Q. P. Code: 36419

Time: 3 hours **Total Marks: 80**

Note: 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.

Q.1) Answer the following questions.

a) Compare the features of cortex R, cortex A and cortex M series. 5M

b) Zig –Bee in wireless sensor networks 5M

c) EDLC 5M

d) uCOS-ii functions 5M

Q.2) a) Explain briefly register structure of Cortex M3 architecture along with the function of various special registers. 10M

b) Define FSM. Explain and draw FSM for G+ 2 elevator. 10M

Q.3) a) Design automatic chocolate vending machine. Give the proper details for this, 10M

i. FSM which describes the functioning of the system
ii. Hardware and software block diagram
iii. List of components with justification
iv. Design challenges and suggest solutions

b) Distinguish between Cortex M3 and M4 architecture and explain briefly the interrupt structure of M3 architecture. 10M

Q.4) a) What is an inter process communication? Explain the various IPCs used in RTOs. 10M

b) Three periodic processes scheduled using EDF, will processes meet the deadlines? 10M

Process	Execution Time = e_i	Period = p_i
P1	1	10
P2	2	4
P3	4	12

Q.5) a) Give the comparison details between black box and white box testing. 10M

b) What are the different data types? What is shared data problem? Explain the solutions to avoid shared data problem. 10M

Q.6) a) Explain various design metrics. Explain the various optimization challenges for embedded system. 10M

b) Write short note on 10M

i. CPLD
ii. FPGA

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Time: 3 Hours **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.

1		Solve **any four** of the following	
	(a)	State how MGS and EGS silicon are fabricated from sand.	**5**
	(b)	Explain the need of isolation techniques in MOSFET fabrication.	**5**
	(c)	Briefly explain four probe method for resistivity measurement.	**5**
	(d)	What is FinFET technology?	**5**
	(e)	Explain the types of Ion Implantation methods.	**5**
2	(a)	Explain law of oxidation. Explain thermal oxidation method and state it's advantages.	**10**
	(b)	Describe with neat diagram Hayness-Schokly experiment for measurement of drift mobility of n type semiconductor.	**10**
3	(a)	Explain NMOS fabrication process steps along with cross sectional diagrams.	**10**
	(b)	State the need of Epitaxial layer. Explain molecular beam epitaxy with diagram.	**10**
4	(a)	Differentiate diffusion and Ion Implantation techniques in all aspects.	**10**
	(b)	State need of λ (lambda) based design rules and draw layout of 2 input CMOS NAND gate using lambda-based design rule.	**10**
5	(a)	Compare evaporation and sputtering methods for metal deposition.	**10**
	(b)	Explain electron beam lithography in detail and state it's advantages.	**10**
6		Write short note on any **four**	
	(a)	Oxide layer patterning method	**5**
	(b)	Fabrication of MESFET	**5**
	(c)	Advantages of Nanowire Transistors	**5**
	(d)	SOI Technology	**5**
	(e)	Diffusion Mechanisms	**5**

(3 Hours) **[Total Marks: 80]**

N.B.: (1) Question No. 1 is compulsory.
(2) Solve any three questions from remaining five questions.
(3) Draw neat diagrams and assume suitable data wherever necessary. Justify your assumptions.

1. Attempt any **four**: **20**
   (a) What do you mean by multiple access? Compare between CSMA/CD and CSMA/CA.
   (b) Compare between circuit switching and packet switching.
   (c) What are the different type of network addresses ? Explain each with an example.
   (d) Explain xDSL with a neat diagram.
   (e) Compare IPv4 and IPv6.

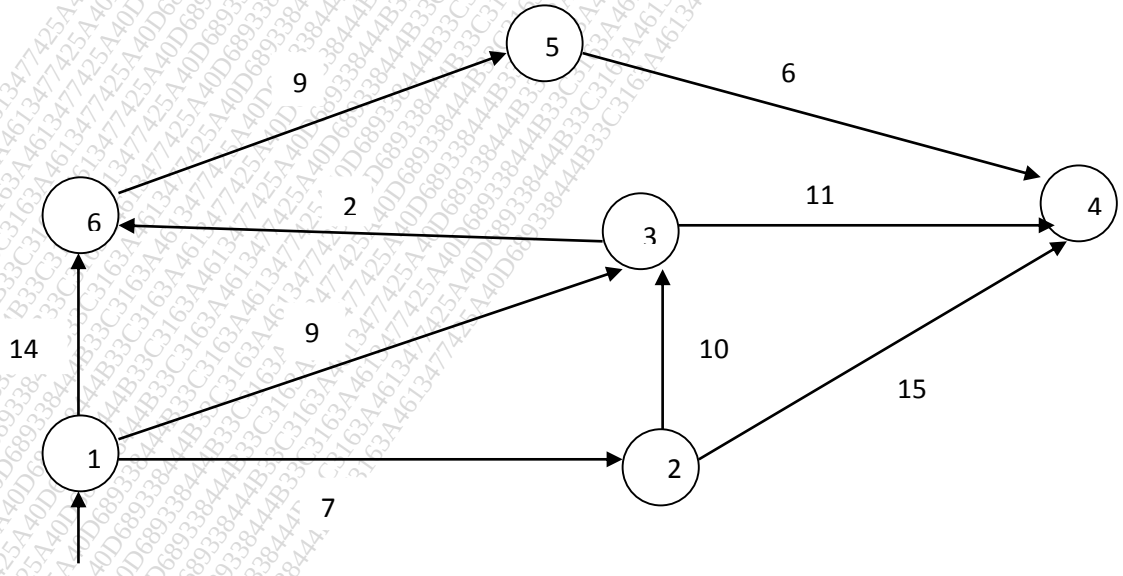
2. (a) Describe in detail physical transmission media for computer communication networks. **10**
   (b) Explain ISO-OSI reference model with a neat diagram. **10**

3. (a) Explain with neat diagram the connection establishment and connection termination in TCP using Three way Handshaking **10**
   (b) Explain IPv6 datagram format with a neat diagram. Also explain transition from IPv4 to IPv6 **10**

4. (a) What are the conditions to be satisfied by a good CRC generator polynomial? **10**
   For P= Predetermined divisor= 110101 (LSB) and
   D= K bit block of data= 1010001101 (LSB). Find the CRC.

   (b) Explain different types of ARQ techniques . Compare their merits and demerits **12**

5. (a) Apply Dijkstra's and Bellman Ford Algorithm to the given network and find the least cost path between the source node 1 to all other nodes: **10**



6. (a) Explain LAN protocol architecture with IEEE 802 reference. Sketch the general MAC frame and LLC PDU structure. Explain the functions of different fields. **10**
   (b) Draw HDLC frame format. Explain each frame in detail. Also explain data transparency and Data transfer modes in HDLC **10**

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(3 hours) **Total Marks: 80**

N.B.: **(1) Question No. 1 is compulsory.**
(2) Solve any three questions from remaining five questions.
(3) Draw neat diagrams and assume suitable data wherever necessary. Justify your assumptions.

1. (a). Explain k means algorithm. **5**
(b) Explain the different types of activation functions. **5**
(c) Impement Mc-culloch Pitts model for OR function. **5**
(d) Model the following as fuzzy set using suitable membership function. "Number close to 5" **5**

2. (a) Design the fuzzy controller to control the feed amount of the coagulant for the water purification plant. Raw water is purified by injecting chemicals at rate related to water quantity. Aluminium sulphate or PAC (polymerized aluminium chloride) is used as coagulant. Aluminium sulphate is less expensive than PAC but is not effective in low temperature water. Assume inputs water temperature (cold, normal, hot) and grade of water (low, medium, high), output variable amount of coagulant(small, medium and large) . Derive the rule for control action and defuzzification. The design should be supported by figure whenever necessary. Clearly indicate that if water temperature is low and grade of water quality is low then PAC is used in large amount. **12**
(b) Explain the concept of linear separability with suitable example. **8**

3. (a) Explain Hebbian learning rule with the help of an example. . **10**
(b) Use perceptron training rule for implementing AND function for bipolar inputs and target(Repeat for two EPOCHS) **10**

4. (a) Explain Error Back Propagation algorithm with a neat flow chart. **10**
(b) Write a short note on Kohonen self organizing maps. **10**

5. (a) Explain any five defuzzification methods **10**
(b) Explain the method of solving EX-OR problem using RBF and MLP **10**

6. (a) If the two fuzzy sets are given as- **10**

$$A=\left\{\frac{1}{2}+\frac{0.5}{3}+\frac{0.6}{4}+\frac{0.2}{5}+\frac{0.6}{6}\right\}$$

$$B=\left\{\frac{0.5}{2}+\frac{0.8}{3}+\frac{0.4}{4}+\frac{0.7}{5}+\frac{0.3}{6}\right\}$$

Find the complement, union, intersection, difference and De-Morgan's law

(b) Draw and explain the architecture of Auto associative neural network. **10**

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(3 Hours) **[Total Marks:80]**

NB.

(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) Why DCT is preferred for image compression? **(5)**
b) Can two different images have the same histogram? Justify. **(5)**
c) What do you mean by aliasing in image sampling? **(5)**
d) Explain any one color model to represent an image. **(5)**
e) Why is the sum of coefficients of a high pass filter mask zero? **(5)**

Q.2 a) The histogram of a digital image with 3 bits per pixel is given below: **(10)**

Grey Level	0	1	2	3	4	5	6	7
Number of pixels	70	100	40	60	0	80	10	40

Perform histogram equalization and plot the histogram of the original and equalized image.

b) Explain the following image enhancement techniques in spatial domain with the help of transformation graphs. **(10)**
i) Contrast stretching ii) Grey level slicing

Q.3 a) What is image segmentation? Explain with example Region based segmentation. **(10)**
b) With the help of suitable examples ,explain the following morphological operations: **(10)**
i)Dilation ii) Erosion

Q.4 a) Check whether the DFT matrix is unitary or not and calculate the 2D-DFT of the given image segment using matrix multiplication method. **(10)**

0	1	2	1
1	2	3	2
2	3	4	3
1	2	3	2

b) Explain Discrete Wavelet Transform and its application in image processing. **(10)**

Q.5 a) Explain in detail Predictive coding technique. **(10)**
b) Explain Homomorphic filtering with the help of neat block diagram. **(10)**

Q.6 Write short notes on any **four** of the following **(20)**

a) Fourier Descriptors
b) Data redundancies in digital image.
c) Bit plane Slicing
d) Image file formats.
e) Hit or Miss Transformation

(3 Hours) **Total Marks: 80**

N. B. 1**)** Question No. 1 is compulsory.
2) Attempt any three questions out of the remaining five questions.
3) Figures to the right indicate full marks.
4) Assume suitable data wherever required but justify the same.

Q 1. Attempt any **Four**: - **20**

a) Explain the effect of source inductance on Single phase full controlled bridge rectifier.

b) State advantages of PWM Method for voltage source inverters.

c) Explain significance of slip in ac motors with suitable example.

d) Explain regenerative braking of DC motor

e) State different factors for selection of battery in UPS systems.

Q 2. a) Explain the speed control of separately excited dc motor by single phase full converter for continuous motor current. Also draw associated voltage and current waveforms. **10**

b) Explain the principle of Induction heating. State advantages, disadvantages and applications. **10**

Q 3. a) Derive and explain the average state space model of boost converter. **10**

b) Explain variable frequency control method of induction motor for two different working modes. **10**

Q 4 a) Explain state vector sequence and switching used in SVM. State advantages of SVM **10**

b) Derive an expression for average output voltage of a three phase full converter with R load by considering the effect of source inductance. **10**

Q 5 a) Explain the isolated fly back converter in continuous mode. State advantages and disadvantages. **10**

b) Explain rotor resistance control Scheme using chopper in detail. **10**

Q 6. Write Short Notes on-[Any Four] **20**

i) PID control in dc to dc converter

ii) Torque speed characteristic of IM

iii) Soft start soft stop operation of dc motor

iv) SMPS and UPS

v) Harmonic reduction techniques.
