KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 4th Year 1st Term Examination, 2019
Department of Computer Science and Engineering
CSE 4105
Computer Networks

TIME: 3 hours   FULL MARKS: 210

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A
(Answer **ANY THREE** questions from this section in Script A)

1. a) What is access network? Describe the enterprize access network with diagram. (08)
   b) How does data pass through network in case of circuit switching? Explain in brief. (08)
   c) What is troughput? What will be the troughput in case of Internet scenario? (06)
   d) What is the differences between RDT 2.1 and RDT 2.2? Draw RDT 2.2 finite state machine (13) for sender and receiver. Briefly describe this.

2. a) Why is UDP used in transport layer though it is unreliable? (05)
   b) In GB3, if every 5th packet is being transmitted is lost and if we have to send 10 packets, then (11) how many transmissions are required?
   c) What is the relation between window size and sequence number in case of selective repeat? (10) Why is this relation needed?
   d) Write short notes on the following terms: (09)
      (i) Demultiplexing, (ii) Characteristics of UDP, and (iii) UDP segment format.

3. a) What is "syn-flooding" attack in case of connection establishment in TCP? Explain. (06)
   b) How many ways are there to terminate a connection in TCP? Explain the ways in proper (12) diagram.
   c) Suppose receiver application program consumes data as 1byte at a time. For this, the receiver (06) TCP announces the window size as 1byte. So, the sending TCP sends 1byte at a time and the traffic intensity will be high. What has to be done to solve the problem? Explain two solutions.
   d) Explain Karn's algorithm in case of TCP timer. What will be the RTO of PKT1 in the (11) following figure?
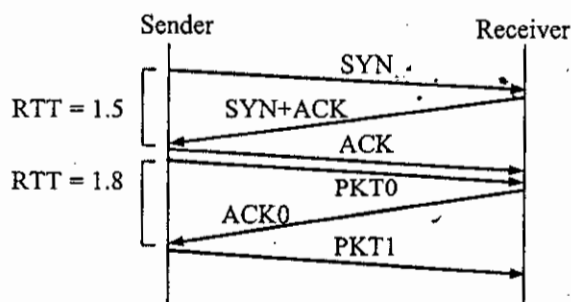
4. a) How does TCP recognize the network congestion? Explain the Reno approach of managing (13) this congestion by using necessary illustration.
   b) Explain block cipher and cipher-block chain algorithm in symmetric key cryptography. Why (14) will we use cipher-block chain instead of block cipher?
   c) In case of RSA, if primes are $p = 5, q = 7,$ public key is $(35,5)$ and cipher text $c = 18$, then (08) decrypt the cipher text to get plain text.

SECTION B
(Answer **ANY THREE** questions from this section in Script B)

5. a) Suppose two nodes start to transmit at the same time a packet of length L over a broadcast (08) channel of rate R. Denote the propagation delay between the two nodes as d_{prop}. What there be a collision if $d_{prop} > \dfrac{L}{R}$? Why or why not.
   b) Briefly describe that two dimensional parity checks can correct and detect a single bit error (08) but a double bit error that can be detected but not corrected.

c) Why is an ARP query sent within a broadcast frame? Why is an ARP repose sent within a (07) frame with a specific MAC address?

d) You have to look carefully Figure 5(d). Computer A wants to send a frame to computer C'. (12) Describe the two switches' behavior when A connects to C' and after completing the communication, how the switch table of both switches look like? (Initially switch table was empty). Finally, write down the self-learning algorithm of switch.
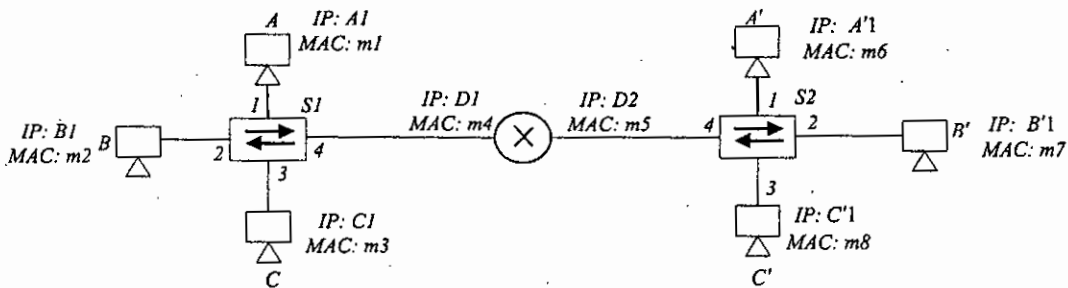

Figure 5(d)

6. a) Suppose you wanted to do a transaction securely from a remote client to a server as fast as (07) possible. Would you use UDP or TCP? Why?

b) What is meant by handshaking protocol? Why is it said that FTP sends control information (07) "out of band"?

c) What are the advantages and disadvantages of a circular DHT (with no shortcuts)? (08)

d) Suppose the CSE department of KUET has 200 personal computer and 10 servers. The (13) network administrator wants you to dynamically assign the IP address of those personal PC. How personal computer get the IP address if you have a network address 172.16.0.0/24. Also, state the dynamic range of IP addresses.

7. a) Briefly describe different types of switching fabrics. Which, if any, can send multiple packets (06) across the fabric in parallel?

b) Define HOL blocking and longest prefix matching with appropriate example. (08)

c) Consider the network shown below and assume that each node initially knows the costs to (12) each of its neighbors. Consider the distance vector algorithm and show the distance table entries at node Z.
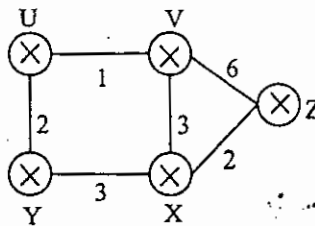
d) Differentiate GET and conditional GET commands of HTTP. How does conditional GET (09) command improve performance of web proxy and local cache mechanism?

8. a) What is NAT traversal problem? How can you solve it? Explain briefly with appropriate (11) figure.

b) Compare and contrast link-state and distance vector routing algorithms. (08)

c) Describe the technologies that are used for transitioning from IPv6 to IPv4 to IPv6. (07)

d) Consider the generator G = 10011 and suppose that D has the value 1010101010. What is the (09) value of R? How can you detect the error using Cyclic Redundancy Check method?

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 4ᵗʰ Year 1ˢᵗ Term Examination, 2019
Department of Computer Science and Engineering
CSE 4109
Artificial Intelligence

TIME: 3 hours   FULL MARKS: 210

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
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SECTION A
(Answer **ANY THREE** questions from this section in Script A)

1. a) How can you test whether a machine has reached the general intelligence level of human (12) being? Explain it.
   b) What is an intelligent agent? Explain the learning agent model elaborately. (13)
   c) What is PEAS? For each of the following activities, give a PEAS description of the task (10) environment: (i) Automated Car Driving, (ii) Automated Robot Cleaner.

2. a) What is CSP? Solve the following tree structured CSP where there are only three colors (Red, (10) Green and Blue) available.
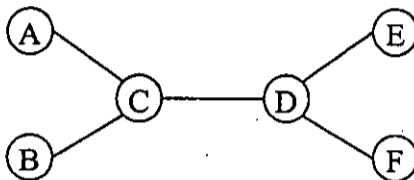
   b) Develop a local search algorithm for solving N-Queen problem using min-conflict heuristic. (12)
   c) Suppose one of the states of "Tic-Tac-Toe" given in the following figure where you mark (13) crosses (X's) and the machine marks circles (O's). Also suppose that now it is your turn to move. What will be your move using Mini-Max procedure? Draw the complete search tree to show how you will find the state.

3. a) What is a fuzzy logic system? Explain clearly. (10)
   b) Discuss different operations on fuzzy sets. Use pictorial view for their clarity. (10)
   c) Develop a general structure of a fuzzy expert system. Hence, explain this system using a fuzzy (15) logic controller of an A/C system.

4. a) What is unification in the FOL? Why is it a key component in first-order inference algorithm? (07)
   b) Using forward chaining and backward chaining, prove that Col. West is a criminal for the (15) proposition:
      "The law says that it is a crime for an American to sell weapons to hostile nations. The country now, an enemy of America, has some missiles, and all of its missiles were sold to it by Col. West, who is an American".
   c) Convert the logic $A \Leftrightarrow (B \vee C)$, into CNF. (08)
   d) What are the advantages of FOL over propositional logic? (05)

SECTION B
(Answer **ANY THREE** questions from this section in Script B)

5. a) What are the differences between Exact Inference and Approximate Inference? Which (05) techniques are used for Approximate Inference?
   b) What is Marginal independence? Calculate the probability values: (i) $p(\text{cavity} \vee \text{toothache})$, (05) (ii) $p(\text{cavity})$, (iii) $p(\text{cavity}|\text{toothache})$, (iv) $p(\neg\text{cavity}|\text{toothache})$ using the following table.

|	toothache		¬toothache	
	catch	¬catch	catch	¬catch
cavity	0.108	0.012	0.072	0.008
¬cavity	0.016	0.064	0.144	0.576

   c) You have a new burglar alarm installed at home. It is fairly reliable at detecting burglary, but (10) also responds on occasion to minor earthquakes. You also have two neighbours, John and Mary, who have promised to call you at work when they hear the alarm. Consider, Burglary=B, Earthquake=E, John=J, Mary=M and Alarm=A. $p(B) = 0.001$, $p(E) = 0.002$, $p(A|B,E) = \langle 0.95, 0.94, 0.29, 0.001 \rangle$, $p(J|A) = \langle 0.90, 0.05 \rangle$ and $p(M|A) = \langle 0.70, 0.10 \rangle$. Draw the Bayesian Network and calculate $p(\neg j, \neg m, a, b, e)$ and $p(j, m, a, \neg e, \neg b)$.

Page: 1 of 2

d) Consider the Wumpus world shown in figure below: (15)

1,4	2,4	3,4	4,4
1,3	2,3	3,3	4,3
1,2 B OK	2,2	3,2	4,2
1,1 OK	2,1 B OK	3,1	4,1

Find out the value for $p(P_{1,3} \mid known, b)$ using Bayesian Inference. Show every consistent model for the frontier variables $P_{2,2}, P_{3,1}$.

6. a) What are the other approaches for uncertainty reasoning? Give a description on them. (12)
   b) What are the differences between typical Bayesian Net. and Dynamic Bayesian Net.? Draw the necessary figures. (06)
   c) Does the order of the Markov process has any impact on inference accuracy? Explain why or why not. (05)
   d) Using Hidden Markov Model derive the equations for the transition and the sensor probability for Robot Localization problem. (12)

7. a) What are the main differences between a probabilistic agent and logical agent? Define Prior and Posterior. (05)
   b) A doctor knows that the disease meningitis causes the patient to have stiff neck 70% of the time. The prior probability that a patient has meningitis is 1/50,000 and for stiff neck is 1%. Let, stiff neck=s and meningitis=m. Calculate $p(m \mid s)$. (05)
   c) Given, (10)

   $q_{cold} = p(\neg fever \mid cold, \neg flu, \neg malaria) = 0.6$; $q_{flu} = p(\neg fever \mid \neg cold, \neg flu, malaria) = 0.2$

   $q_{malaria} = p(\neg fever \mid \neg cold, \neg flu, malaria) = 0.1$.

   Build the conditional probability table using noisy-Or assumption.
   d) Consider the following Bayesian Network: (15)
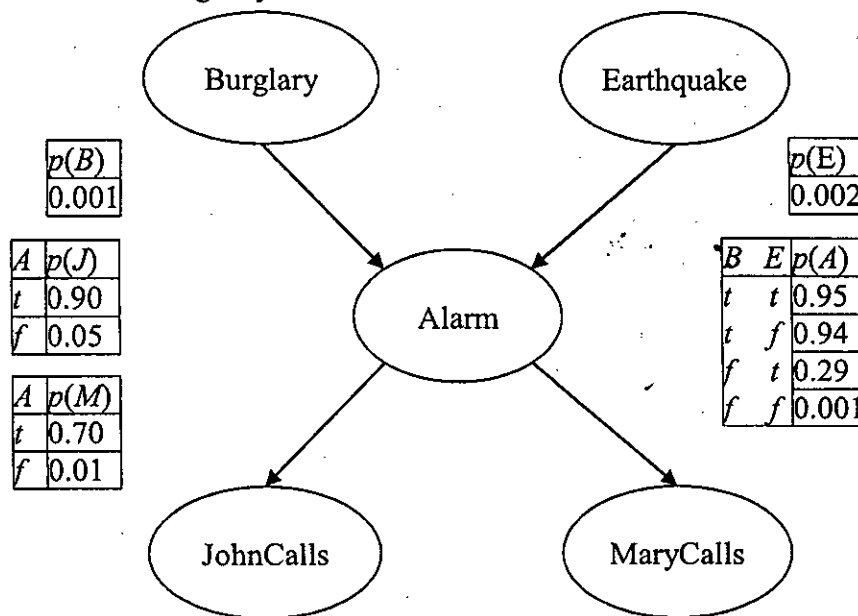
By using inference by enumeration calculate $p(B \mid j, m)$ with proper diagram.

8. a) Prove that, $p(\neg A) = 1 - p(A)$ using axioms. (05)
   b) Suppose that, an online book retailer would like to provide overall evaluation of products based on recommendation from customers. The evaluation is a posterior distribution based on quality of the book. But the problem is, kind customers tend to give high recommendations while dishonest ones give very high or low. Briefly explain a Bayesian model for this real life scenario. (10)
   c) What is Dempster-Shaffer Theory? Explain with example. (06)
   d) Explain fuzzy sets and fuzzy logic with example. (06)
   e) Explain state model and transition model in Dynamic Bayesian Network with proper figures and examples. (08)

TIME: 3 hours   FULL MARKS: 210

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SECTION A
(Answer **ANY THREE** questions from this section in Script A)

1. a) What do you mean by learning? In biological system, what are the elements and how they response for learning? (08)
   b) Draw computational model of a single neuron. Solve different binary logics with the model. (09)
   c) What are the different types of memory? What are their significances and uses? (09)
   d) Calculate the weight set (W) of a Hetero-Associative memory for the following samples: (09)

Pattern, p	Source s(p)	Target, t(p)
1	1 0 0 0	1, 0
2	1 1 0 0	1, 0
3	0 0 1 1	0, 1
4	0 0 0 1	0, 1

   Finally verify the system with appropriate samples.

2. a) What do you understand by linear problem and non-linear problem in the context of machine learning? Why solving non-linear problem is challenging? Briefly explain with an appropriate example. (07)
   b) "An additional dimension (input) may transform a non-linear problem to linearly separable"- justify the statement with proper example. (08)
   c) Why training may not perform after certain iteration even though error remain in training a neural network using Back-Propagation? Explain with appropriate example. (10)
   d) What is the condition to use a function as Activation Function in neural network? Graphically represent two different forms of sigmoidal functions and their derivatives. Explain similarity and dissimilarity between the functions. (10)

3. a) What are the basic differences between Radial Basis Function (RBF) network and Multi Layer Perceptron (MLP)? Briefly describe training steps of RBF networks. (09)
   b) Why ensemble of neural networks is essential when an MLP solve any arbitrary function? What are the conditions for ensemble construction? (06)
   c) What are the different techniques for training individual networks in ensemble construction? Mention different ensemble methods for each type. (08)
   d) Describe an ensemble method which uses sampling of individual patterns. Is such technique suitable for ensemble of Decision Tree? Explain briefly. (12)

4. a) What do you mean by Swarm Intelligence (SI)? Briefly describe common features of SI based algorithms. (05)
   b) Explain importance of exploration and exploitation properties in SI algorithms. Describe exploration and exploitation matter in Particle Swarm Optimization (PSO). (10)
   c) In Ant Colony Optimization (ACO), how an ant complete a tour in solving Travelling Salesman Problem (TSP)? (08)
   d) What do you understand by the terms Global Search, Local Search and Blind Search? Does GA follows the search methods? Explain your justification with techniques included in GA. (12)

SECTION B
(Answer **ANY THREE** questions from this section in Script B)

5. a) What are support vectors in Support Vector Machine (SVM)? How does Linear SVM work? Explain. (10)
   b) How can SVM classify non-linearly separable data? Explain with an example and proper figure. (07)
   c) Can SVM be over trained? What can be the effect of over training? How will you detect over fitting of a SVM model? (08)

d) Can you classify the data points (x, 0) depicted in the following figure using LSVM? (10)
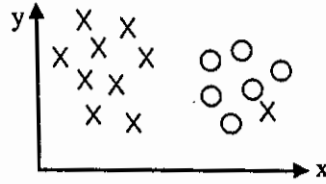
Explain the procedure of finding the correct hyper plane for the data points.

6. a) Define "Occam's Razor Principle". Explain its effect on Decision Tree. (07)
   b) "Entropy measures the impurity of training data instances"-is this statement true or false? (08) Explain with proper reasoning.
   c) Formulate a decision tree based on the following experience table where Buys-computer is (20) set as target class.

| Records	Age	Income	Student	Credit-Rating	Buys-computer
1	<= 30	High	No	Fair	No
2	<= 30	High	No	Excellent	No
3	31 ... 40	High	No	Fair	Yes
4	> 40	Medium	No	Fair	Yes
5	> 40	Low	Yes	Fair	Yes
6	> 40	Low	Yes	Excellent	No
7	31 ... 40	Low	Yes	Excellent	Yes
8	<= 30	Medium	No	Fair	No
9	= 30	Low	Yes	Fair	Yes
10	> 30	Medium	Yes	Fair	Yes
11	<= 30	Medium	Yes	Excellent	Yes
12	31 ... 40	Medium	No	Excellent	Yes
13	31 ... 40	High	Yes	Fair	Yes
14	> 40	Medium	No	Excellent	No

7. a) Why Pre-pruning and Post-pruning are necessary for decision trees? How does error propagate (10) in decision tress?
   b) How do you tackle the curse of dimensionality? (05)
   c) Write short notes on: (i) Data condensation, and (ii) Data squashing. (08)
   d) How does Principle Component Analysis construct the principle components? Point out the (12) steps briefly with an example.

8. a) Consider the data in the following table: (15)

ID	Height	Age	Weight
1	5	45	77
2	5.11	26	47
3	5.6	30	55
4	5.9	34	59
5	4.8	40	72
6	5.8	36	60
7	5.3	19	40
8	5.8	28	60
9	5.5	23	45
10	5.6	32	58
11	5.5	38	??

Predict the weight of ID 11 based on their height and age using KNN.
   b) What are the strengths of K-means algorithm? (05)
   c) Differentiate between divisive clustering and agglomerative clustering. (08)
   d) Draw a dendrogram from the following figure: (07)
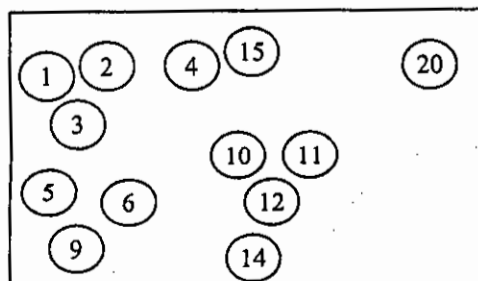
TIME: 3 hours   FULL MARKS: 210

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SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) Define the terms: 'confusion', 'diffusion', 'cryptography' and 'cryptanalysis'. Discuss (12)
       Shannon characteristics of good cipher.
    b) 'RSA is a commutative like cryptosystem' – how? Explain deliberately. (08)
    c) Define cryptosystem. Discuss about the ingredients of a cryptosystem. (08)
    d) Define 'known-plaintext' attack. How this attack can mount over RSA? (07)

2. a) Discuss characteristics of digital signature. Explain ElGamal digital signature algorithm with (12)
       an example.
    b) Digital signature and public key cryptography can be combined – why and how? Explain. (08)
    c) Using an example explain ElGamal cryptosystem. How does it relate with discrete logarithm (10)
       problem?
    d) Discuss threats to e-mail. (05)

3. a) Discuss 'stream cipher' and 'block cipher'. Explain a specific key exchange protocol to (13)
       distribute a key.
    b) Explain AES algorithm using a block diagram. Make a comparison between DES and AES. (13)
    c) Define sensitive data. Discuss the factors that can make data sensitive. (09)

4. a) What is meant by homomorphic encryption? Show that RSA and ElGamal cryptosystems are (10)
       homomorphic.
    b) What are the parameters that make a computer network vulnerable? Discuss them briefly. (10)
    c) Discuss the dimensions of reliability and integrity of database. What are the requirements for (10)
       database security? Explain them.
    d) Explain the mechanism of triple DES algorithm. (05)

SECTION B

(Answer **ANY THREE** questions from this section in Script B)

5. a) What is salt and how does it make password hashing more secure? Also explain rainbow table (15)
       attack and how salt can help against rainbow table attack.
    b) How does the attacker know what algorithm and salt to use in a dictionary attack? (06)
    c) Explain Buffer Overflow attack with proper code and stack diagram. Also discuss about the (14)
       countermeasures that are used against Buffer Overflow attack.

6. a) Explain how Format String attack works with appropriate activation record diagrams. Also (15)
       explain different uses of Format String attack with proper example(s) and stack diagrams.
    b) Demonstrate Integer Overflow attack using suitable example(s). (07)
    c) Explain SQL Injection attack with practical example. Also discuss about the prevention (13)
       techniques used against SQL Injection attack.

7. a) Explain Persistent, Reflected and DOM-based Cross-Site Scripting (XSS) attacks with (15)
       example(s).
    b) Explain the methods of preventing XSS attacks. (10)
    c) What are web bugs? Explain how attackers bypass CAPTCHA protection. (10)

8. a) Explain how combining Paging with Segmentation provides better performance for protection (09)
       in general purpose operating system compared to using them separately.
    b) What is a Covert Channel? How to create Covert Channels? (06)
    c) Briefly explain the following attacks: (i) Ransomware, (ii) Salami Attack, (iii) Tapjacking, (16)
       (iv) Document virus using Microsoft's Dynamic Data Exchange.
    d) What is Access Control Directory? (04)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 4th Year 1st Term Examination, 2019
Department of Computer Science and Engineering
CSE 4127
Image Processing and Computer Vision

TIME: 3 hours

FULL MARKS: 210

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A
(Answer **ANY THREE** questions from this section in Script A)

1. a) Specify image compression. 'Huffman Coding can be used as a symbol encoder in an image compression system'-illustrate the statement. (12)
   b) Explain false contouring with necessary examples using the concept of sampling and quantization. (08)
   c) Consider the image segment shown below: (10)

4	2	3	2 (q)
3	3	1	3
2	3	2	2
(p) 2	1	2	3

   Complete length of the shortest-4, shortest-8, and shortest-m paths between pixels p & q where, v = {1, 2}. If a particular path does not exist between these two points, explain why?
   d) Interpret the significance of shading correction in digital image processing. (05)

2. a) Construct a modified image using histogram specification where histogram of original and target images are given below: (20)
   original histogram:

Gray level	0	1	2	3	4	5	6	7
No. of Pixels	8	10	10	2	12	16	4	2

   Target histogram:

Gray level	0	1	2	3	4	5	6	7
No. of Pixels	0	0	0	0	20	20	16	8

   b) Assuming continuous intensity values, suppose that an image has the intensity PDF $P_r(r) = \frac{2r}{(L-1)^2}$ for $0 \le r \le (L-1)$ and $P_r(r) = 0$ for other values of r. find the transformation function that will produce an image whose intensity PDF is $P_z(z) = \frac{3z^2}{(L-1)^3}$ for $0 \le z \le (L-1)$ and $P_z(z) = 0$ for other values of z. (10)

   c) 'Local Histogram processing is necessary to enhance details over small areas in an image'- justify the statement. (05)

3. a) Image X and Y are shown below with crossing in the left bottom showing their correspondence. (12)
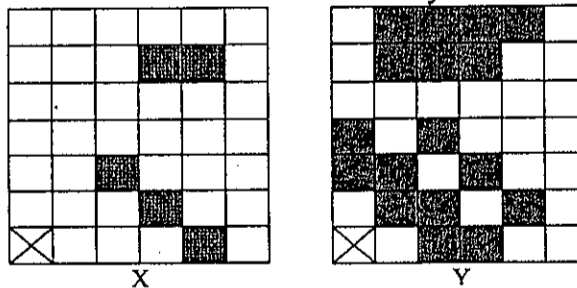
   Design an appropriate structure element such that Y can be obtained after dilating X. (Black for 1 and white for 0).
   b) 'Textural segmentation is crucial in finding a boundary between two regions based on textural content'-justify the statement with necessary figures. (11)
   c) Detect edge on the following image using erosion and show the outcome of each step separately. (12)
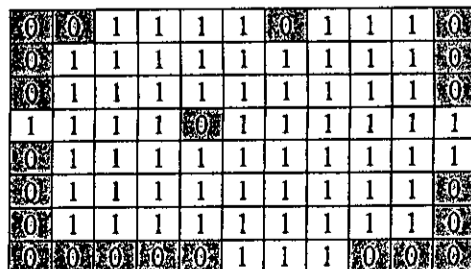
0	1	0
1	(1)	1
0	1	0

   Structuring Element

4. a) State and explain the data redundancies that can be identified in an image for the exploitation of image compression. (09)

   b) Define Hue and Saturation. Calculate the HSI value of the following RGB point: (11)
   (155, 210, 75)

   c) What will happen if you change the value of H channel of an HSI image while keeping the other channel's value constant? (05)

   d) Illustrate the concepts: (i) Color slicing and (ii)Tone correction (10)

SECTION B
(Answer ANY THREE questions from this section in Script B)

5. a) Compare between image processing and computer vision. Explain some typical challenges in solving a computer vision problem. (12)

   b) Consider the 1D image below: (08)

a	b	c	d	e	f	g

   i) Suppose, you apply a width-3 mean filter twice. Give an expression for the center pixel after the filter has been applied.

   ii) Define a single 1D kernel that, when applied only once to the image, will produce the same results.

   c) Find the unsharp mask first and then the sharped image for the following image: (15)

2	8	6
5	4	1
7	3	9

   Use a 3x5 mean filter as a blurring kernel and do wrap around padding where required.

6. a) Design a Bulterworth Low-pass Filter (BLPF). What happens when you choose a higher order BLPF to smooth an image? When would you prefer BLPF than Gaussian Low-pass Filter? (12)

   b) Show that the Fourier transform of a shifted function is unaltered except for a linearly varying phase factor. (08)

   c) Verify the soundness of the statement: 'Laplacian with a -8 in the center yields sharper results than the one with -4 in the center'. (10)

   d) Explain estimation of image degradation function by mathematical modeling. (05)

7. a) Segment the image shown below with a global threshold computed by Otsu's method. (13)

1	2	0	12	14
2	3	4	8	13
9	2	3	15	7
3	2	2	11	13
1	2	0	14	12

   Mention some limitations of global thresholding.

   b) Rotate the image shown below by backward mapping method with $\theta = 30°$. (12)

1	5	2
6	3	4
7	9	5

   Use bilinear interpolation and allow the image to grow to fully contain the rotated image.

   c) Find the 4-point basis matrix of Discrete Fourier Transform (DFT) and then use it to find the DFT of [1 -1 1 -1]. (10)

8. a) Define image representation and description. Measure the entropy and uniformity of the following 3-bit image: (13)

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

   b) Explain the basic principle of Hough line detection mechanism. (09)

   c) What is optical flow? Explain Lucas-Kanade method of calculating optical flow. (13)

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SECTION A
(Answer **ANY THREE** questions from this section in Script A)

1. a) Define industrial management. Draw a network of management functions and explain it.　(13)
　 b) "It is necessary to have management knowledge and management skill prior to an industrial　(10)
　　　 engineer". Explain it in the sense of industrial management.
　 c) Assume that you are a production manager in a reputed organization. Explain your managerial　(12)
　　　 roles that are in the organization.

2. a) Define job evaluation. Describe the factor comparison method of job evaluation with suitable　(12)
　　　 example.
　 b) A job is rated in terms of wages of Tk. 800 per day. The standard time set for the job is　(15)
　　　 10 days, 8 hrs/day. Two workers have taken 75 and 85 hours respectively for the completion
　　　 of the job. A bonus of 70% on the time taken will be given only to those who have completed
　　　 the job in the standard time. Calculate the earnings of each individual by Bedaux plan. Here,
　　　 1B stands for 0.8 standard work minute and it includes working time as well as time for rest.
　 c) Differentiate between wages and salaries. Explain Bedaux plan with example.　(08)

3. a) Define the bureaucracy theory school. "A successful organization should react as an organic　(12)
　　　 and open system". To what extent you are agreeing with this opinion. Explain.
　 b) Define group dynamics. Explain Hawthrone experiment regarding human nature and attitude.　(10)
　 c) Differentiate delegation and decentralization. How can delegation be made more effective?　(13)

4. a) Discuss Herzberg's theory of motivation. How does it differ from Maslow's theory? What are　(12)
　　　 its limitations?
　 b) Define upper and lower breakeven point. Why breakeven analysis is called short-run analysis?　(10)
　 c) A cooling water pumping station at the LCRA plan costs $600,000 to construct, and it is　(13)
　　　 projected to have a 25 years life with an estimated salvage value of 15% of the construction
　　　 cost. However, the station will be book depreciated to zero over a recovery period of 30 years.
　　　 Calculate the annual depreciation charge for years 4, 10 and 25 using (i) straight line
　　　 depreciation (ii) DDB depreciation (iii) implied salvage value for DDB.

SECTION B
(Answer **ANY THREE** questions from this section in Script B)

5. a) Define forecast. What advantages as a forecasting tool does experimental smoothing have over　(09)
　　　 moving averages?
　 b) For the following table of data, plot the data on graph and verify if a linear trend relation exists　(13)
　　　 between them. If exists, then develop a line trend equation for the given data. Then use the
　　　 equation to predict the next two values of the series.

Period	Demand
1	44
2	52
3	50
4	54
5	55
6	55
7	60
8	56
9	62

　 c) Write down the elements of a good forecast and briefly describe the steps in the forecasting　(13)
　　　 process.

6. a) Deduce the EOQ model with assumptions. Also, make a comparison between EOQ and EPQ (12) model.

   b) A manufacturing firm uses roughly 3,400 pounds of chemical dye a year. Currently, the firm (13) purchases 300 pounds per order and pays $3 per pound. The supplier has just announced that orders of 1,000 pounds or more will be filled at a price of $2 per pound. The manufacturing firm incurs a cost of $100 each time if submits an order and assigns an annual holding cost of 17 percent of the purchase price per pound.

      i) Determine the order size that will minimize the total cost.

      ii) If the supplier offered the discount at 1,500 pounds instead of 1,000 pounds, what order size would minimize the total cost?

   c) What is lead time? Describe briefly A-B-C approach to inventory control. (10)

7. a) Define MRP. Write short notes on (i) Master schedule (ii) Bill of materials (iii) Inventory (12) records.

   b) A firm that produces wood shutters and bookcases has received two orders for shutters: one (15) for 100 shutters and one for 150 shutters. The 100-unit order is due for delivery at the start of week 4 of the current schedule, and the 150-unit order is due for delivery at the start of 8 week. Each shutter consists of two frames and four slated wood sections. The wood sections are made by the firm, and fabrication takes one week. The frames are ordered and lead time is two weeks. Assembly of the shutters require one week. There is a scheduled receipt of 70 wood sections in week 1 (i.e., at the beginning). Determine the size and timing of planned-order releases necessary to meet delivery requirements under lot-for-lot ordering condition.

   c) Write down the differences between product and process layout. (08)

8. a) Define CAPP. Briefly describe the roles of CAPP in manufacturing. (10)

   b) The following table contains information on the cost to run three jobs on four available (15) machines. Determine an assignment plan that will minimize cost.

		Machine			
		A	B	C	D
	1	12	16	14	10
Job	2	9	8	13	7
	3	15	12	9	11

   c) A group of six jobs is to be processed through a two-machine flow shop. The first operation (10) involves cleaning and the second involves painting. Applying Johnson's rule, determine a sequence that will minimize the total completion time for this group of jobs. Processing times are shown in the following table.

Job	Processing time (hours)	
	Workcenter1	Workcenter2
A	5	5
B	4	3
C	8	9
D	2	7
E	6	8
F	12	15