

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering 4th Year 1st Term Examination, 2021
 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.

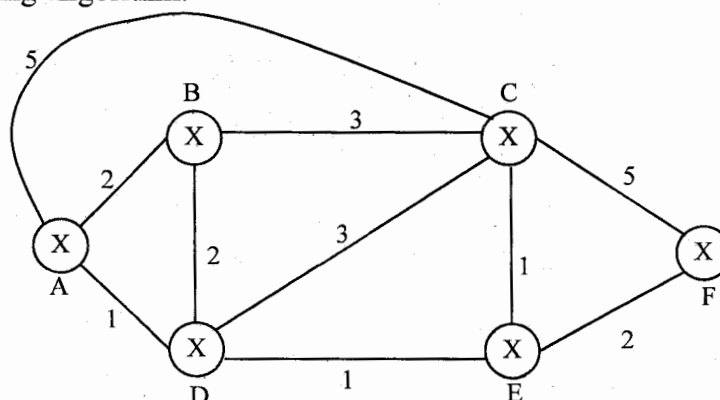
SECTION A

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

1. a) Briefly discuss about client-server architecture. Discuss about the major challenges of P2P architecture. (12)
- b) “Socket is analogous to door” – Justify the statement. What transport service does an app need? (08)
- c) What are the components of cookies? Describe how cookies keep state using database with proper examples. (10)
- d) FTP control connection is “out of band”. Explain. (05)
2. a) Let, host at *abc.poly.edu* wants IP address for *defg.cs.uxyz.edu*. Show, how it is done using recursive queries for various DNS servers. (09)
- b) Explain the necessity of mail access agent in email system. Compare and contrast the functionalities of POP and IMAP. (10)
- c) Consider the following 20-byte header (IPv4). Find the header checksum. Why does IPv4 header checksum cover only data portion? (10)

4	5	0			28
1			0	0	
4	17	0			
10.12.14.5					
12.6.7.9					

- d) How does conditional GET command improve performance of web proxy and local cache mechanism? (06)
3. a) Explain how DHCP works. What are the main benefits of DHCP? (09)
- b) Apply fragmentation on following information for IPv4 datagram. (13)
 - i) Original Datagram: 5000 bytes, Header: 20 bytes.
 - ii) MTU: 1st level 2000 bytes & 2nd level: 800 bytes.
- c) An ISP is granted a block of addresses starting with 190.100.0.0/16. The ISP needs to distribute these addresses to 3 groups of customers: (13)
 - i) 1st group: 52 customers, each needs 128 addresses.
 - ii) 2nd group: 40 customers, each needs 256 addresses.
 - iii) 3rd group: 100 customers, each needs 64 addresses. How many addresses are still unallocated? Note down the network addresses of each group.
4. a) Briefly explain how PAT works. Why is PAT used over NAT? (10)
- b) Determine the routing table/forwarding table at the router B from the following topology using a Link-state Routing Algorithm. (17)



- c) Concisely describe the error reporting messages of ICMP. (08)

SECTION B

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

5. a) Describe the working principle of Ethernet's CSMA/CD protocol with a detail look on exponential back-off algorithm. (10)
- b) Write filtering/forwarding algorithm of a switch. List the actions with corresponding conditions that a switch may perform when it receives a frame. (09)
- c) What is multiprotocol label switching (MPLS)? How does it work? Describe MPLS functionality with a simple example. (12)
- d) Describe silly windows syndrome created by the sender. (04)

6. a) How does TCP handle congestion? Describe with proper state diagram and graph. (15)
- b) Write down the connection establishment and half close in TCP. (10)
- c) How retransmission timeout is calculated in TCP? In which situation Karn's algorithm is applied? (10)

7. a) Briefly explain how Secure Socket Layer (SSL) works on top of TCP and what services it provides. (10)
- b) What is the difference between RDT 2.2 and RDT 3.0? Describe the FSM of RDT 3.0. (12)
- c) Write short notes on (i) Persistent Timer and (ii) Keepalive Timer. (08)
- d) What should be the relation between window sizes and sequence number in case of Selective Repeat? Why do we need the relationship? (05)

8. a) What are the shortcomings of symmetric key cryptography? How are those solved in public key cryptography. (06)
- b) In symmetric key system, how do two entities establish shared secret key over a network? Explain a solution with suitable example. (10)
- c) How does Multiple Access with Collision Avoidance (MACA) solve hidden terminal problem in wireless network? Explain with example. (07)
- d) Suppose, A wants to send a packet to B. If A does not know B's MAC address then how does it determine this MAC address in the following two situations: (12)
 - i) A and B are in the same network.
 - ii) A and B are in the different network.

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 4th Year 1st Term Examination, 2021
Department of Computer Science and Engineering
CSE 4109
Artificial Intelligence

TIME: 3 hours

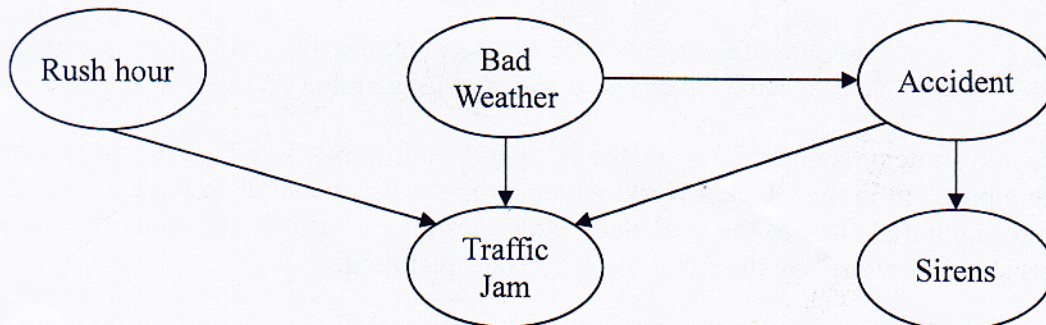
FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
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 artificial intelligence? To what extent are the following computer systems instances of artificial intelligence? Explain. (12)
 - i) Supermarket bar-code scanners.
 - ii) Web search engines.
 - iii) Voice-activated telephone menus.
 - iv) Internet routing algorithms.
- b) Consider a rabbit grazing in a carrot field. What are its sensors, actuators and environment? Discuss how its sensors and actuators are well suited to its environment? (13)
- c) Give a demystified classification of artificial intelligence. "The most subfield in AI focuses on smaller components thought to be necessary for producing intelligent programs" – Justify the statement. (10)
2. a) Explain why problem formulation must follow goal formulation. (08)
- b) What is PEAS? For each of the following activities, give a PEAS description of the task environment and characterize it in terms of the properties of
 - i) Bidding on an item at an auction, and
 - ii) Automated taxi driving.
- c) How does a simple reflex agent differ from a goal based agent? "Learning agent is suitable for dynamic environment" – Justify this statement using an appropriate example. (15)
3. a) What is a fuzzy logic system? Explain. (10)
- b) Explain different operations on fuzzy sets. Use pictorial view for their clarity. (10)
- c) Design a fuzzy logic based washing machine system using fuzzy expert system development methodology. (15)
4. a) Formulate graph coloring problem as a constraint satisfaction problem. Draw the constraint graph for an arbitrary graph. (11)
- b) What is a parse tree in NLP and for what purpose is it used? (05)
- c) Construct a grammar for the following sentence: (08)
"The traveler shot the tiger with the gun" and also draw the syntactic tree.
- d) Derive the joint probability function for the following Bayesian network. (11)



SECTION B

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

5. a) How can you decide whether a system is an intelligent or not? Write down some capabilities of Artificial Intelligent (AI) system? (08)
- b) "The person is a toddler; If the person is a toddler, then the person is a child; If the person is a child and male, then the person is a boy; If the person is an infant, then the person is a child; if the person is a child and female, then the person is a girl; The person is a female;". Then express the above sentences into propositional logic and prove that the person is a girl. (12)

- c) Consider the Wumpus world problem in the following 4x4 grid. The A, W, S, B, G and P in the grid define the facts of Wumpus world. (15)

4	S		B	P
3	W	B S G	P	B
2	S		B	
1	A Start	B	P	B
	1	2	3	4

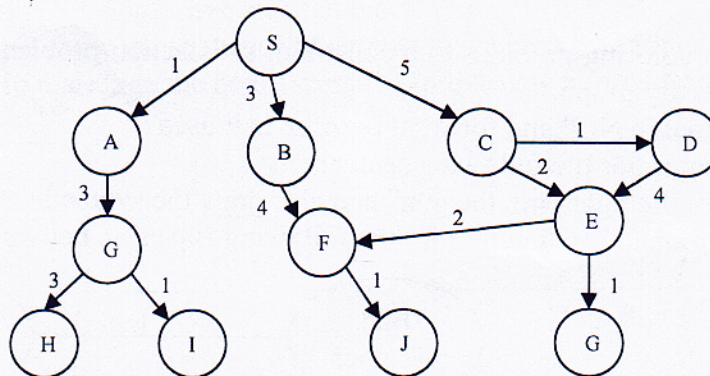
Derive some rules from the Wumpus world problem using the grid and prove that there is a Wumpus ($W_{1,3}$) in the (1, 3) position.

6. a) Write down the limitations of propositional logic. (05)
 b) Transfer the following implicative clause into Conjunctive Normal Form (CNF): (08)
 $(Z \rightarrow Y) \rightarrow (\sim X \rightarrow (W \wedge P))$
 c) Consider the following board of tic-tac-toe game of computer (O) versus human (X) and it's computer's turn to move. Then, how does computer take the better decision to move? Discuss with the heuristic function, the computer should consider. (12)

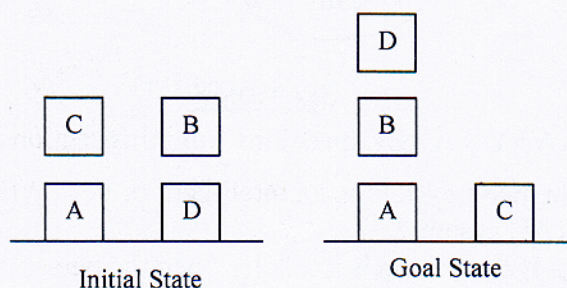
	O	
	X	O
X		

- d) Discuss the pruning conditions in alpha-beta pruning with proper example (10)
7. a) Write down the properties of quantifiers used in First-Order Logic (FOL). (05)
 b) Discuss the common mistakes of universal and existential quantifier of FOL with proper example. (12)
 c) Represent the following sentences into FOL. (18)
 i) Every house is a physical object.
 ii) Some physical objects are houses.
 iii) Every house is owned by somebody.
 iv) Everybody owns a house.
 v) Sue owns a house.
 vi) Peter does not own a house.

8. a) Find the path for destination node $\{J\}$ starting from node $\{S\}$ using uniform cost search strategy of the following graph. (12)



- b) Which search strategy is better between the A^* search and greedy best first search and why? (10)
 c) A planning problem in the Block's world where a robot with one hand wants to rearrange the block from the initial state to the goal state. Now, design the actions and show the sequence of actions should perform by the robot using forward planning. (13)



KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 4th Year 1st Term Examination, 2021
Department of Computer Science and Engineering
CSE 4111
Machine Learning

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 do you mean by “Machine” and “Learning”? What are their individual features? In what prospects both the terms combine in Machine Learning (ML) subject? (07)
- b) “Training appropriate neural network architecture with appropriate training set is necessary to develop an appropriate model for a given task” – Justify the statement for a logic gate function case. (08)
- c) Draw the minimal neural architectures for the following three input (A , B and C) logic gate operations. (12)
 - i) $NN1 = (AB)'C$
 - ii) $NN2 = ABC'$
 - iii) $NN3 = (A + B)'C$
 - iv) $NN4 = (A + B)C'$
- d) Differentiate learning and generalization in the context of machine learning. Which one is more desirable and why? What are the measuring techniques of those? (08)

2. a) Why is a single neuron unable to solve XOR problem? Solve XOR problem with Radial Basis Function (RBF) network considering cluster centers (0, 1) and (1, 0) with appropriate radius of each center. (08)
- b) Write down the roles of activation function in artificial neural network? Compare two different forms of sigmoidal functions through graphical representations of Input vs Output and derivatives. (08)
- c) What is the naming significance of “Back Propagation (BP)” algorithm? What is the effect of learning rate in BP? How momentum parameter speedup training in BP? (07)
- d) What is the goal of neural network ensemble construction? Explain an ensemble method for enough data and an ensemble method for limited data. (12)

3. a) Why non-deterministic operation is preferable over deterministic operation in population-based optimization algorithms? How non-deterministic feature assures in Genetic Algorithm (GA), Particle Swarm Optimization (PSO) and Ant Colony Optimization (ACO)? (12)
- b) Explain velocity and position updates of particles in PSO mentioning corresponding equations in continuous function space. How the terms may transfer to solve Traveling Salesman Problem (TSP)? (09)
- c) Why both exploration and exploitation operations are necessary in an algorithm for better performance? (06)
- d) How individual parameters of PSO velocity update equation influence exploration and exploitation? (08)

4. a) What do you understand by the search terms Global Search, Local Search and Blind Search? Compare GA with a prominent Swarm Intelligence (SI) method on the basis of the search methods. (13)
- b) Explain the working principle of GA with a flowchart. Briefly explain importance of different operators and parameters in GA. (08)
- c) Suppose two TSP solutions are 1 – 2 – 4 – 3 – 6 – 5 and 1 – 5 – 3 – 4 – 2 – 6 where numeric values are city indexes. Generate an offspring from the solutions using Enhanced Edge Recombination algorithm. (08)
- d) Explain the fundamental differences between ACO and PSO to establish interaction among individuals. (06)

SECTION B

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

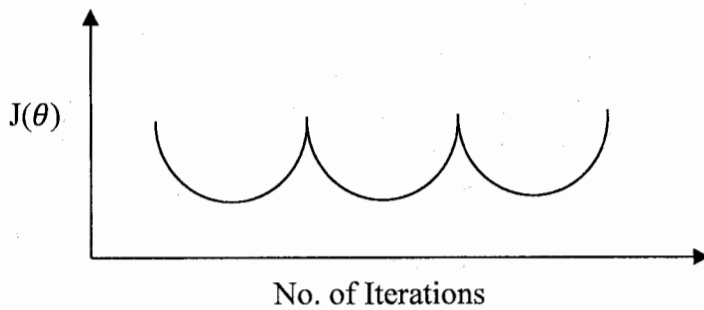
5. a) What is 'K' in the K Nearest Neighbor (KNN) algorithm and why is the odd value of 'K' preferred over even values in the KNN algorithm? (05)
- b) We can easily find K Nearest Neighbors using Euclidean distance and then classify an instance. Then, why do we need K Dimensional tree (K-D Tree) for KNN? (05)
- c) Suppose, a satellite image can be segmented using four categories: water body, grass land, bare land and semi grassy area. Choose a suitable algorithm to segment the image and explain the process. (05)
- d) Consider the following cost function and hypothesis for linear regression. Derive the normal equation, $\theta = (X^T X)^{-1} X^T Y$ to get the values of vector θ . (15)

$$j(\theta) = \frac{1}{2m} \sum_{i=1}^m (h_{\theta}(x^{(i)}) - y^{(i)})^2$$

$$h_{\theta}(x^{(i)}) = \theta_0 + \theta_1 x_1^{(i)} + \dots + \theta_n x_n^{(i)}$$

How do you calculate θ when $X^T X$ is non-invertible?

- e) Consider the following outcome of the cost function of a linear regression model. (05)



Is there any issue with the outcome? Explain the issue and solution (if any).

6. a) The cost function of logistic regression is given below: (15)

$$J(\theta) = -\frac{1}{m} \sum_{i=1}^m \left[y^{(i)} \log(h_{\theta}(x^{(i)})) + (1 - y^{(i)}) \log(1 - h_{\theta}(x^{(i)})) \right]$$

Prove that, $\frac{\partial}{\partial \theta_j} J(\theta) = \frac{1}{m} \sum_{i=1}^m [h_{\theta}(x^{(i)}) - y^{(i)}] x_j^{(i)}$.

- b) Is there any similarity between a logistic regression model and a single neuron of a neural network (with sigmoid activation function)? Explain (if any). (07)
- c) What do you mean by overfitting and underfitting? Write down a way to minimize both the issues. (07)
- d) Suppose, one of your friends is planning to build a Machine Learning (ML) model to predict the diseases of many patients from various symptoms. He wants to sell the product to several hospitals. He has only 400 instances of data from 300 different patients. The dataset has both categorical and continuous features. There are only 5 diseases for prediction. Which ML model would you suggest to your friend and why? (06)

7. a) Consider the following dataset where attribute 'Salary' represents class label. (14)

Department	Age	Status	Salary
Sales	25..30	Junior	Low
Sales	31..35	Senior	Medium
Marketing	31..35	Senior	High
Admin	25..30	Junior	Medium
Admin	31..35	Senior	High
Admin	36..40	Senior	High
Marketing	36..40	Senior	High
Sales	25..30	Junior	Low
Marketing	36..40	Senior	Medium
Marketing	25..30	Junior	Low

Find the root attribute of the Decision Tree (created from the dataset) using Gain Ratio as the attribute selection measure.

b) Consider the following problem. (14)

$$\text{Minimize } f(x, y) = (x - 1)^2 + (y - 3)^2$$

$$\text{Subject to } x + y \leq 2, y \geq x$$

Use the following formula for the minimization problem and find the minimum values for x and y .

$$\text{Lagrangian, } L = f(x) + \sum_{i=1}^p \lambda_i \cdot h_i(x).$$

$$\text{KKT constraints are as follows: } \frac{\partial L}{\partial x_i} = 0, i = 1, 2, \dots, d.$$

$$\lambda_i \geq 0, i = 1, 2, \dots, p.$$

$$h_i(x) \leq 0, i = 1, 2, \dots, p.$$

$$\lambda_i \cdot h_i(x) = 0, i = 1, 2, \dots, p.$$

c) The learning task in Support Vector Machine (SVM) can be formulated as the following constrained optimization problem. (07)

$$\text{Minimize } \mu(W, b)$$

$$\text{Subject to } y_i(W \cdot x_i + b) \geq 1, i = 1, 2, 3, \dots, n.$$

Write down the Lagrangian and KKT constraints for this problem.

8. a) Consider the case of a binary classification with a training data of 6 tuples as shown in the following table. (12)

X_1	X_2	Y	λ_i
0.38	0.48	+	65.52
0.59	0.71	-	65.52
0.82	0.31	-	65.52
0.75	0.90	-	0
0.19	0.59	+	0
0.41	0.35	+	0

The lagrange multipliers λ_i for each training tuple are solved using quadratic programming and the first three tuples are support vectors. Determine W and b to find the Maximum Margin Hyperplane of linear SVM.

b) Briefly explain the curse of dimensionality problem. (06)

c) Consider the following dataset with 2 dimensions. (17)

Dimension 1	Dimension 2
2.5	2.4
2.2	2.9
1.9	3.0
2.7	2.5
2.0	1.6
2.1	1.1
1.0	1.8
1.9	2.7

Using Principal Component Analysis (PCA), reduce the dataset to one dimension. Explain each step with necessary calculations.

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 4th Year 1st Term Examination, 2021
Department of Computer Science and Engineering
CSE 4115

Computer and Network Security

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) Explain the terms: 'Security services', 'Cryptosystem', 'Cryptoanalysis' along with the major goals of security. Also explain a conventional cryptosystem by using a proper diagram. (13)
- b) Specify Shannon characteristics to explain good ciphers along with 'confusion' and 'diffusion'. Using a block diagram depict the symmetric cryptosystem along with the ways of the key distribution. (14)
- c) Discuss the benefits of an asymmetric cryptosystem. For RSA algorithm from $ed \equiv 1 \pmod{\phi(n)}$ show that for a single value of e , there may exist many values of d , where symbols have their usual meanings. (08)

2. a) Define chosen-plaintext attack. Show how RSA algorithm suffers with this attack. (08)
- b) Explain the working procedure of Caesar cipher. How it is an example of substitution ciphers. (07)
- c) Discuss the properties of digital signatures. RSA algorithm can be used to implement product cipher. How? Show it? (10)
- d) Discuss the techniques, pros and cons of block and stream ciphers. What are the trends of maintaining security? Explain them. (10)

3. a) Explain the working procedure of ElGamal encryption algorithm. Why it is said to be a probabilistic encryption algorithm? Explain. (13)
- b) Explain ElGamal digital signature algorithm in detail. Also give a working example of it. (13)
- c) Discuss the major characteristics of cryptographic hash function? Why it is one-way? (09)

4. a) What is firewalls? Discuss the characteristics of various malicious code. (09)
- b) Explain AES algorithm with a block diagram. Establish a comparative study between AES and DES. (14)
- c) Discuss the characteristics of good viruses. (05)
- d) How triple DES is better than DES algorithm? Explain primitive element of Elgamal cryptosystem. (07)

SECTION B

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

5. a) What is segmentation fault? Explain Buffer Overflow attack with proper code and stack diagram. (15)
- b) Show how Integer Overflow attack compromises a program's reliability and security. (15)
- c) Explain document virus using Microsoft's Dynamic Data Exchange (DDE) protocol. (05)

6. a) What are the problems associated with Segmentation and Paging? Explain how Paged Segmentation removes them. (15)
- b) Explain some countermeasures that are used against Buffer Overflow attack. (15)
- c) What is format string? (05)

7. a) Explain attacks on format string vulnerability. (15)
- b) Write short notes on the followings: (12)
- (i) DHCP Spoofing Attack. (ii) Rainbow Table Attack.
- (iii) Polymorphic Viruses. (iv) Dictionary Attack.
- c) What are covert channels? Differentiate between errors and faults. (08)

8. a) How does viruses attach with original programs? (10)
- b) Explain the working principle of Elliptic Curve Cryptography (ECC). What are the reasons to prefer ECC over RSA? (10)
- c) What is salt? How does it help against Rainbow Table attack and make password hashing more secure? (10)
- d) Explain SQL injection and web bug. (05)

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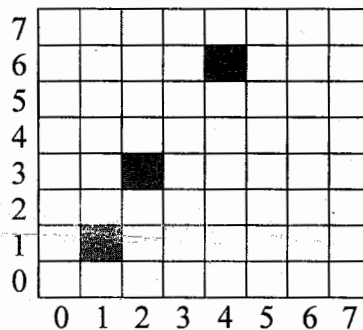
SECTION A

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

1. a) Derive the equation for Laplacian of a 2D Gaussian function $G = A \cdot e^{-\frac{x^2+y^2}{2\sigma^2}}$. Sample the LoG function to get a convolution kernel with $A = \sigma^2 = 1$. Scale the kernel values to the nearest integer. Use appropriate kernel size to support the function. (17)
 b) Determine the 4-point 1D DFT matrix. Use it to find the 2D DFT of the following image. (13)

$$\begin{bmatrix} 1 & 0 & -1 & 1 \\ 0 & 1 & 1 & -1 \\ -1 & 2 & 1 & 0 \\ 2 & -1 & 1 & 1 \end{bmatrix}$$

- c) Explain an implementation idea for hysteresis thresholding used in Canny edge detection method. (05)
 2. a) Use Hough line transformation for the following edge image to detect the line. Use an appropriate accumulator array with $d\theta = 30^\circ$, $d\rho = 1$. θ spans from 0° to 180° , ρ spans from -4 to 8 . Show vote count in the array and determine the line equation. (18)



Edge Image

- b) Use weighted median filter to restore the following 4-bit image. Show results only for the middle row, use the given weight matrix. (10)

4	3	1	2	6
2	7	3	5	0
9	15	6	0	3
12	4	10	8	7
11	6	2	7	6

Image

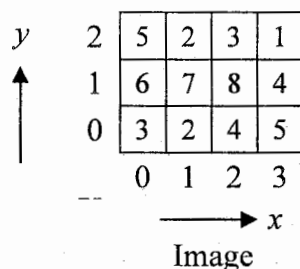
1	2	1
2	3	2
1	2	1

Weight Matrix

- c) If $x_0(t) = at/T$ and $y_0(t) = bt/T$ denotes the time varying components of motion in x and y directions, then show that uniform linear motion between image and the sensor during image acquisition can be modeled by the following degradation function. Here, symbols have their usual meanings. (07)

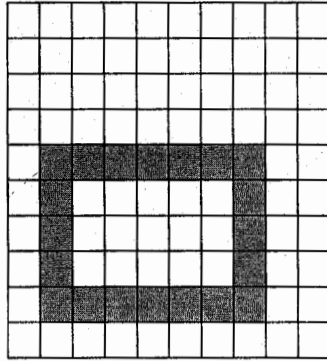
$$H(u, v) = \frac{T}{\pi(ua + vb)} \sin[\pi(ua + vb)] e^{-j\pi(ua+vb)}$$

3. a) What is the importance of image warping in computer vision? Warp the following image with the given transformation matrix, T . Use backward mapping and bilinear interpolation during the process. Mention the size of the warped image and determine the intensity only at pixel (2, 3). (16)



$$T = \begin{bmatrix} 0.43 & -0.25 \\ 1 & 1.73 \end{bmatrix}$$

- b) State the maximum entropy based image thresholding algorithm with necessary mathematical derivation. (16)
- c) Draw signature for the following binary image. (03)



Binary Image

4. a) State the pros and cons of histogram based texture descriptors with proper example. (08)
- b) For the following image, determine the Gray Level Co-occurrence Matrix (GLCM) with displacement $d = [1, 1]$. And thereby, measure the uniformity and homogeneity of the matrix. (17)

	→ x				
	0	1	2	4	1
	1	4	0	2	3
	1	1	3	2	0
↓ y	3	2	0	3	1
	4	3	2	4	2

- c) Derive the equations used by Lucas-Kanade to estimate motion field from a video sequence. (10)

SECTION B

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

5. a) Illustrate the 'Golomb Coding' technique to encode non-negative integer in data compression. (20)
Calculate the Golomb Codes for the following representation:
- $G_{11}(37)$
 - $G_{12}(-15)$
 - $G_{exp}^2(13)$
- b) Explain false contouring effect in digital image using the concept of sampling and quantization. (08)
- c) What measure can be taken to improve the brightness discrimination provided that a weber ratio is given? (07)
6. a) Explain the application of pseudo-color processing for highlighting explosives contained in a luggage using proper transformation functions. (12)
- b) Write down the conditions for ~~pre~~ color-component processing and vector-based processing to be equivalent with proper example. *per* (08)
- c) Derive the CMY intensity mapping function $s'_i = kr'_i + (1 - k)$ using its RGB counterpart where $0 < k < 1$. (10)
- d) Prove, erosion and dilation are duals of each other with respect to set complementation and reflection. (05)
7. a) Write down the technique for filtering the hue component in HSI color space provided that the saturation is low and hue value is quite unstable. (12)
- b) 'It is possible to save a digital image with roughly 50% less storage than the original image using bit plane slicing.' - Justify the statement. (08)
- c) Illustrate the objective fidelity criteria for quantifying the nature of loss in image compression. (10)
- d) Mention the drawbacks of 'Convex Hull' algorithm. (05)
8. a) Illustrate the automated hole filling algorithm for binary image based on morphological reconstruction. (12)
- b) Suppose, you are asked to enhance dark areas of an image that may contain hidden features while leaving the light area as unchanged as possible. Now, apply 'local enhancement by contrast manipulation' to solve this problem using histogram statistics. (15)
- c) If histogram equalization is applied twice to an image, that is, if it is applied to the result of histogram equalization, will the second application change the image or not? Explain why or why not? (08)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering 4th Year 1st Term Examination, 2021
 Department of Computer Science and Engineering
 IEM 4127
 Industrial Management

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.
 iii) Necessary chart: Standard Normal Distribution chart will be provided.

SECTION A

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

1. a) What is Management? Draw a network of management functions and explain its functions. (13)
 b) Assume that, you want to promote as “Manager” at ‘R-Pac International Limited’. To achieve this role, what managerial skills you need to possess? (12)
 c) Explain how management and administration are different from each other? (10)
2. a) Define the contingency theory school. “A successful organization should react as an organic and open system.” – Do you agree with this statement? Give logical explanation. (13)
 b) Discuss functional, line and line-staff organization briefly. (12)
 c) What is delegation? Differentiate between flat structure and tall structure. (10)
3. a) Discuss Herzberg’s theory of motivation. How does it differ from Maslow’s theory? What are its limitation? (12)
 b) Define upper and lower breakeven point. Why breakeven analysis is called shoot run analysis? (10)
 c) Shajal is the top businessman in the field of food industry. Pranto is the emerging competitor of Shajal. Both Shajal’s and Pranto’s company workers are rated in terms of wages 30 paisa per minute. The standard time for the workers is 4.0 hours. Shajal’s company workers takes 2.5 hours to complete the job whereas Pranto’s company workers take 2.0 hours to complete the job. Calculate the earnings of each company’s workers according to Halsey plan. (13)
4. a) What is committee? Mention the condition for effective functioning of committee. (09)
 b) Handheld fiber optic meters are useful measuring temperature. The fixed costs associated with manufacturing are, \$800,000 per year. If revenue is \$2950 and its variable costs is \$2075, then
 i) How many units must be sold for breakeven in each year?
 ii) What will be the profit for sales of 3000 units per year? (13)
 c) A depreciable construction truck has a first cost of \$20,000 with a \$4000 salvage value after 5 years. Find the (i) Depreciation and (ii) Book value after 3 years using SL and DDB depreciation. (13)

SECTION B

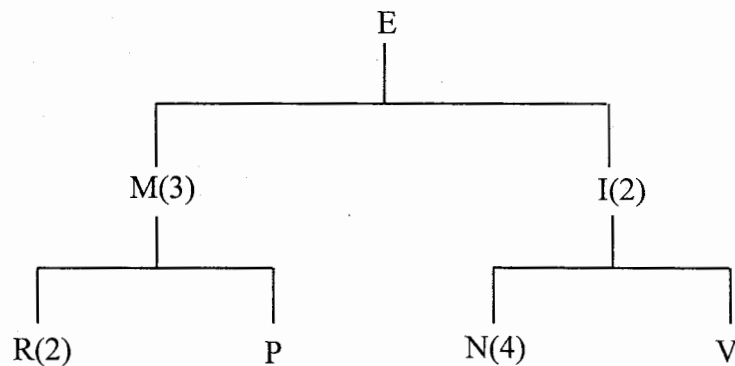
(Answer **ANY THREE** questions from this section in Script B)

5. a) Define forecasting. What is the significance of exponential smoothing technique? Why is it preferable than moving average? (10)
 b) An analyst must decide between two different forecasting techniques for weekly sales of roller blades: a linear trend equation and the naïve approach. The linear trend equation is $F_t = 124 + 2t$, and it was developed using data from periods 1 through 10. Based on data for periods 11 through 20 as shown in the following table, which of these two methods is better? (17)

t	Units Sold	t	Units Sold
11	147	16	152
12	148	17	155
13	151	18	157
14	145	19	160
15	155	20	165

- c) Write down the three forecasting techniques and briefly explain them. (08)

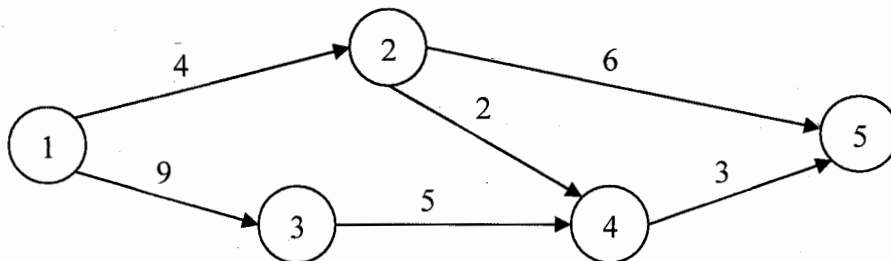
6. a) Briefly explain about the A-B-C approach to inventory control. (10)
- b) The Dine Corporation is both producer and a user of brass couplings. The firm operates 220 days a year and uses the couplings at a steady rate of 50 per day. Couplings can be produced at a rate of 200 per day. Annual storage cost is \$2 per coupling and machine setup cost is \$70 per run. Annual demand is 11,000 units. (17)
- Determine economic run quantity.
 - Approximately how many runs per year will there be?
 - Compute the maximum inventory level.
- c) Differentiate between level capacity strategy and chase demand strategy of aggregate planning. (08)
7. a) The product structure tree for end item E is given below. The manager wants to know the material requirements for part R that will be needed to complete 120 units of E by the start of week 5. Lead time for E is one week, one week for M and I, and two weeks for R, P, N and V. There is a scheduled receipt of 60 units of M at the start of week 2 and 100 units of R at the start of week 1. Lot for lot ordering is used. (17)



- b) Processing times and due dates for six jobs waiting to be processed at a work center are given in the following table. Determine the sequence of the jobs, average flow time, average tardiness and average number of jobs for each of these rules: (18)
- FCFS, (ii) SPT and (iii) CR.

Job	Processing Time (days)	Due Date (days)
A	2	7
B	8	16
C	4	4
D	10	17
E	5	15
F	12	18

8. a) Write down the differences between product and process layout. (05)
- b) Using computing algorithm, determine the slack times for the following AoA diagram. Identify the activities that are on the critical path. (15)



- c) Develop an assignment plan that will minimize processing costs, given the information shown and compute the total cost. (15)

JOB	MACHINE		
	A	B	C
1	12	08	11
2	13	10	08
3	14	09	14
4	10	07	12