Q.P. Code :08274

[Time: 3 Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B:
1. **Question No.1 is compulsory.**
2. **Attempt any three questions from remaining**
3. **All questions carry equal marks**
4. **Assume suitable data wherever necessary.**

Q.1 Answer any four of the following:

a) Differentiate between 8 connectivity and m connectivity. 05

b) Explain Dilation and Erosion in brief. 05

c) Justify, "Huffman coding is lossless compression technique". 05

d) Justify, "Butterworth low pass filter is preferred to ideal low pass filter". 05

e) Explain the importance of Isopreference curves. 05

Q.2 a) Define Image Enhancement. Explain the following enhancement operations and draw the graphs of transformation function: 10

1. Dynamic range compression
2. Gray level slicing

10

b) The grey level distribution of an image is shown in table below. Perform Histogram equalization and plot histograms of original and equalized images. Explain need of histogram equalization.

Gray Level	0	1	2	3	4	5	6	7
Frequency of occurrence	100	250	100	300	150	0	0	0

Q.3 a) Explain the method of edge linking using Hough transform. 10

b) What is image segmentation? Explain with example segmentation based on similarities. 10

Q.4 a) Explain Discrete Wavelet Transform and its application in image processing. 10

10

b) Apply DFT algorithm to the rows and columns of the image segment shown and obtain 2D DFT. Show the Butterfly diagram.

6	1	3	2
1	3	2	3
1	6	4	1
1	2	1	1

Q.5 a) Consider an 8 pixel line of grey scale data {10, 11, 15, 13, 15, 57, 54, 51} which has been uniformly quantized with 6 bit accuracy. Construct its 3 bit IGS code. Compute the rms error for the decoded IGS code. 10

b) What are different types of data redundancies found in a digital image? Explain in detail. 10

Q.6 Write short notes on any three of the following:- 20

a) Hit or Miss transformation

b) Chain codes

c) Image Sampling and Quantization

d) Homomorphic filtering

Q. P. Code: 23732

Total Marks: 80 **Duration:3 Hrs**

N.B. 1) Question no. 1 is compulsory
2) Attempt any THREE questions out of the remaining FIVE questions.
3) Assume suitable data wherever necessary.
4) Figures to the right indicate Full marks.

Q. No.			**Marks**
Q.1		Attempt any FOUR questions out of the following questions.	
	a)	How many hosts per network in each class of IP address can exist? Show with example.	[5 Marks]
	b)	The Selective repeat ARQ is the most efficient protocol, explain.	[5 Marks]
	c)	Compare inband signaling and outband signaling.	[5 Marks]
	d)	What is the difference between network layer delivery & transport layer delivery?	[5 Marks]
	e)	Compare the peer to peer network & client-server network.	[5 Marks]
Q.2	a)	Explain different ARQ techniques.	[10 Marks]
	b)	Explain various transmission media in brief.	[10 Marks]
Q.3	a)	Explain Berkeley API.	[10 Marks]
	b)	Explain CSMA/CD & its use. What part of 802 Project uses CSMA/CD.	[10 Marks]
Q.4	a)	Draw the OSI layer architecture. Explain the function of each layer and show the path of actual & virtual communication between the layers.	[10 Marks]
	b)	Compare the following: i)TCP & UDP ii) Router & Switch	[10 Marks]
Q.5	a)	Draw a three-stage space division switch for N=20, n=5 & k=2and estimate the number of cross point required. If the above switch is to be made non-blocking, derive an expression for the condition to be satisfied, also calculate the minimum cross point required for non-blocking.	[10 Marks]
	b)	What is DSL technology? Explain various DSL technologies & compare them.	[10 Marks]
Q.6	a)	With reference to HDLC protocol, explain the following; i)HDLC frame format ii)Data transfer modes iii)Different HDLC frames iv)Importance of P/F bit v)Balanced & Unbalanced configurations	[10 Marks]
	b)	Write short note on- i)FDDI ii)FTP	[10 Marks]

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Time: 3 Hours **Max Marks: 80**

N.B. 1*) Question No.1 is compulsory*
2) Solve any three questions from the remaining questions.
3) Assume suitable data if necessary.

Q.1.	Solve *any four* of the following	
(a)	What are the pros and cons of ion implantation vs diffusion?	**5**
(b)	Explain the difference between Dry Etching and Wet Etching	**5**
(c)	Explain High K and Low K dielectrics with application of each.	**5**
(d)	Explain difference between SOI Finfet and Bulk Finfet	**5**
(e)	Describe the SIMOX Method for fabrication of SOI	**5**
Q.2 (a)	Explain Czochralski method for silicon Crystal growth. What are its advantages?	**10**
Q.2(b)	Explain Interstitial and Substitutional diffusion process with example	**5**
Q.2(c)	Explain predeposition and drive in step in diffusion process	**5**
Q3.(a)	Explain the difference Between Positive Photo resist and Negative Photo resist.	**5**
Q.3(b)	Differentiate between Schottky contacts and Ohmic contacts	**5**
Q3 (c)	What is the significance of Design Rules? Draw layout for two input CMOS NOR gate using lambda (λ) based design rule.	**10**
Q.4(a)	What is LOCOS? Why it is required in CMOS Process. Explain technology solution for avoiding problems in LOCOS.	**10**
Q.4(b)	Develop the equations to describe the oxidation process (Deal-Grove Model).	**10**
Q.5(a)	Explain the fabrication Process steps along with vertical cross-sectional view for CMOS Inverter using N-well Process	**10**
Q.5(b)	With the help of a neat diagram describe Hayness-Schokly experiment for measurement of Drift Mobility of n-type semiconductor	**10**
Q.6	Write short notes on *any four* of the following. (a) The steps in Standard RCA cycle during wafer cleaning (b) Fabrication of MESFET (c) Electronics package reliability (d) Multigate device structures (e) Types of Thin Film Deposition	**20**

Q.P. Code: 26682

Duration 3 Hours **Maximum marks 80**

1) Question 1 is compulsory.
2) Solve any three from the remaining five questions.
3) Assume suitable data if necessary.
4) Figures to the right indicate full marks.

Q.1. Attempt any **four** from the following questions. 20

a Differentiate between feed forward and recurrent artificial neural networks.

b What is the importance of bias in an artificial neural network?

c Explain the delta rule of learning with an example.

d Explain Max-membership principle of defuzzification..

e State any four learning rules.

Q.2.a Discuss the learning factors involved in back propagation network. 10

b Apply Perceptron learning rule to a network presented with the following training vectors: 10

$\mathbf{X_1}$= [1 -2 0 -1]^t ; $\mathbf{X_2}$=[0 1.5 -0.5 -1]^t ; $\mathbf{X_3}$=[-1 1 0.5 -1]^t

The learning constant, c=0.1 and the desired responses for $\mathbf{X_1}$, $\mathbf{X_2}$ and $\mathbf{X_3}$ are d1= -1, d2= -1 and d3=1 respectively. Assume the initial weight vector to be $\mathbf{W_1}$= [1 -1 0 0.5]^t and obtain the updated weight vector after one epoch.

Q.3.a Construct an autoassociative network to store the vectors X1=[1 1 1 1 1], X2=[1 -1 -1 1 -1], X3=[-1 1 -1 -1 -1]. Find the weight matrix with no self connection and calculate the energy of the stored patterns. Using discrete Hopfield network test the pattern S=[1 1 1 -1 1]. 10

b. Explain in detail Adaptive Resonance Theory networks. 10

Q.4.a With a neat architecture, explain the training algorithm of Kohonen self-organizing feature maps. 10

b. With a neat architecture, explain the training algorithm of Adaline network. 10

Q.5 a Two fuzzy sets are defined as: 10

$$\underset{\sim}{A} = \left\{\frac{0.4}{1} + \frac{0.5}{2} + \frac{0.45}{3} + \frac{0.6}{4} + \frac{0.8}{5}\right\}$$

$$\underset{\sim}{B} = \left\{\frac{0.5}{1} + \frac{0.5}{2} + \frac{0.2}{3} + \frac{0.5}{4} + \frac{0.75}{5}\right\}$$

Perform union, intersection, difference and complement over these fuzzy sets.

b With the help of a block diagram, explain the working of a fuzzy logic controller. 10

Q.6 Write short notes on any **four**: 20

a) McCulloch-Pitts Neuron
b) Perceptron convergence theorem
c) Simulated annealing neural network
d) Radial Basis Function Networks
e) Bidirectional Associative Memory

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(3 Hours) [Total Marks: 80]

N. B.: (1) Question No. 1 is compulsory.
(2) Attempt any three questions from remaining five questions.
(3) Assume suitable data if necessary.
(4) Figures to the right indicate full marks.

1. Attempt **any four** questions: **20**
   (a) Explain block diagram of DC motor control. Name any four strategies for DC motor speed control.
   (b) Why only IGBT/MOSFET are preferred over thyristor in an inverter? Justify.
   (c) Draw torque-speed characteristics of three-phase induction motor during plugging, motoring and generating modes.
   (d) With help of neat block diagram explain the working of SMPS.
   (e) Give the significance of slip in AC motors.

2. (a) Explain the operation of AC induction motor at point A, B, and C in the following figure. Which operating point is most suitable? Justify. **10**

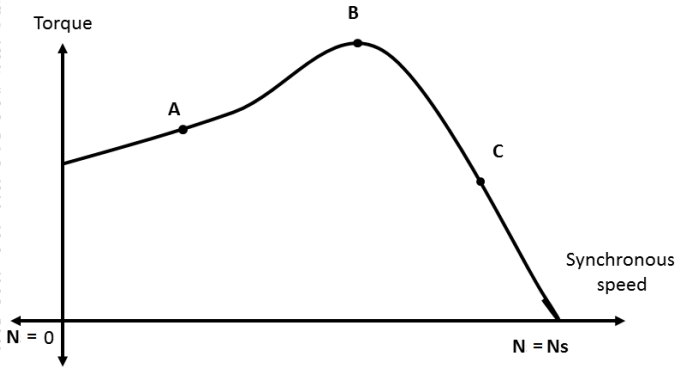

Fig. Q-2(a)

   (b) Explain the working principle of UPS. State their classification. Briefly discuss each type in detail. **10**

3. (a) Explain variable frequency control method of induction motor for two different working modes. **10**
   (b) Explain state vector sequence and switching used in SVM. State advantages of SVM. Draw state vector sequence diagram for sector 1. **10**

[TURN OVER]

4. (a) Derive expression for output voltage of single phase fully controlled rectifier in the presence of source inductance. **10**

   (b) A separately excited DC motor with ratings 200V, 1000 rpm, 50 Amperes and Ra = 0.2Ω is driven using full converter fed with 230 V, 50 Hz, single-phase supply. Determine firing angle of the converter if motor speed is 500 rpm at half the rated torque. Assume field winding is fed with rated voltage. **10**

5. (a) Derive and explain the average state space model of buck converter. Use this state space model to derive equation for output voltage of buck converter at equilibrium condition (dv/dt = 0). **10**

   (b) Explain in detail the working principle of buck-boost converter with help of neat diagram and waveform. Justify why the output is inverted. **10**

6. Write short notes on **(any three)** **20**

   (a) Battery charging system.

   (b) PID control for DC to DC converter.

   (c) V/F control.

   (d) Harmonic reduction in inverters.

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