

Time: 16:00 to 17:30 hrs

Max Marks: 30

Dated: 30th September, 2019

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 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.

- 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.

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...). [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.

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: [6]

- **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.

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2019

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)

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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

- 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 |

(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 | smooth | danger |
| 6 | white | small | smooth | safe |
| 7 | brown | medium | Poodle | danger |
| 8 | black | small | Poodle | safe |
| 9 | black | medium | Poodle | safe |
| 10 | white | medium | smooth | safe |
| 11 | black | medium | smooth | safe |
| 12 | brown | medium | Poodle | safe |
| 13 | brown | big | smooth | danger |
| 14 | white | medium | Poodle | safe |

(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, SVNIT, 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.
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| | | | | | | | | | | |
|------------------------|--------|--------|--------|--------|--------|------------|------------|------------|------------|------------|
| 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 |

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 |
| O | | O |
| | 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)

- 1) List major disadvantages of Hill Climbing Technique and propose solution for these problems with suitable example.

- 2) List Major difference between Forward chaining and Backward chaining

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

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

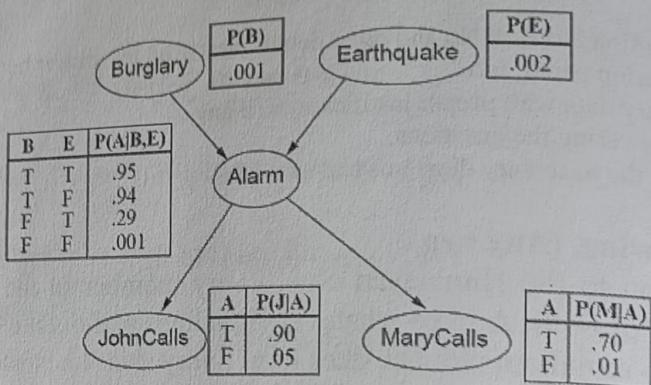
- 5) “One particularly simple form of semantic network is an AND/OR Tree” Justify the statement and support your answer with proper example.

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

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

$$(2) P(J) = ?$$



- 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 (X1 seconds) | Strength (X2 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.

Dated: 5th March, 2020

Computer Engineering Department, SVNIT, Surat.
Mid-Semester Examinations, March 2020
B.Tech. - III (CO) - 6th Semester
Course: (CO306) Computer Graphics (CS-3)

Time: 14:00 to 15:30 hrs

Max Marks: 30

Admission no. : _____

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.
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Q1. Answer the following questions:

- a. Explain each of the following coordinate system in brief and draw a figure that clearly illustrates each of them: Modelling coordinates, World coordinates, Viewing coordinates, Device coordinates. [9]

OR

b. Explain the term "Homogeneous coordinates" and state its usefulness.

c. Discuss various approaches used for producing color displays with CRT in brief.

b. Derive transformation matrix for standard single point perspective projection where view plane is parallel to xy plane and center of projection is at distance d on the negative z -axis. Also, find coordinates of the vanishing point.

Q2. Answer the following questions:

- a. I. Suppose an RGB raster system is to be designed using an 8-inch \times 10-inch screen with a resolution of 100 pixels per inch in each direction. If we want to store 6 bits per pixel in the frame buffer, how much storage (in bytes) do we need for the frame buffer? [2]
- II. How much time is spent scanning across each row of pixels during, screen refresh on a raster system with a resolution of 1280×1024 and a refresh rate of 60 frames per second?

- b. A $\triangle ABC$ is formed by the vertices $A(4,1)$, $B(5,2)$, $C(4,3)$. What are the final coordinates of the vertices if the triangle is first reflected about the x -axis and then reflected about the line $y = -x$. Show that this transformed configuration of vertices is also obtainable by rotating the original triangle about the origin by 270° . [3]

- c. A cuboid with one vertex at origin has sides of length 4 units, 6 units and 10 units respectively. Write non-uniform 3D scaling transformation matrix, T , to transform this cuboid to a cube of side 2 units. Also, find the coordinates of the resultant cube. [2]

- d. A unit cube with one vertex at origin is projected on the xy plane using cabinet projection with $\phi = 30^\circ$. Find the transformation matrix for the cabinet projection and the vertices of the projected cube. [2]

Q3. Answer the following questions (Any Two)

- a. State and derive all necessary formulas for decision parameters for mid-point circle drawing algorithm. Given the center point coordinates $(4, -4)$ and radius as 10, generate all the points to form a circle. [4]
- b. Write Bresenham line drawing algorithm and digitize a line with endpoints $(20, 10)$ and $(30, 5)$. Given input ellipse parameter $r_x=4$ and $r_y=3$, whose centre co-ordinates are $(x_c, y_c) = (0, 0)$. Determine pixel positions along the ellipse path in the first quadrant using the midpoint ellipse generation algorithm. Also, write the steps involved in midpoint ellipse generation algorithm. [4]

- Q4. Write a procedure for filling the interior of any specified set of "polygon" vertices using the non-zero winding number rule to identify interior regions. [4]

***** ALL THE BEST*****

Computer Engineering Department, SVNIT, Surat.

End Semester Examinations, December 2019

B.Tech III – Fifth Semester

Course: Computer Networks (CO-307)

Date: 5th 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° . 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°

b) 55°

c) 75°

At 1,0 ref w

(2) How does NAT work (answer briefly with a neat diagram)? State two problems of NAT.

*Outgoing translation
Table m*

(3) Explain the architecture of World Wide Web (WWW) with suitable diagram.

1 b/f +

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

- 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

→ c) Selective-Repeat ARQ, using 12-bit sequence number
Controlled by receiver from my PC → send to server side
Client PC → interface - to display.

Q-3 Answer the following (any three)

- (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

- (1) 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?

[09]

05

(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

* * *

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:

1. 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

Date: 4 Dec 2019

Time: 12:00 to 03:00

Max Marks: 100

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.

Q1 Answer the following. (Any two) [24]

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 |
| O | | O |
| | 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

On(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]

Q2 Answer Following. (Any Four)

Answer the following four questions and propose solution for these problems

1) List major disadvantages of Hill Climbing Technique and propose solution for these problems with suitable example.

2) List Major difference between Forward chaining and Backward chaining

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

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

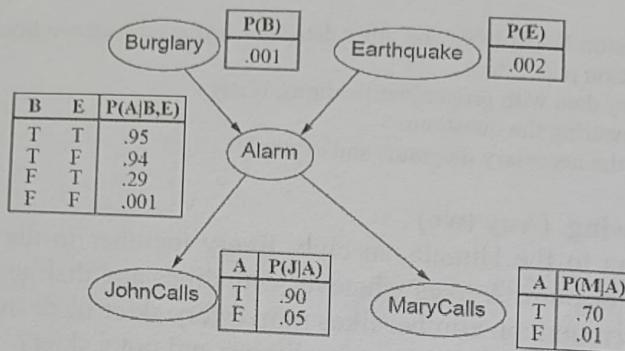
5) “One particularly simple form of semantic network is an AND/OR Tree” Justify the statement and support your answer with proper example.

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.

- Precision vs Recall
- True Error vs Sample Error
- 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 (X1 seconds) | Strength (X2 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.

11

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: 28th 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.

Q-2 Answer the following

[15]

- (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 G₀-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? [05]
- (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: 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)

[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.

[15]

Q-2 Answer the following.

- (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?

* * *

Dated: 30th September, 2019

Instructions:

Time: 16:00 to 17:30 hrs

Max 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.

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.

- 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.

- 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.

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.
