(Duration: 3 Hrs) **[Total Marks: 80]**

N.B. 1) Question no. 1 is compulsory
2) Attempt any THREE questions from 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)	In Go-Back-N ARQ, the size of the send window must be less than 2^m. Justify.	[5 Marks]
	b)	Coaxial cable is much less susceptible to interference & cross talk than twisted pair. Why?	[5 Marks]
	c)	Define the type of the following destination addresses; i) 4A:30:10:21:10:1A ii) FF:FF:FF:FF:FF:FF iii) 47:20:1B:2F:08:EE	[5 Marks]
	d)	What is the difference between congestion control & flow control?	[5 Marks]
	e)	What are the propagation time and transmission time for 2.5kbyte message (an e-mail) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at $2.4X10^8$ m/s. Comment on the result.	[5 Marks]
Q.2	a)	What is DSL technology? Explain various DSL technologies & compare them.	[10 Marks]
	b)	Draw the OSI layer architecture. Explain the function of each layer and show the path of actual & virtual communication between the layers.	[10 Marks]
Q.3	a)	Explain CSMA/CD & its use. What part of 802 Project uses CSMA/CD?	[10 Marks]
	b)	Identify class of following IP addresses: i)200.58.20.165 ii) 128.167.23.20 Also perform CIDR Aggregation of following; i)200.96.87.0 /22 ii)128.56.24.0 /22	[10 Marks]
Q.4	a)	Explain Following protocols with an example: a) OSPF b) BGP	[10 Marks]
	b)	Compare the following: i)TCP & UDP ii) SMTP & HTTP	[10 Marks]
Q.5	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)	Explain the following network connecting devices- i) Switch ii)Router iii)Gateway iv)Bridge v)Hub	[10 Marks]
Q.6		Write short note on- [Any Four] i) Data flow and Data communication components ii) Design Issues for the layers iii) RIP iv) DNS v) FDDI	[20 Marks]

----------**********----------

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

1. **Question No. 1 is compulsory.**
2. **Out of remaining questions, attempt any three questions.**
3. **Assume suitable additional data if required.**
4. **Figures in brackets on the right hand side indicate full marks.**

Q.1. (A) Write a short note on TRAPATT. (05)

(B) Write a short note on high electron mobility transistors. (05)

(C) Match a load impedance Z_L=60-j80 to a 50 Ω line using a double stub tuner. The stubs are open circuited and are spaced λ/8 apart. The match frequency is 2 GHz. (10)

Q.2. (A) With a neat functional diagram explain the working principle of Cylindrical Magnetron. (10)

(B) Derive equation for phase velocity, cutoff frequency, cutoff wavelength and field equations for rectangular waveguide. (10)

Q.3. (A) Explain any one bio-medical application using microwave. (10)

(B) Explain the working of a negative resistance parametric amplifier. (10)

Q.4. (A) What is the importance of beam coupling coefficient? Derive the equation of velocity modulation in klystron. (10)

(B) Given the circuit shown in Fig. 4(B), design a lumped element matching network at 60 MHz that would transform Load impedance Z_L = 100 - j25 Ω into an input impedance of Z = 25 + j15 Ω. Take Z_0 = 50 Ω. (10)

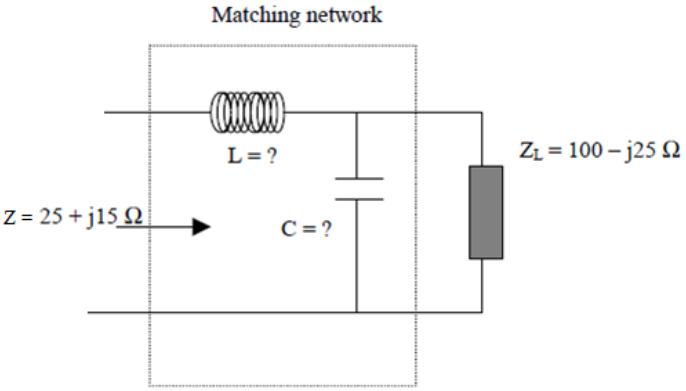

Fig. 4(B)

Q.5. (A) What is meant by RADAR range? Derive the equation for Radar range in terms of the noise figure. (10)

(B) Radar operating at 1.5 GHz uses a peak pulse power of 2.5 MW and has a range of 100 nmi for objects whose radar cross section is 1 m^2. If the minimum receivable power of the receiver is $2x10^{-13}$ Watt, what is the smallest diameter of the antenna reflector could have assuming it to be a full paraboloid with η=0.65. (10)

Q.6. Write a short note on following:

(A) Gunn diode. (07)

(B) Hybrid Ring. (07)

(C) Instrument landing system. (06)

****

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

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.

1. Answer any **four** of the following:

(a) Explain the various steps involved in digital image processsing. 5

(b)Compare Huffman and Arithmetic coding. 5

(c) Give 3X3 masks for Laplacian filter,horizontal,vertical,$+45^0$ and -45^0 line detectors 5

(d) Median filter is effective to remove salt and pepper noise .Justify your answer. 5

(e)Explain Region Growing with an example. 5

2. a) Perform Histogram Equalization for the given 3 bits per pixel image and plot the histograms of the original and equalized images. 10

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

b) Apply the following Image Enhancement techniques for the given 3 bits per pixel image segment. 10

$$I = \begin{bmatrix} 3 & 1 & 4 & 1 & 0 \\ 5 & 1 & 7 & 3 & 2 \\ 2 & 3 & 1 & 3 & 7 \\ 1 & 1 & 4 & 6 & 3 \\ 1 & 4 & 2 & 3 & 4 \end{bmatrix}$$

(i) Digital Negative
(ii) Bit plane Slicing
(iii) Thresholding with T=4
(iv) Intensity level slicing with background and without background assuming r1=3 and r2=5

3. a) Explain discontinuity based image segmentation in detail. . 10

b) With suitable examples explain the following morphological operations: 10

i) Dilation ii) Erosion

4. a) An image segmented has resulted in the following edge points : (1,0),(2,1),(4,3) and (2,0).Find the equation of the line that passes through maximum number of points using Hough Transform 10

4. b) Explain transform based image compression with the help of block diagram. 10

5 .a) Obtain the discrete cosine transform matrix for N=4. 10

b) Explain in detail Differential Pulse Code modulation technique. 10

6 . Write short notes on any **four** of the following: 20

(a) Fourier Descriptors

(b)Hit or Miss Transformation

(c)Run length coding

(d)Connectivity of pixels

(e)Discrete Wavelet Transform

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.

1		Solve **any four** of the following	
	(a)	Enlist the steps for obtaining silicon from sand	5
	(b)	Compare evaporation and sputtering methods for metal deposition	5
	(c)	Explain bird beak effect.	5
	(d)	Enlist important Parameters for which measurement is required before device processing begin	5
	(e)	Explain SOI fabrication using bonded SOI and smart cut.	5
2	(a)	Explain Liquid phase epitaxy method with neat diagram	10
	(b)	What do you mean by Class of clean room ? Give the steps in standard RCA cycle during wafer cleaning	10
3	(a)	Explain the fabrication process steps along with vertical cross sectional view of CMOS inverter using N well along with vertical cross sectional view.	10
	(b)	Explain the difference Between Positive Photo resist and Negative Photo resist.	5
	(c)	Differentiate Between Schottky contacts and Ohmic contacts	5
4	(a)	State need of λ (lambda) based design rules and draw layout of CMOS based 2 input NAND gate.	10
	(b)	Describe with the help of a neat diagram Haynes –Shockley Experiment for measurement of drift mobility of n-type semiconductor	10
5	(a)	Explain difference between SOI Finfet and Bulk Finfet	5
	(b)	Explain MMIC technology.	5
	(c)	Explain the difference Between Contact, Proximity and Projection Printing	10
6		Write short note on **any four**	
	(a)	Types of Thin Film deposition Technique	5
	(b)	MESFET fabrication	5
	(c)	Application of nanowire	5
	(d)	Electronic package reliability.	5
	(e)	Dry and Wet Etching	5

****

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

NB:

1) Question no. 1 is compulsory
2) Solve any three from the remaining five questions.
3) Assume suitable additional data if necessary.

Q1 Answer the following questions. (20)

a) Justify the need for brown-out detection circuit in embedded systems environment and the mechanism of implementing the same.

b) With respect to power, performance and cost state and explain the associated design metrics for an embedded system.

c) Explain the structure of typical C source program for ARM based target processor. Typically list the various data types along-with memory size supported by a C compiler.

d) What are interrupts and explain the factors that contribute to interrupt response time in a system.

Q2 a) With regards to Cortex – M3 architecture, explain the various states and its modes of operation. (10)

b) Explain the utilisation bound in task scheduling in light of Rate Monotonic Scheduling algorithm. (10)

Q3 a)What is a task and various states that a task can lie in for an embedded environment. (10)

b) Explain briefly the memory and bus structure in Cortex-M3 architecture. (10)

Q4 a) Explain briefly the serial communication protocol RS 232. What are the advantages of RS – 485 over RS -232 communicaction. (10)

b) Explain the operation and significance of following MicroC/OS – II functions a) OSSemCreate(); OSSemPend(); OSSemPost(); b) OSInit(); OSStart(); (10)

Q5 a) Compare the features of Cortex – A8 and Cortex - R4 architectures. (10)

b) Explain the various inter-process/task communication and synchronisation tools like semaphores, mutex, mailbox and pipe used by an RTOS environment. (10)

Q6) Write short notes on (Any two) (10 x 2) (20)

a) Problem of priority inversion and mechanism to prevent the same.
b) MSP-430 architecture and its low power capability.
c) Design metrics for a typical embedded system.
d) Black-box and White-box testing

****

(3 Hours) [Total Marks: 80]

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

Q1. Attempt **any four** questions. **20**

a) Compare fully controlled bridge converter and semi-converter.
b) List the factors affecting the speed of an induction motor.
c) Explain the principle of operation of DC motors.
d) State true or false with justification: The transfer function model of a buck converter is of second-order.
e) Give advantages of induction heating when compared to other conventional methods of heating.

Q2. a) Derive an expression for Overlap angle (μ) and output voltage for a three phase fully controlled bridge rectifier with source inductance. **10**

b) Explain the SVM technique for 3-phase voltage source inverters. Draw sector diagram. **10**

Q3. a) Derive and explain the average state space model of Buck Converter. Use this state space model to derive equation for output voltage of the converter at equilibrium condition (dv/dt=0). **10**

b) Explain various feedback control methods for DC-DC converters. Which method is best suitable for efficient control? Which method does not require mathematical model of the converter? **10**

Q4. a) A separately excited DC motor is supplied from 230V, 50 Hz, AC source through a single phase half wave controlled converter. Its field is fed through single phase semi-converter with zero degree firing angle delay.

Motor resistance= 0.70 Ω; motor constant =0.5Vsec/rad.
For a rated load torque of 15 N-m at 1000 rpm and for continuous ripple free current, determine

a. Firing angle delay of armature converter.
b. RMS value of thyristor current and free-wheeling current. **10**

b) Explain the working of single-phase full converter drive for separately excited DC motor. **10**

Q5. a) Compare the V/f and stator voltage speed control methods for an induction motor. Which method is more popular in practice? Justify your answer. **10**

b) Draw and explain the torque-speed characteristics of an induction motor. Explain which region of the characteristics is most suitable for the stable operation of the motor. **10**

Q6. Write short notes on (**any two)** **20**

i) Static Scherbius drive.
ii) Battery charging system.
iii) Role of DC-DC converter in SMPS circuits.
iv) Regenerative braking of induction motor.
