

:23/9/20

uctions: 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.

Assume any necessary data but give proper justifications.

1. Answer the following:
1. Be precise and clear in answering the questions.

16

a) Compare the relative advantages of waterfall model and spiral model .Give some suitable examples, the type of problems for which you would adopt the waterfall model for software development and the type of problem for which you would adopt spiral model.

b) List three common types of risks that a typical software project might suffer from. How you can identify the risks that your project is susceptible. Suppose you are the project manager of a large software development project, point out the main steps you would follow to manage risks in your software development.

OR

Suppose you are the project manager of the large product development team and have to make a choice between the democratic and the chief programmer team organizations. Which development structure would you adopt for your team? Justify your answer.

Draw a context level and level-0 DFD for below scenario.

a) A supermarket needs to develop the software to encourage customers. For this, the customer needs to supply his residence address, telephone number, and the driving licence number. Each customer who registers for this scheme is assigned unique customer number (CN) by the computer.

b) A customer can present his CN to the checkout staff when he makes any purchase. In this case, the value of his purchase is credited against his CN. At the end of each year, the supermarket awards surprise gifts to 10 customers who make the highest total purchase over the year. Also, it awards a 22 carat gold coin to every customer whose purchases exceed Rs 10,000. The entries against the CN are reset on the last day of every year after the prize winners lists are generated.

c) Consider a scenario of the student admission procedure in an IIT. The following are requirements for the software system :

- An academic section should maintain the record of all students in the institute.
- An account section should maintain the records of fee status of every student in the institute.
- There is a hostel office in an institute that deals with the operations such as room allotment, hostel fee structure and catering facility in the hostel.
- The institute has a health centre that is responsible for the health care of the students in the institute.
- Each department maintains the records of the student who is registered with that department.
- Considering the above requirements, design an activity diagram for the software system.

Answer the following:

- a) Describe Functional, Non-Functional and Domain requirements with suitable case study. 4
b) Write a short note on. Requirement Engineering Process 4
c) Draw a Petri Net model for Producer-Consumer system (Integrated Petri Net for 2 buffers). 3

- d) Draw a Finite State Machine (FSM) for Producer-Consumer system (Integrated Petri Net for 2 buffers). 3
e) List out the limitations of Data flow Diagrams (DFD) and a FSM. 3

OR

- f) Draw a Petri Net model for the dining philosopher problem. There are 4 philosophers and 4 forks around a circular table. Each philosopher has access to 2 forks, one on either side. Each fork is shared by 2 philosophers. Each fork may be either on the table or in use by one philosopher. A philosopher must have 2 forks to eat. 3

Computer Engineering Department, S V N I T, Surat.
Mid Semester Examination, March 2016
B.Tech III (CO) - 6th 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 (Δd) 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 $P_1(1, 1)$, $P_2(8, 1)$, $P_3(8, 6)$, $P_4(5, 3)$ and $P_5(1, 7)$. 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 $D(3, 8)$. 10
 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 .

Id - End - 2016

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

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

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Date:03/03/2016

Time:14:00 to 15:30

Max Marks: 30

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3.
Q-1
1.

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
1.
W
2.
3.

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 _____.

3.
3.
3.
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:

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

a.) Draw Gantt charts illustrating the execution of these processing 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.

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

Time: 1 1/2 Hours

Instructions: Figures to the right indicates maximum marks

Marks: 30
29th Feb. 2016

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

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

- (a) How big is a page in this system? Explain in one sentence.
- (b) How many segments are in this system? Explain in one sentence.
- (c) 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?
- (d) 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!
3. 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;
    }
}
```

4. A processor has a 32 bit address space, and combines both segmentation and paging. 4 03 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:

- (a) A user process does a read of address 0xC0DEDBAD and it is in memory.
- (b) What different/more/less happens if it is paged out to disk?
- (c) What different/more/less happens if it is not a valid address?

5. Explain how the following algorithms decide how much memory to give a process: 04

- (a) Page fault frequency
- (b) Working set algorithm

6. #include <stdio.h>
#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.

7. 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

-End- 2016

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. 03
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? 03

Evening

Computer Engineering Department, SVNIT, Surat.
End Semester Examination, April 2016
B.Tech III (CO) - 6th Semester
Course: Computer Graphics (CO306)

Date: 28/4/2016

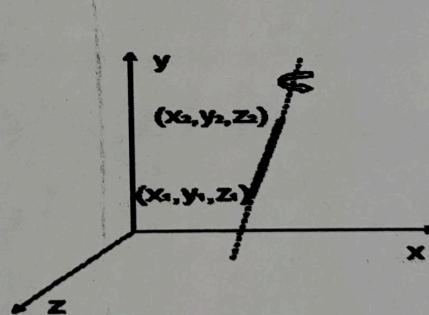
Instructions:

- Time - 12:00 to 15:00 Total Marks - 100
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.

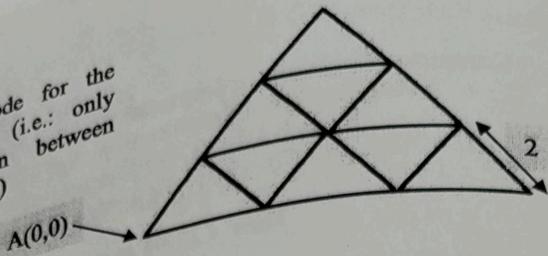
Q-1 ANSWER THE FOLLOWING:

- 1 Explain the following terms:[Any Seven] [18]
1. initGL
 2. glutInit
 3. glClearColor
 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]
- 3 Write the general form of scaling matrix with respect to a fixed point P(h,k). [03]
- OR

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]

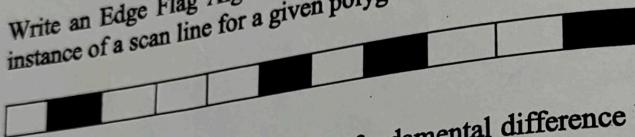
6 Write an OpenGL code for the figure given below, (i.e.: only write the code in between `glBegin()`-----`glEnd()`)



Q-3 ANSWER THE FOLLOWING:

- 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. [08]



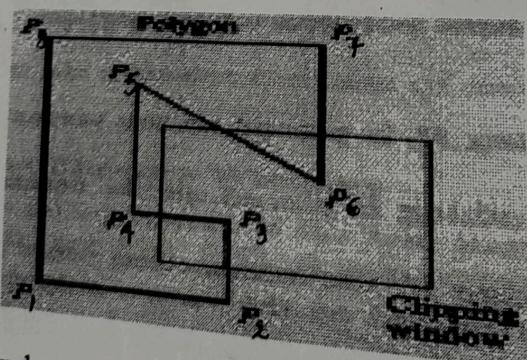
- 3 For the polygon filling, explain the fundamental difference between scan line method and a seed fill method. Consider a boundary-defined region with vertices (1,1), (8,1) (8,4), (6,6) and (1,6). The interior hole is defined by (3,2), (6,2), (6,4), (3,4). The seed pixel i is at (4,4). Fill the region using simple seed fill method. Show the traversal of pixels. [08]

- 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?

- 5 For Weller Atherton polygon Clipping : [08]

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.



- 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? [08]

21st - 2016

[06]

[S2]

[12]

dated: 27th April 2016

Instructions:

1. Write your B Tech Admissions question paper, too.
2. Students are allowed to take.
3. Assume any necessary data.
4. Be precise and clear in answer.

Answer the following:

1. What do you mean by working of those processes?
2. Explain the terms.
3. Draw a neat and clear diagram.
4. What can be the applications?
5. Who initiates client requests to identify clients?

1. A web browser sends the correct time to the server to increase the speed of your application.
2. What are the benefits of using a proxy server?
3. Discuss the role of a proxy server in a network.

Q-2 Answer the following:

1. What are the benefits of using a proxy server?
2. Create a simple application between Server and Client using API: <http://www.w3schools.com/xml/>
3. Explain the types of proxy servers.
4. In Data Mining, what are the advantages and disadvantages of using decision trees?
5. What are the different types of neural networks?
6. In Linear Algebra, what are the properties of matrix multiplication?
7. In Linear Algebra, what are the properties of matrix inversion?
8. In Linear Algebra, what are the properties of matrix transpose?
9. In Linear Algebra, what are the properties of matrix inverse?
10. In Linear Algebra, what are the properties of matrix determinant?
11. In Linear Algebra, what are the properties of matrix trace?
12. In Linear Algebra, what are the properties of matrix eigenvalues?
13. In Linear Algebra, what are the properties of matrix eigenvectors?
14. In Linear Algebra, what are the properties of matrix singular value decomposition?
15. In Linear Algebra, what are the properties of matrix LU factorization?
16. In Linear Algebra, what are the properties of matrix QR factorization?
17. In Linear Algebra, what are the properties of matrix Cholesky factorization?
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100. In Linear Algebra, what are the properties of matrix eigenvalue problem?

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

Mid Semester Examination, March 2017

B.Tech III (CO) - 6th Semester

Course: Computer Graphics (CO306)

Date: 23/3/2017

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.

ven - End - 2017.

2nd March 2017
02:00-03:30PM

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

Seat No. _____

[Total Marks: 30]

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

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, SVNIT, Surat.
End-Semester Examinations, May 2017

M.Sc IV -VIII Semester
Course: Computer Network (CO430)

Dated: 5th 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?

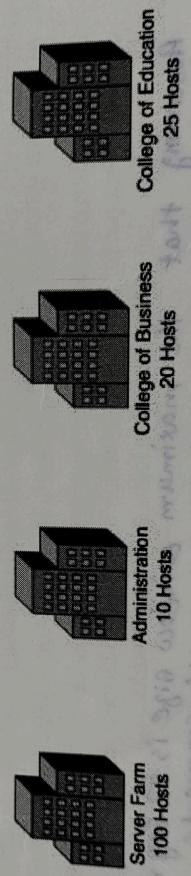
OR

- 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?

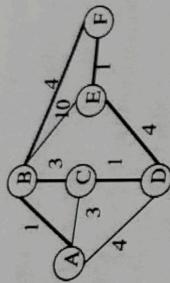


- 2 What is ATM? Explain ATM architecture in detail?

- 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 conversion 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.



Q-3 Answer the following Questions.

1. 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) 20
2. The following is a dump of a UDP header in hexdecimal format. 5
 - i. What is the source port number?
 - ii. What is the destination port number?
 - iii. What is the total length of the user datagram?
 - iv. What is the length of the data?

OR

In Sharing Channel in CDMA,

Channel 1 is sending bit 0, Channel 2 is silent, Channel 3 is sending bit $\frac{1}{4}$,
Channel 4 is sending bit 0

What will be the data that pass through the common channel

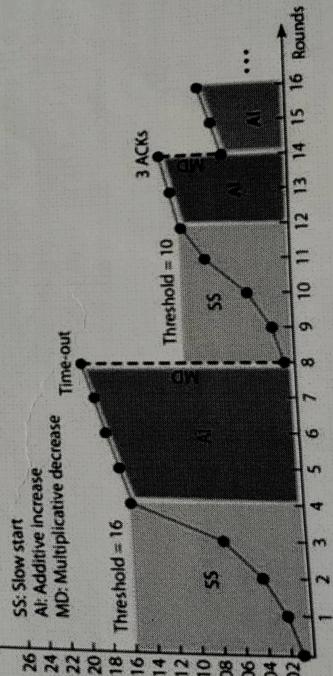
3. Draw TCP Segment structure and justify the importance of its field values. 5

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

4. 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 4th bit of the data is altered So, correct the data on the receiver side. 5

Q-4 Answer the following Question.

1. 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. 06



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

B.tech - V Semester

Dated: 20th September 2017

Time: 14:00 to 15:30 hrs

Instructions:

1. Write your Admission No/Roll No and other details clearly on the answer books while writing 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 $R_1=150 \text{ kbit/s}$, $R_2=200 \text{ kbit/s}$ and $R_3=400 \text{ kbit/s}$. 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 sliding window (window size 3) and go-back-n error control strategy. All packets are ready and immediately available for transmission. If every 5th 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.

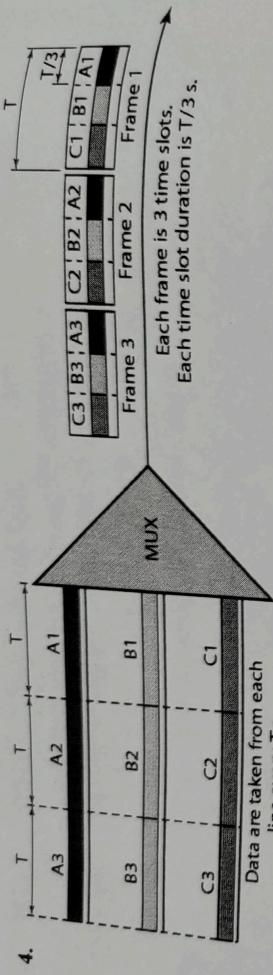
- 1 Explain the principle of operation of CRC error detection method. Suppose a bit stream 10011101 is transmitted using the standard CRC method. Suppose the third bit from the left is inverted during transmission.

Through an example show how:

- a. What is the actual bit string transmitted?
- b. How error is detected at the receivers end?

Use the generator polynomial X^3+1 .

2. Explain Selective Repeat ARQ?
3. 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?

Dated: 30th September, 2019

Time: 16:00 to 17:30 hrs

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.

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

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.

a. Prepare a use case diagram for this system.

b. Prepare a sequence diagram corresponding to any two use cases that you have identified for this system.

c. Model Data Flow Diagram up to level 0 for this system.

Q2. Answer the following:

a. Consider a simple microwave oven whose behaviour is governed by the following rules: [3]

- 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.

End Exam

- b) Consider a Vending machine described as follows : [5]

- 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.

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....).

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.

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).

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

ated: 30th September, 2019
STRUCTIONS:
Write your B.Tech Admins
Admission No on the ques
Assume any necessary data
Be precise and clear in ans

1. Consider an online browsers.

When logging into
can access their ac
Services offered

- Interface: service.
- Compose
- Delete M
- Contact
- Inbox F
- Spam F
- Files: t
- Email

- a. Prepare a use

- b. Prepare a sec
this system.

- c. Model Data

Q2. Answer the

- a. Consider a

- T
- W
- tu
- V
- I

Mode

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)

Date: 3rd 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

- John does not love anyone (involving negation and the existential quantifier)
- Someone walks and talks.
- Someone walks and someone talks
- 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 |

Even-End Sem
— 2019

- (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 | danger |
| 7 | brown | small | smooth | safe |
| 8 | black | medium | Poodle | danger |
| 9 | black | small | Poodle | safe |
| 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 |

- Date: 4th December
Instructions:
1. Write your Admin
2. Write your Admin
3. Be precise and clear
4. Support your answer
- Q1 Answer the following questions
1. What do you mean by Quasi-quadrilaterals?
2. Do programmatical answer.
3. Write a macro to generate integer list from 1 to n in LISP.
4. Write a PROGRAM to calculate length in different input from user.
5. Differentiate A and B with respect to the following
name: Honda
1. Find a
2. Change
- Q2 Answer the following questions
1. Write a LISP program to calculate the number of votes for each candidate. Also state a few programming problems.
2. Explain the Programming approach.
3. State the use of

1. progn
2. lambda
3. mapcar
4. find-if
5. getf
6. let*

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
9th 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 04
starting in the direction (a) UP (b) DOWN.
- 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, SVNIT, Surat.
Mid-Semester Examinations, October – 2019
B.Tech III – Fifth Semester
Course: (CO-307) Computer Networks

Date: 4th Oct 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)

- (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)? [10]
- (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.

- Q**
- (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 bit rate ? What is the output bit duration?
- (5) Draw the diagram for the delay in circuit switched network when only two switches involved. Make comparison for the delay in datagram switched network and circuit switched network.
- Date: 4th Oct 2019
- Instructions:
Write your B.Tech
on the question p
Assume any nec
Be precise and c

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?

* * *

- Q-1 Answer**
- (1) How how
(2) What sche
(3) Wh Giv
(4) Ma
(5) Wh dis
(6) D

S.V.NATIONAL INSTITUTE OF TECHNOLOGY
Department of Computer Engineering

B.Tech. III, Semester – VI, Mid Semester Examination
Operating Systems (CO302)

2nd March – 2020

[Time: 14:00 - 15:30 Hours]

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

Seat No. _____
[Total Marks: 30]

1. Answer to the following:

Explain Linux Thread Model with suitable diagram.

b. What are the different principles which must be considered while selecting a scheduling algorithm?

03

c. Distinguish conceptually between an I/O-bound program and a Processor-bound program. Suppose a short-term scheduling algorithm favors those processes that have used little processor time in the past. Which type of programs will this algorithm favor? Justify your answer with appropriate reasoning.

03

03

2. Answer to the following:

Consider following processes with length of CPU burst time in milliseconds

Process Burst-time

P₁ 5

04

P₂ 10

P₃ 2

P₄ 1

All process arrived in order P₁, P₂, P₃, and P₄ all at time zero.

1. Draw Gantt charts illustrating execution of these processes for SJF and Round robin(quantum=1)

2. Calculate waiting time for each process for each scheduling algorithm

3. Calculate average waiting time for each scheduling algorithm

- b. Consider a multilevel feedback scheduling policy with five priority queues levels. Each of these priority queues uses the round robin scheduling policy with a time quantum of 3 units, and the maximum execution time at each priority level is two quantum (or 6 units). All jobs needing the CPU begin at the highest priority level and then move down priority levels as the time using the CPU grows. The CPU is always allocated to the highest priority job.

1. Does this scheduling policy work well for CPU bound processes? Explain.

2. Is this scheduling algorithm good for I/O bound processes? Explain.

3. Is starvation possible? If yes, how might you modify the policy to avoid starvation.

3. Answer to the following:

a. Explain with flowchart operation of Paging and Translation Lookaside Buffer (TLB).

04

b. A certain computer system has the segmented paging architecture for virtual memory. The memory is byte addressable. Both virtual and physical address spaces contain 2^{16} bytes each. The virtual address space is divided into 8 non-overlapping equal size segments. The memory management unit (MMU) has a hardware segment table, each entry of which contains the physical address of the page table for the segment. Page tables are stored in the main memory and consist of 2 byte page table entries. What is the minimum page size in bytes so that the page table for a segment requires at most one page to store it? Also give the division of virtual address for above.

04

4. Consider we have the following reference string: 5, 0, 4, 4, 0, 3, 0, 4, 1, 0, 2, 0, 5, 3, 0, 1. Find the page fault of virtual memory using (i) Enhanced Clock algorithm, where we used 3 frames and number in bold is with modified bit set.

04

Computer Engineering Department, S V N I T, Surat.
Supplementary Examination, Feb 2020
B.Tech.-III – Fifth Semester
Course: Artificial Intelligence and Machine Learning (CO-305)

Date: 10 Dec 2020

Instructions:

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.
 Assume and write necessary data with proper justifications, if any.
 Be precise and clear in answering the questions.
 Support your answer with the necessary diagrams and examples.

Time: 10:00 to 01:00

Max Marks: 100

Answer the following. (Any five)

- Q1 Consider dataset that describes the weather conditions for playing a game of golf. Given the weather conditions, each tuple classifies the conditions as fit ("Yes") or unfit ("No") for playing golf. Use **naive bayes classifier** to find probability that a player can play golf or not, given today's weather (i.e. Sunny, Hot, Normal, False) and P(Yes|Sunny, Hot, Normal, False) [50]

| | OUTLOOK | TEMPERATURE | HUMIDITY | WINDY | PLAY GOLF |
|----|----------|-------------|----------|-------|-----------|
| 0 | Rainy | Hot | High | False | No |
| 1 | Rainy | Hot | High | True | No |
| 2 | Overcast | Hot | High | False | Yes |
| 3 | Sunny | Mild | High | False | Yes |
| 4 | Sunny | Cool | Normal | False | Yes |
| 5 | Sunny | Cool | Normal | True | No |
| 6 | overcast | Cool | Normal | True | Yes |
| 7 | Rainy | Mild | High | False | No |
| 8 | Rainy | Cool | Normal | False | Yes |
| 9 | Sunny | Mild | Normal | False | Yes |
| 10 | Rainy | Mild | Normal | True | Yes |
| 11 | overcast | Mild | High | True | Yes |
| 12 | overcast | Hot | Normal | False | Yes |
| 13 | Sunny | Mild | High | True | No |

Construct by hand a neural network that computes the given below functions of two inputs. (Clearly mention all necessary assumptions such as initial weight, bias, activation function, etc. also perform at least three epochs)

1. OR 2. AND

"As per the law, it is a crime for an American to sell weapons to hostile nations. Country A, an enemy of America, has some missiles, and all the missiles were sold to it by Robert, who is an American citizen."

Prove that "Robert is criminal." (Use Forward Chaining)

Q4 Answer following Questions.

- a) State difference between PCA and LDA.
- b) What is "curse of dimensionality" and how to deal with it?
- c) Difference between K-Means and K-Medoids.

The 8 puzzle consists of eight numbered, movable tiles set in a 3x3 frame. One cell of the frame is always empty thus making it possible to move an adjacent numbered tile into the empty cell. Draw a complete search tree for given Start and Goal state, up to depth level 3 (where Start state is at depth 0) and give unique ID to each node of the tree. Give the Node Traversal sequence for the following search approaches

- a) Brute-Force Approach
 b) Depth-First Search (DFS)
 c) Depth-First Iterative Deepening (DFID) Search
 Hill Climbing (where heuristic function $h = \text{number of tiles that are not in the correct place}$
 (not counting the blank))

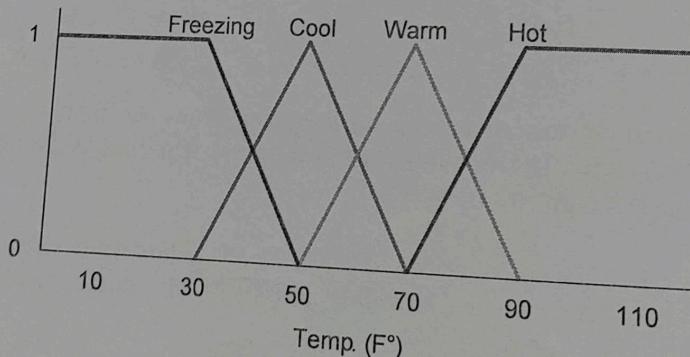
| Start state | Goal state | | | | | | | | | | | | | | | | | | |
|--|------------|---|---|---|---|---|---|---|--|--|---|---|---|--|---|---|---|---|---|
| <table border="1"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>4</td><td>8</td><td>5</td></tr> <tr><td>7</td><td>6</td><td></td></tr> </table> | 1 | 2 | 3 | 4 | 8 | 5 | 7 | 6 | | <table border="1"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td></td><td>8</td><td>5</td></tr> <tr><td>4</td><td>7</td><td>6</td></tr> </table> | 1 | 2 | 3 | | 8 | 5 | 4 | 7 | 6 |
| 1 | 2 | 3 | | | | | | | | | | | | | | | | | |
| 4 | 8 | 5 | | | | | | | | | | | | | | | | | |
| 7 | 6 | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | | | | | | | | | | | | | | | | | |
| | 8 | 5 | | | | | | | | | | | | | | | | | |
| 4 | 7 | 6 | | | | | | | | | | | | | | | | | |

Also comment on the performance of all the search techniques.

- 6) Explain Expert System with proper block diagram. Describe each block of an Expert System. Explain working of each blocks for MYCIN- an expert system.
- Q.2 Answer the following. (Any five)** [50]
- 1) Convert the following sentences in to predicate logic to design the knowledge base.
- a) Every person loves themself.
 - b) Everyone loves some person who loves themself.
 - c) All gardeners like the sun.
 - d) Some person loves no one except themself.
 - e) Toby loves everyone who loves him.
 - f) Love is never requited. (Expand out the meaning of requited.)
 - g) Brown frogs are bigger than green frogs.
 - h) No natural food is blue.
 - i) Mary gave an apple to Tom.
 - j) One of the apples that Mary gave to Tom is Rotten.
- 2) Consider the graph given in Figure.

- i. Write the membership functions corresponding to the fuzzy sets. Hence answer the question: How cool is 36°F?
- ii. Explain the methods of defuzzification.

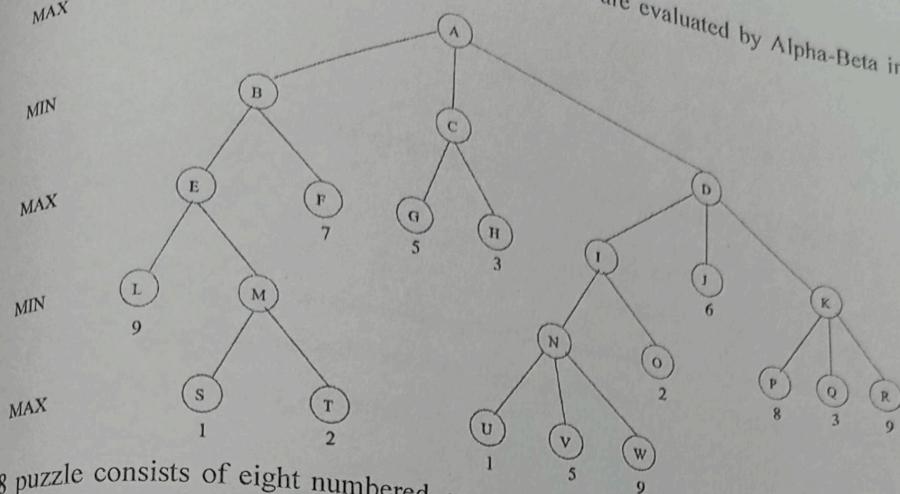
Elaborate on Fuzzy Inference Systems



- 3) Consider the following game tree of given figure. Assume that the children of each node are evaluated from left to right.
- i. Use the Minimax to compute the value of each node in the game tree.
 - ii. List the nodes that are evaluated by Alpha-Beta.
 - iii. Redraw the game tree such that Alpha-Beta performs the minimum number of evaluations (i.e., the best case for Alpha-Beta). How many nodes are evaluated by Alpha Beta in the resulting game tree?

Redraw the game tree such that Alpha-Beta performs the maximum number of evaluations

L (i.e., the worst case for Alpha-Beta). How many nodes are evaluated by Alpha-Beta in the resulting game tree?



The 8 puzzle consists of eight numbered, movable tiles set in a 3×3 frame. One cell of the frame is always empty thus making it possible to move an adjacent numbered tile into the empty cell. Draw a complete search tree for given Start and Goal state, up to depth level 3 (where Start state is at depth 0) and give unique ID to each node of the tree.

1. Give the Node Traversal sequence for 1) Best First Search and 2) A* for the following Heuristics search approaches

- a. Heuristic search using the heuristic function $h = \text{number of tiles that are not in the correct place (not counting the blank)}$.
- b. Heuristic search using the Manhattan heuristic function.

| Start state | Goal state |
|-------------|------------|
| 1 2 3 | 1 2 3 |
| 4 8 5 | 8 5 |
| 7 6 | 4 7 6 |

Consider the following data set consisting of the scores of two subjects on each of seven individuals cluster individuals into two different clusters Using K-means Clustering.

| Subject | A | B |
|---------|-----|-----|
| 1 | 1.0 | 1.0 |
| 2 | 1.5 | 2.0 |
| 3 | 3.0 | 4.0 |
| 4 | 5.0 | 7.0 |
| 5 | 3.5 | 5.0 |
| 6 | 4.5 | 5.0 |
| 7 | 3.5 | 4.5 |

Explain Filter methods and Wrapper Methods.

Oodol Emal - 2018

and by concating two strings in reverse order. The

Computer Engineering Department, SVNIT, Surat.
Mid Semester Examination September - 2018
B Tech III(CO) – 5th Semester
Course: Computer Networks (CO 307)

Dated: 26th September 2018

Time: 14:00 hrs to 15:30 hrs

Max Marks: 30

Instructions:

1. Write your Admission No/Roll No and other details clearly on the answer books and 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.

[04]

1. A sender sends a series of packets to the same destination using 5-bit sequence numbers. If the sequence number starts with 0, what is the sequence number after sending 100 packets?
2. Explain the reason for moving from the Stop-and-Wait ARQ Protocol to the Go-Back-N ARQ Protocol.

Q-2 Answer the following questions. [Any Two]

[06]

1. What kind of errors are undetectable by the checksum?
2. What is the Hamming distance for each of the following codewords?
 - a. d (10101, 10000)
 - b. d (11111, 11111)
 - c. d (000, 000)
3. Which of the following CRC generators guarantee the detection of a single bit error?
 - a. $x^4 + x^2$
 - b. 1
 - c. $x^2 + 1$
4. Using 5-bit sequence numbers, what is the maximum size of the send and receive windows for each of the following protocols?
 - a. Stop-and-Wait ARQ
 - b. Go-Back-NARQ
 - c. Selective-Repeat ARQ

Q-3 Answer the following questions. [Any Two]

[04]

1. Consider a scenario in which you want to make a switched network then which type of switch you will use? single crossbar switch or Multistage switch. Justify your answer.
2. What is the significance of the twisting in twisted-pair cable?
3. In fiber optical cable, how you can achieve step index and graded index?

Q-4 Answer the following questions.

[06]

1. What is NAT? How can NAT help in address depletion?
2. In which situation we use multiplexing? In TDM, explain different strategy to overcome the situation in which data rates of all input lines are not same.

Q-5 Answer the following questions.

[10]

1. In a block of addresses, IP address of one host is 182.44.82.16/26. What are the first address, last address and total address in this block?
2. Explain the restriction on classless address blocks with suitable example.

5th March – 2018

[Time: 14:00 - 15:30 Hours]

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

S.V.NATIONAL INSTITUTE OF TECHNOLOGY

Department of Computer Engineering

B.Tech. III, Semester – VI, Mid Semester Examination

Operating Systems(CO302)

Seat No. _____

[Total Marks: 30]

1. Answer to the following:

- Explain with diagram: Linux Process State Model. 02
- Explain with suitable example how a binary semaphore can be used to implement mutual exclusion. 03
- A time sharing system is to be designed to support a large number of users. List all considerations which influence the choice of the time slice. Justify with example each of the considerations 03
- What is priority inversion? How could it happen? How can it be overcome? 03
- Consider the following set of five processes where arrival is the time the process becomes ready, t is the total service time, and e is the external priority. Assume that execution starts immediately at time 0 and there is no context switch overhead. For the following scheduling disciplines, draw a time diagram showing when each of the five processes executes. (In the case of a tie, assume that the process with the lower process number goes first.) 04

| process | arrival | t | e |
|---------|---------|----|----|
| p0 | 0 | 80 | 9 |
| p1 | 15 | 25 | 10 |
| p2 | 15 | 15 | 9 |
| p3 | 85 | 25 | 10 |
| p4 | 90 | 10 | 11 |

0 and there is no context switch overhead. For the following scheduling disciplines, draw a time diagram showing when each of the five processes executes. (In the case of a tie, assume that the process with the lower process number goes first.)

- (i) SRT
- (ii) RR (quantum =1)
- (iii) ML (with FIFO at each priority level)
- (iv) MLF (with $n=5$, $T=10$, and FIFO at each priority level)

2. Answer to the following:

- Explain with example Belady's Anomaly. 02
- Define *thrashing* and justify the following statement: "Thrashing can arise in a paged virtual memory system using a working set memory allocator. However, it cannot last for long". 02
- Consider a system using multilevel paging scheme. The page size is 1 MB. The memory is byte addressable and virtual address is 64 bits long. The page table entry size is 4 bytes. 04
 - How many levels of page table will be required?
 - Give the divided physical address and virtual address.
- Explain with diagram working set strategy. 03
- Give a reference string that has the following property: both *doubling* and *halving* the page size will result in more page faults. Use an LRU page replacement policy. You can choose whatever amount of physical memory and the initial page size you wish when constructing this reference string. Show what page faults result in the three cases: original page size, page size doubled, and page size halved. 04