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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

- 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
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3	brown	big	Poodle	safe
4	white	medium	Poodle	safe
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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	Cetirizine	domperidone	Peracetamol	Crocin 650
Weight index	1.29	2.08	4.53	5.67	2.38
pH	1	1	3	4	4

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

End-Semester Examination, December 2019

B.Tech.-III – Fifth Semester

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

Date: 4 Dec 2019

Time: 12:00 to 03:00

Max Marks: 100

Instructions:

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

Q.1 Answer the following. (Any two) [24]

- 1) A, B and C belong to the Himalayan club. Every member in the club is either a mountain climber or a skier or both. A likes whatever B dislikes and dislikes whatever B likes. A likes rain and snow. No mountain climber likes rain. Every skier likes snow.

Q1: Is there a member who is a mountain climber and not a skier?

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

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

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

X	O	X
0		0
	X	

Evaluation function :

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

$X_n(s)$ = 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

Q.2 Answer Following. (Any Four) [24]

- 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.

Computer Engineering Department, S V N I T, Surat.
End-Semester Examination, December 2019
B.Tech.-III – Fifth Semester
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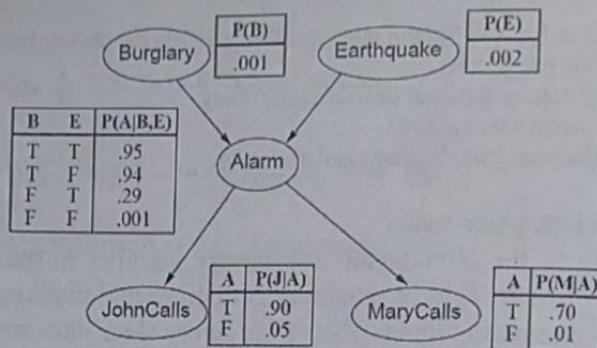
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- 4) What is the importance of planning in AI problem solving? List Important steps of planning and define Goal stack planning.
- 5) “One particularly simple form of semantic network is an AND/OR Tree” Justify the statement and support your answer 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)

- What is Back propagation? Explain Back propagation training algorithm with the help of one hidden layer feed forward Neural network.
- 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.)
- What is Ensemble learning? Discuss Bagging and boosting.
- Compare Linear regression and Logistic regression. Explain Linear regression with appropriate example.
- What are the two types of feature reduction? Explain feature selection methods.

Computer Engineering Department, S V N I T, Surat.
Mid-Semester Examination, October 2019
B.Tech.-III – Fifth Semester
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- (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 $P(\text{No} | \text{Red, Domestic, SUV})$

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pH	1	1	3	4	4

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

Date: 12/07/2019

Time: 2:00 PM to 5:00 PM

Total Marks: 50

Instructions:

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

Q-1 Answer the following:

[15]

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

Q-2 Answer any three of the following:

[15]

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

Q-3 Answer the following: [14]

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

Q-4 Answer the following (Any 2) [6]

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

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

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 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
2. a. What are the advantages of threads over multiple processes? Suggest one application that would benefit from the use of threads, and one that would not. 03
- b. Briefly explain how messages can be used to achieve mutual exclusion. What is the main advantage of messages compared to semaphores and monitors? 03
- c. If the wait and signal operations are not executed atomically, then mutual exclusion may be violated. Explain with suitable example. 04
- d. Consider a variant of the RR scheduling algorithm where the entries in the ready queue are pointers to the PCBs. What would be the effect of putting two pointers to the same process in the ready queue? What would be the major advantages and disadvantages of this scheme? 04
- e. Explain following terms with example: monitor, race condition, live lock, and starvation. 04
- f. Explain deadlock avoidance with suitable example using banker's algorithm. 04
- g. Compare and contrast different classes of Real time scheduling algorithms with suitable examples. 04

Computer Engineering Department, S V N I T, Surat.
END-SEMESTER EXAMINATIONS, April-May 2019
B.Tech. - IV (CO) - 8th Semester

Course: (CO406) Elective I: Network and System Security
Time: 2:30 p.m. to 5:30 p.m.

Dated: 30th April, 2019

Max Marks: 100

[10]

Q1. Answer the following:

Consider following code fragment and identify the type of malicious software:

- a. legitimate code
if data is Friday the 13th;
 crash_computer();
legitimate code
-----[1 Mark]
- b. username = read_username();
password = read_password();
if username is "133t h4ck0r"
 return ALLOW_LOGIN;
if username and password are valid
 return ALLOW_LOGIN
else return DENY_LOGIN
-----[1 Mark]

- c. What is the difference between Masquerader, Misfeasor and clandestine user? -----[3 Marks]
Suggest suitable solution to assess overall vulnerability score and rating of any system/process of any business with suitable example.

Q2. Answer the following :

1. Discuss the principal objective for developing IPsec architecture. Explain the following modes in terms of IPsec, a. Transport Mode and b. Tunnel Mode
2. Suggest suitable firewall that examines each IP packet to allow or deny particular packets. Which factors are used by this firewall to achieve its goal? Is there any weakness? If yes, explain.
3. Discuss the type of VPN tunneling in which service provider has additional burden than other tunneling methods. Specify the type of Tunneling Protocol supported by it.
4. What do you mean by Rainbow Table Attack? Discuss its benefit and drawback over Dictionary attack. How you can prevent the success of Rainbow Table Attack?

5. (a) Write Snort rule for following:

1. To log all TCP packets for string "Intruder" either going to or originating from any Telnet server in 172.16.0.0/16 with message "Intrusion Detected".
2. To alert on all UDP packets with source IP address not originating from 192.168.2.0/24 and 192.168.8.0/24 to any destination except port ranges from 2000 to 2040.

(b) Write iptables rule for following:

1. Create a new rule to log all the traffic for telnet port.
2. Assume there is user defined chain ABC. Block port 22 from 192.168.8.0 for the local machine inside ABC chain.

Q3. Answer the following:

1. Consider Elliptic Curve Cryptography based Elgamal encryption scheme as shown below where public key $Q=dP$, d is private key and P is the generator of elliptic curve group.

Encryption algorithm:

INPUT : Elliptic curve domain parameters (p, E, P, n), public key Q , plaintext m .

OUTPUT : Ciphertext (C_1, C_2)

1. Represent the message m as a point M in $E(F_p)$

2. Select $k \in_R [1, n-1]$.

3. Compute $C_1 = kP$.

4. Compute $C_2 = M + kQ$.

5. Return (C_1, C_2) .

[30]

Decryption algorithm:

INPUT : Elliptic curve domain parameters (p, E, P, n), private key d , ciphertext (C_1, C_2)
 OUTPUT : Plaintext m .

1. Compute $M = C_2 - dC_1$, and extract m from M
2. Return M .

Answer the following for the EC-Elgamal scheme:

- (a) What is the underlying hard problem based on which you prove security of EC-Elgamal?
- (b) Comment on the homomorphic property of EC-Elgamal. If it is homomorphic, prove it.
2. Consider Shamir's secret sharing scheme where Dealer D computes and distributes shares to participants. At least k number of participants are required to reconstruct the secret s . Explain the scheme. What are the consequences if,
3. (a) Dealer behaves maliciously? (b) one of the participants behaves maliciously?
 Discuss issues in implementing Biometric based authentication system (e.g. Aadhar) in a country like India. How do you measure efficiency of any biometric authentication scheme?
4. Suppose that a hospital wants to publish the patient records in Table (a) to a research centre. Suppose that the research centre has access to the external table Table (b) and knows that every person with a record in Table (b) has a record in Table (a).

(a) Patient table			
Job	Sex	Age	Disease
Engineer	Male	35	Hepatitis
Engineer	Male	38	Hepatitis
Lawyer	Male	38	HIV
Writer	Female	30	Flu
Writer	Female	30	HIV
Dancer	Female	30	HIV
Dancer	Female	30	HIV

(b) External table			
Name	Job	Sex	Age
Alice	Writer	Female	30
Bob	Engineer	Male	35
Cathy	Writer	Female	30
Doug	Lawyer	Male	38
Emily	Dancer	Female	30
Fred	Engineer	Male	38
Gladys	Dancer	Female	30
Henry	Lawyer	Male	39
Irene	Dancer	Female	32

- (a) Show that, joining the two tables on the common attributes Job, Sex, and Age may link the identity of a person to his/her Disease.
- (b) Now, generate and show a 3-anonymous table by generalizing quasi attributes {Job, Sex, Age} from Table (a) using the taxonomy tree shown in figure 1. Prove that the resultant table solves the problem of identity disclosure.

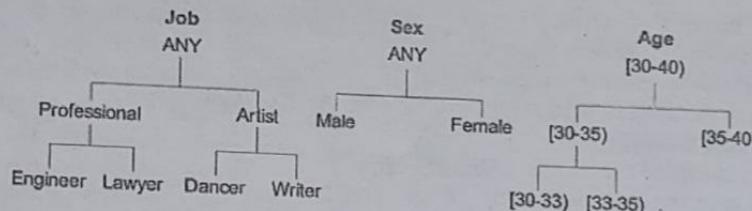


Figure 1: Taxonomy tree

5. Private Information Retrieval (PIR) protocol enables client B to retrieve one entry from a database maintained by server A without A knowing which entry it is. Suggest and explain the methodology that can be used to implement PIR.

Q4. Answer the following:

1. An organization A wants to implement password based authentication scheme for its users. Which among the following is the most secure authentication scheme? Show critical analysis of the scheme (with explanation of each scheme with suitable diagram) and then decide.
 (a) Fixed Password scheme (b) On-time Password scheme
2. Differentiate Challenge-response protocol and Zero-knowledge protocol for authentication giving example of at least one method in each category.
3. Based on your reading of Facebook Inc. Data policy document, answer the following:
 (a) What kind of information is collected ? (b) How do they use this collected information ?
 (c) How this information is shared?
 (d) What measures are taken to ensure the privacy of users?
 (e) Identify possible privacy breach and suggest suitable countermeasures.

[30]

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

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Q-1 Answer the following (any five) [10]

- (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.

Q-2 Answer the following (any three) [09]

- (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 1,094 km

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

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

*Outgoing straight line
Table 2a*

- (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

Q-3 Answer the following (any three)

[12]

- (1) Suppose we want to transmit the message 1101 0110 0110 1001 and protect it from errors using the CRC-8 polynomial $x^8+x^2+x^1+1$.
- Use polynomial division to determine the message that should be transmitted.
 - Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receiver's CRC calculation? How does the receiver know that an error has occurred.
- (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".
- What is the source port number and destination port number?
 - What is the length of the data and total length of the user datagram?
 - Is the packet directed from a client to a server or vice versa? What is the client process?
 - What are the types of source and destination port numbers?
- (4) What are the deficiencies of IP protocol and how ICMP protocol compensates the deficiencies? Write short note on two broad categories of ICMP messages.

Q-4 Answer the following

[09]

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

(or)

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

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

Q-5 Answer the following [10]

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

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

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

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

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

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

* * *

Computer Engineering Department, S V N I T, Surat.
Makeup Mid-Semester Examinations, April 2019

M Tech I (CO), 2nd Semester

Course: (CO602) Wireless Network and Mobile Computing

Dated: 12 April 2019

Time: 14:00 hrs to 15:30 hrs

Marks: 30

Instructions:

- Please start the answer to each question on new page ONLY of your answer sheets.
- Please write your correct exam no without fail on the answer sheets as well as the question papers.
- Please be brief and to-the-point in the attempting the answers to the theory questions. Unnecessary and unjustified elaboration will not fetch more marks. The Hallmark of an answer to a short question indeed is its brevity.

- Q.1 Describe the call initiation and call delivery process in detail with different scenarios of (i) same network service provider: (a) home network and (b) foreign network and (ii) another service provider: (a) within home network and (b) foreign network (Hint: total 8 scenarios). Each scenario described with steps and diagram. [8]
- Q.2 What is Doppler effect? Describe the equations for spectrum spread. [4]
- Q.3 What are the parameters: QoS and GoS? How are these parameters measured for wireless network? Define call blocking probability and call dropping probability. [4]
- Q.4 Define the term Call-to-mobility ratio. Consider a cellular system in which the location of mobile stations within the cellular network is managed by the IS-41 two tiered architecture with reference to HLR and VLR using Gatway. [6]
(i) With the help of diagrams, describe the sequence of actions that is required for (a) reporting location update, and (b) call delivery.
(ii) If a local anchor approach is incorporated into the two-tiered architecture of IS-41, explain and discuss the advantages and disadvantages.
- Q.5 How is the channel capacity related to (a) number of clusters and (b) number of cells per cluster and (c) number of channel available in the region? Explain with the help of numerical example with a given set of channels and varying the number of clusters and number of cells per cluster in the region. What is frequency re-use? What are points to be taken care while frequency re-sue and channel allocation? [8]

Computer Engineering Department, S V N I T, Surat.
Mid-Semester Examinations, March 2019

M Tech I (CO), 2nd Semester

Course: (CO602) Wireless Network and Mobile Computing

Dated: 5 March 2018

Time: 14:00 hrs to 15:30 hrs

Course: (CO602)

Marks: 30

Instructions:

- Please start the answer to the each question on new page ONLY of your answer sheets.
- Please write your correct exam no without fail on the answer sheets as well as the question papers.
- Please be brief and to-the-point in the attempting the answers to the theory questions. Unnecessary and unjustified elaboration will not fetch more marks. The Hallmark of an answer to a short question indeed is its brevity.

- Q.1 (a) Describe the channel modeling describing the following terms. [3]
1. Multi path delay
 2. Doppler effect
 3. Spectrum spreading
- (b) Derive the linear time-variant wireless channel modeling with necessary equations. [3]
- (c) Why is wireless channel considered as time variant? How? How does the spectrum spread occur? [3]
- (d) Describe different time and frequency domain representations of channel transfer functions. [3]
- Q.2 (a) Formulate the two level pointers' based location tracking mechanism cellular communication. [2]
- (b) Compare this scheme with IS-41 scheme used with GSM with different cost parameters. [2]
- (c) Introduce all necessary variables for basic move and find operations using IS-41 as well as using two level pointers mechanism. [4]
- (d) Derive the cost function in detail for performance analysis. [2]
- Q.3 (a) Formulate the problem for statistical location estimation using propagation model assuming non-uniform transmitter radiation in different direction. [2]
- (b) Define receiving signal model and solution for estimation of location using maximum likelihood approach with necessary equations. [6]

Computer Engineering Department, S V N I T, Surat.
Mid-Semester Examinations, March 2019

M Tech I (CO), 2nd Semester

Course: (CO602) Wireless Network and Mobile Computing

Dated: 5 March 2018

Time: 14:00 hrs to 15:30 hrs

Marks: 30

Instructions:

- Please start the answer to the each question on new page ONLY of your answer sheets.
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**Computer Engineering Department, S V N I T, Surat.
Mid-Semester Examinations, March 2019**

M Tech I (CO), 2nd Semester

Course: (CO602) Wireless Network and Mobile Computing

Dated: 5 March 2018

Time: 14:00 hrs to 15:30 hrs

Marks: 30

Instructions:

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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

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-505)

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				

Computer Engineering Department, SVNIT, Surat.

Mid-Semester Examination, October 2019

B.Tech.-III – Fifth Semester

Course: Artificial Intelligence and Machine Learning (CO-505)

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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[12]

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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	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	Cetirizine	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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3. Be precise and clear in answering the questions.
4. Support your answer with the necessary diagrams and examples.

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[12]

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 Justify this statement using Water Jug Problem as described below, showing multiple sequence of solution.

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- (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
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3	Red	Sports	Domestic	Yes
4	Yellow	Sports	Domestic	No
5	Yellow	Sports	Imported	Yes
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9	Red	SUV	Imported	No
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- (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
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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	Cetirizine	domperidone	Peracetamol	Crocin 650
Weight index	1.29	2.08	4.53	5.67	2.38
pH	1	1	3	4	4

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

Date: 4 Dec 2019

Time: 12:00 to 03:00

Max Marks: 100

Instructions:

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.

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 :

$\text{Eval}(s) = 10X_3(s) + 3X_2(s) + X_1(s) - (10O_3(s) + 3O_2(s) + O_1(s))$ 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 X's and no O'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.

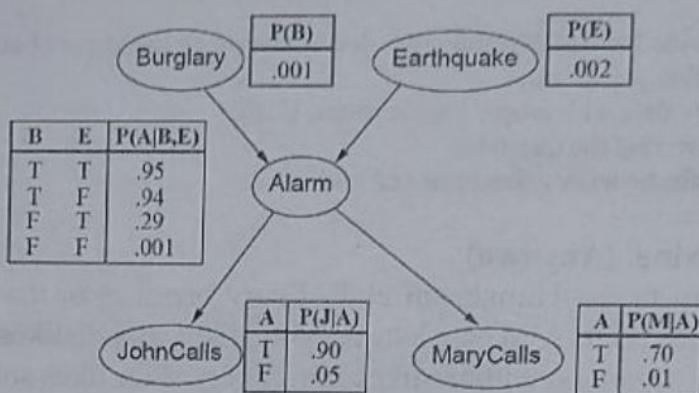
Page 1 of 2

Q.3 Answer Following. (Any Four)

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

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

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



- 2) Define following with respect to Performance evaluation.

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

- 3) We have data from questionnaire 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 are 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.

[28]

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

Q-3 Answer the following (any two)

[05]

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

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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.

Q-2 Answer the following.

[15]

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

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

Q-3 Answer the following (any two)

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

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