCP.

(or)

Explain Lost segment scenario (RTO has lower value and retransmission occurs after RTO) and Fast Retransmission scenario (RTO has higher value and retransmission occurs after three duplicate ACK segments) in TCP error control. What is SYN flooding attack and what are the strategies to alleviate the effects of a SYN attack?

SARDAR VALLABHBHAI NATIONAL INSTITUTE OF TECHNOLOGY  
BTECH.-III SEM.-VI (SUPPLEMENTARY EXAMINATION) – JULY - 2019  
OPERATING SYSTEMS (CO-302)

Time: 10-00 to 01-00

Instructions: Figures to the right indicates maximum marks

Marks: 50  
9<sup>th</sup> July 2019

Answer to the following:

- a. Explain with diagram various I/O Buffering techniques. 05
- b. Given a disk with 200 tracks, where track requests are received in the following order: 55, 58, 39, 18, 90, 160, 150, 38, and 184. The starting position for the arm is track 100. Calculate the number of tracks crossed when the following algorithms are used: (i) The elevator algorithm starting in the direction (a) UP (b) DOWN. 04
- c. Consider the following page reference string : 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms assuming three, and four frames? Remember that all frames are initially empty, so your first unique pages will all cost one fault each. (i) LRU replacement (ii) Optimal replacement. 04
- d. What is the working set of a program, and how can an operating system use it in the management of virtual memory? 04
- e. Explain: (i) Why RAID 0 increases read performance but decreases fault tolerance? (ii) How RAID 1 increases both read performance and fault tolerance (surviving any single fault) at the cost of doubling disk usage? 03
- f. Explain with diagram scheme for Intel IA-32 Paging Architecture. 04
- a. What are the advantages of threads over multiple processes? Suggest one application that would benefit from the use of threads, and one that would not. 03
- b. Briefly explain how messages can be used to achieve mutual exclusion. What is the main advantage of messages compared to semaphores and monitors? 03
- c. If the wait and signal operations are not executed atomically, then mutual exclusion may be violated. Explain with suitable example. 04
- d. Consider a variant of the RR scheduling algorithm where the entries in the ready queue are pointers to the PCBs. What would be the effect of putting two pointers to the same process in the ready queue? What would be the major advantages and disadvantages of this scheme? 04
- e. Explain following terms with example: monitor, race condition, live lock, and starvation. 04
- f. Explain deadlock avoidance with suitable example using banker's algorithm. 04
- g. Compare and contrast different classes of Real time scheduling algorithms with suitable examples. 04

**Computer Engineering Department,S V N I T, Surat.**  
**Supplementary Examinations, February 2019**  
**M. Sc -IV(Maths)- 7<sup>th</sup> Semester**  
**Course: (CO421) Software Engineering**

ed: 15<sup>th</sup> February, 2019

Time: 14:00 to 17:00 hrs

Max Marks: 100

Instructions:

Write your B.Tech Admission No/Roll No and other details clearly on the answer books while write your B.Tech Admission No on the question paper, too.

Assume any necessary data but give proper justifications.

Be precise and clear in answering the questions.

**Answer the following :**

Specify the Abstract Data Type StringSpec for a system to manage strings, using algebraic specification technique. [40] [10]

Consider the following in your specification:

- creating new, empty strings
- concatenating strings
- adding a new character at the end of a string
- checking the length of a given string
- checking whether a string is empty

Suppose there are two traffic lights (each has red, green and yellow light) at a road junction. Model [10] the behavior of these two lights using PN. Note that the characteristics of the combined system (of two lights) are:

- They are mutually exclusive
  - They should alternate
- Consider the following predicates for the elevator problem: [10]
- arrival (E, F, T): arrival of elevator E at floor F at time T.
  - departure (E, F, D, T) : departure of elevator E from floor F in direction D {Up, Down} at time T.
  - stop (E, F, T) : Elevator E stops at floor F at time T.
  - list (E, L, T1,T2) : list of floors of the elevator E is L during time T1 to T2.

Using the above predicates ,specify the following rules using logic Specification

1. Assume that elevators have a fixed time to service a floor. If the list is not empty at the end of such interval, the elevator leaves the floor immediately.
2. At the end of the minimum stop interval Dts, E remains standing if there are no floors to service.
3. When E arrives at floor F, it continues to move if there is no request for service from F and the list is not empty .If the floor to serve is higher, it moves upward ; otherwise it moves downward.
4. E stops at F if it gets there with an empty list

Consider the "cinema ticket booking system" which is a web based application. The application helps customer to purchase their movie tickets online. [10]

The application has three types of users' viz. the cinema owners, system administrator and customers. Customers can view movie rating, show timings, cinema locations, book the movie ticket by selecting the seats of their choice, can rate the movie and cinema.

Cinema owners provide their information regarding the movies, screens in cinema etc. using the web-portal. This information will act as the bases for search result displayed to the user. System administrator also uses the web-portal in order to administrate the system and keep the user information accurate. The administrator can, for instance, verify cinema owners and manage user information.

Identify the functional and non-functional requirements for the above mentioned system. [30]

**Answer the following:**

Discuss State-explosion problem of FSM with suitable example.  
‘Data flow diagrams are semiformal specification technique’-justify the statement giving appropriate examples.

Draw use case diagram for Railway Reservation system.

Differentiate between CMM and ISO.

Draw the sequence diagram of the scenario that may occur when the customer withdraws money from an ATM. [30]

**3. Answer the following: (Any Six)**

Explain the verification and validation (V & V) process.

2. Discuss cleanroom approach to software development.
3. Discuss the types of user testing.
4. What is feasibility study? Discuss the contents of the feasibility report.
5. What are the benefits of prototyping?
6. How the CASE tools are classified? Discuss any two of them.
7. Discuss clean room engineering in brief.

**Sardar Vallabhbhai National Institute Of Technology, Surat**  
**Computer Engineering Department**  
**M.Sc. IV (Mathematics)**  
**End Semester Examination December-2019**  
**Subject:Software Engineering(CO421)**  
**Date:06/12/2019**  
**Time:15:30 to 18:30**

**Marks:50**

Q.1 Attempt any five:

- a) Explain Spiral Model in detail. 20
- b) The Payroll Management System deals with the financial aspects of employee's salary, allowances, deductions, gross pay, net pay etc. and generation of pay-slips for a specific period. Identify Functional and Non-Functional Requirements for this System.
- c) A Library Management System is a software built to handle the primary housekeeping functions of a library. Library management systems help libraries keep track of the books and their checkouts, as well as members' subscriptions and profiles. The system involves maintaining the database for entering new books and recording books that have been borrowed with their respective due dates. Write down Software Requirement Specification (SRS) for Library Management System.
- d) Explain Ethnography.
- e) Discuss the difference between Black Box Testing and White Box Testing.
- f) List out software maintenance model and explain any two.

Q.2 Attempt the following:

- a) What are the five levels of Capability Maturity Model? List important features of these levels. 10
- b) Explain Interface Testing in detail.

Q.3 Attempt the following:

- a) Explain Unified Modelling Language and also explain Object Oriented concepts. 15 4

**OR**

- a) Draw a use case diagram for the following system:  
The 'Online Mobile Recharge' gives us the information about all the mobile service providers in terms of their plans, options, benefits, etc. Suppose, any customer wants to have the information of all the schemes and services provided by the company, he/she can have the information and according to his convenience, he can recharge the mobile from the same application. The major advantage of this proposed system is to have the recharging facility of any service provider under the same roof.  
Considering the end users of the system such as service provider, third party system administrator, registered user and visitor.

b) Explain Entity Relationship diagram with its component. Also draw 4  
ER-Diagram for Enrollment System.

OR

b) Explain Cleanroom software development with diagram.

c) Write and explain categories of Case tools. Also draw taxonomy of it. 4

d) Write and explain the components of case tools. 3

5

Q.4 Attempt any one:

a) Draw level 0, level 1, level 2 Data Flow Diagram(DFD) for the following System:

In a hotel reservation system, a customer can make online booking for a hotel, by specifying the accommodation requirements such as type of rooms, duration of a stay. The system then selects suitable hotel as per customer's requirements. If such a hotel is found then availability of rooms in that hotel is checked. The charges are calculated for the selected requirements and these are acknowledged to the customer. If the customer is satisfied with the selection made by the system then he confirms the reservation.

b) Draw class diagram for the following case using appropriate relationships between them:

In a university there are different classrooms, offices and departments. A department has a name and it contains many offices. A person working at the university can be a professor or an employee. A professor can be a full, associate or assistant professor and he/she is enrolled in one department. A room can be an office or a classroom. Classroom has a number of seats. Every employee works in an office.

**Sardar Vallabhbhai National Institute Of Technology, Surat**  
**Computer Engineering Department**  
**M.Sc. IV (Mathematics)**  
**Mid Semester Examination September-2019**  
**Subject: Software Engineering(CO421)**

Date: 05/10/2019

Time: 16:00 -17:30

**Marks: 30**

Q.1 Attempt any six:

- a) Explain Software Engineering as a Layered Technology.
- b) Identify Functional and non-functional requirements for Hospital Management System.
- c) Discuss umbrella activities and its role in software development life cycle.
- d) Compare ISO9000 and CMM.
- e) Explain RAD Process Model.
- f) What is Software Requirement Specification (SRS)? Why is it important? List the characteristics of a good quality SRS? What contents can we include in it?
- g) Explain Requirement Elicitation.

Q.2 Attempt any one:

- a) "Non-functional Requirements are more critical than the functional requirements"- Justify the statement.
- b) "In practice, it is impossible to produce a complete and consistent requirements document"- Justify the statement.

Q.3 Attempt any two:

- a) What is Data Flow Diagram(DFD)? Explain DFD level 0 and DFD level 1 and also write DFD components.
- b) Define any three:
  1. Abstraction
  2. Encapsulation
  3. Dependency
  4. Aggregation
- c) What is class and object. Explain class diagram.

Q.4 Attempt any one:

- a) Draw the state diagram of online food ordering system.
- b) Draw the activity diagram for the following scenario:  
Student wants to enroll in the university and have filled copy of enrollment form. Registrar inspects the form and check whether the form is filled properly or not. Registrar informs student to attend the university overview presentation and also helps student to enroll in seminars. Registrar asks the student to pay for the initial tuition fees.

**Computer Engineering Department, S V N I T, Surat.**  
Makeup Mid-Examinations, November 2019  
B.Tech III – Fifth Semester  
Course: (CO-307) Computer Networks

Date: 28<sup>th</sup> Nov 2019

Time: 14:00 to 15:30

Max Marks: 30

Instructions:

1. Write your B.Tech Admission No/Roll No and other details clearly on the answer books while write your B.Tech Admission No on the question paper, too.
2. Assume any necessary data but give proper justifications.
3. Be precise and clear in answering the questions.

**Q-1 Answer the following (any five)**

[10]

- (1) Which address changes from hop to hop? Which address identifies a process on a host? How many bits are used to represent Ethernet address? Give an example for representing Ethernet address.
- (2) Write any two responsibilities of physical layer and data link layer of the OSI model.
- (3) Draw the frequency domain of the non-periodic signal which has a bandwidth of 100 kHz, with a middle frequency of 150 kHz and peak amplitude of 20 V.
- (4) Consider a pure ALOHA network with 50 stations. If  $T_{fr} = 1$  ms, what is the number of frames/s each station can send to achieve the maximum efficiency?
- (5) Find the class of following IP addresses.
  - i. 113.21.3.56
  - ii. 11000011 11110011 00010101 10001100
- (6) Explain variable bit rate and bursty data traffic profiles.

[15]

**Q-2 Answer the following**

- (1) Write a short note on closed loop congestion control techniques (explain any three techniques).
- (2) The protocol RARP is almost obsolete and two protocols BOOTP and DHCP are replacing RARP. Why RARP is almost obsolete? What is advantage of using BOOTP and DHCP over RARP? What is difference between static and dynamic address allocation?
- (3) An organization is granted the block 15.0.0.0/8. The administrator wants to create 1000 fixed length subnets.
  - i. Find the subnet mask.
  - ii. Find the first and last address in subnet 2.
  - iii. Find the number of addresses in each subnet.

- (4) What is sliding window? Explain send sliding window and receive sliding window for Go-Back N ARQ with suitable diagram.
- (5) Calculate checksum for a text of 8 characters "SVNITSUR". The text needs to be divided into 2-byte words. Use 2-digit hexadecimal number to represent each characters ('I' can be represented as 0x49).

**Q-3 Answer the following (any two)**

- (1) What are bridges? What is the main purpose of using bridges? What are the different types of bridges?
- (2) List three different techniques in serial transmission and explain the differences.
- (3) Explain flow control in TCP with a suitable diagram for sliding window.

\* \* \*

**Computer Engineering Department, SVNIT, Surat.**  
Mid-Semester Examinations, October – 2019  
**B.Tech III – Fifth Semester**  
**Course: (CO-307) Computer Networks**

Date: 4<sup>th</sup> Oct 2019

Time: 14:00 to 15:30

Max Marks: 30

Instructions:

Write your B.Tech Admission No/Roll No and other details clearly on the answer books while write your B.Tech Admission No on the question paper, too.  
Assume any necessary data but give proper justifications.  
Be precise and clear in answering the questions.

**Q-1 Answer the following (any five)**

[10]

- (1) How many duplex links are required to connect one thousand devices in mesh topology and how many ports are required for each device (consider input and output ports are separated)?
- (2) What will be the value of 'r'(data element / signal element ) in the following line coding schemes ?
  - a. Manchester polar bi-phase Scheme
  - b. AMI bipolar Scheme
  - c. 2B1Q Multilevel Scheme
  - d. 8B6T Multilevel Scheme
- (3) Which application is more sensitive to delay, sending an e-mail or surfing the internet? Give suitable justification.
- (4) Match the following to one or more layers of the OSI model with suitable explanations.
  - a. Log in and Log out services
  - b. Interface to transmission media
  - c. Format and code conversion services
  - d. Defining Frames
- (5) What is the characteristic of the infrared waves that prevents interference? What is the disadvantage of using infrared waves in data communication?
- (6) Differentiate between unshielded and shielded twisted pair cable.

**Q-2 Answer the following.**

[15]

- (1) Generate suitable code word for the given data stream by using error detection system which can detect up to 3 errors. Original data is : 1010001110100011011011101010. Demonstrate 3-bit error and efficiency of your code word.

- (2) Show the format of 802.3 MAC frame and shortly describe different fields.
- (3) Design algorithm for byte stuffing at sender side where bytes are added and at receiver side where bytes are removed.
- (4) A multiplexer combines five 200 -kbps channels using a time slot of 2 bits. Show the output with five input lines. What is the frame rate? What is the frame duration? What is the output bit rate ? What is the output bit duration?
- (5) Draw the diagram for the delay in circuit switched network when only two switches are involved. Make comparison for the delay in datagram switched network and circuit switched network.

**Q-3 Answer the following (any two)**

- (1) Design a bidirectional algorithm for the stop-and-wait protocol using piggybacking. Note that the both parties need to use the same algorithm.
- (2) Assume that we have a sampled signal and the sample amplitudes are between -10V and +10 V. Considering four levels ( $L=4$ ) generate encoding bits if the quantized amplitudes are 3.5, 9.3, 2.2, -6.3, -8.3, -2.5.
- (3) What is wire center? Why it is used? Which topology / protocol is suitable for this application?

\* \* \*