

ETRX

Q.P.Code: 013691

(3 Hours)

[Total Marks: 80]

- 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) What is a watch-dog timer, its use and typical application 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) Compare the serial communication protocols RS – 232C and RS – 485 protocols.
- Q2 a) Write a note on the interrupt structure of Cortex – M architecture. (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 register structure of Cortex-M3 architecture along-with the function of various special registers. (10)
- Q4 a) Compare the features of Cortex – A8 and Cortex - R4 architectures. (10)
- b) Explain the operation and significance of following MicroC/OS – II functions
- (a) OSSemPend(); & OSSemPost(); b) OSMboxPost(); & OSMboxPend(); (10)
- Q5) a) Write a brief note on boundary scan architecture. (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.

[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.

1 Answer any four of the following:

- a. Explain the Human visual system in accordance with the processing of images. 05
- b. Why is the sum of coefficients of High pass filter mask zero? 05
- c. Define Hadamard transform. Write the Hadamard matrix for N=8. 05
- d. Explain the steps involved in homomorphism filtering with the help of neat block diagram. 05
- e. What effect would setting to zero the lower order bit planes have on the histogram of an image in general? 05

a. Perform Histogram Equalization on Gray level distribution shown in the table. Draw the histograms of the original and equalized images. 10

Gray Levels	0	1	2	3	4	5	6	7
No. of Pixels	790	1023	850	656	329	245	122	81

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

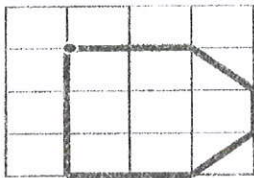
3 a. What are the different types of data redundancies found in digital images? Explain in detail. 10

b. Explain arithmetic coding in detail with the help of an example. 10

4 a. Explain the following morphological operations with the help of an example. 10

- i. Dilation
- ii. Erosion

b. What are chain codes? For the following figure calculate the chain code and prove that, the chain code is invariant to translation and rotation. 10



5 a. Explain the properties of 2D DFT in detail. Find the DFT transform of the image segment shown below: 10

$F(x,y)=$

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

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b. Explain Euclidean distance, City block distance, Chess board distance and Dm distance with the help of an example. 10

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

- a. JPEG encoder and decoder
- b. Hough Transform
- c. Region Splitting
- d. Connectivity of pixels
- e. Vector Quantization

[Time: 3 Hours]

[Total Marks: 80]

Please check whether you have got the right question paper.

- N.B:
- 1) Question No. 1 is **compulsory**
 - 2) Attempt any **Three (03)** Questions from remaining **Five (05)** Questions.
 - 3) Assume suitable data where ever necessary.

Q. 1 Attempt the following Questions (any 4)

- a) Draw the refractive index profile with dimensions of different types of fiber. 5
- b) Explain linearity polarized modes. 5
- c) Describe the eye diagram as applicable to optical fiber communication. 5
- d) With the help of neat sketch, explain the working of optical isolator 5
- e) Distinguish spontaneous and stimulated emission. 5
- f) What is Optical Transport network (OTN)? 5

- Q. 2 a) Compare step index fiber and graded index fiber.; Derive the expression for Numerical Aperture of a step-index fiber. What will happen to Numerical Aperture if cladding is removed? 10
- b) Find core radius necessary for single mode operation at 820nm of step index fiber with $n_1=1.482$ and $n_2=1.474$. What is the numerical aperture and maximum acceptance angle of this fiber? Calculate the corresponding solid angle. 10

- Q. 3 a) Explain with neat sketch the two categories of front end amplifiers, Discuss the possible sources of noise in optical fiber receiver. 10
- b) What do you understand by intermodal dispersion? Derive the expression for material dispersion Explain with neat diagram. Explain how to minimize micro bending losses. 10

- Q. 4 a) Compare coherent and non-coherent detection. Explain the bit error rate of optical receiver and receiver performance. 10
- b) Generic configuration of typical SONET or SOH Network What are the Network Categories? Give the names of public Network established. 10

- Q. 5 a) Explain OTDR with neat sketch and mention its advantages and applications. 10
- b) Explain with components a typical WDM link in detail & Give the details of network management in a typical optical network. 10

Q. 6 Write short note on (any 4) :- 20

- a) Mode coupling.
- b) State difference between LED and LASER.
- c) Link power budget.
- d) connectors used in optical fiber communication
- e) Network topologies.

(3 hours)

Total Marks:100

Note: (1) Question No.1 is compulsory and Answer any four out of the remaining six questions.

(2) Illustrate answers with sketches whenever required

Q.1 Answer any four of the following: (20)

- Explain various LAN topologies.
- Explain leased line concept with an example.
- Explain Integrated Service Digital Network.
- Explain general principles of congestion control in communication network.
- Explain how microwave communication work.

Q.2 a) What is DSL technology? Explain various DSL technologies. What is difference between DSL modem and DSLAM with the following (10)

- Downstream rate
- Upstream rate
- Distance (in ft)
- Number of twisted pair
- Line codes

b) Draw the block diagram of SONET and explain its operation. Also explain SONET frames. Find the data rate of an STS-1 and STS-3. (10)

Q.3 a) State and explain various frame types in HDLC. (10)

b) Explain different types of modems. What are the protocols used by MODEMS to transfer files? (10)

Q.4 a) Explain OSI model in detail. (10)

b) Explain Fast Ethernet specifications also explain CSMA-CD in detail. (10)

Q.5 a) Explain two different approaches of packet switching. (10)

b) Explain in detail any one routing algorithm. (10)

Q.6 a) What are the different classes of IPV4 address. Give the format of each class.

What are the advantages of IPV6 (10)

b) Explain TCP IP model (10)

Q.7 a) Explain different types of ARQ and compare their merits and demerits. (10)

b) Explain UTP, STP, coaxial cable and fiber optic cable. Also give their applications, limitations and general properties. (10)

(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) What are the advantages of SVM over the conventional Sine wave PWM? Explain.
 - b) Compare various schemes of DC motor speed control.
 - c) With the help of neat sketch, explain the working of single-phase half-wave semi converter.
 - d) Explain the concept of battery charging systems.
 - e) What is V/F control? Explain in detail.
2. a) Draw and Explain the state space model for dc-dc buck converter in detail. 10
- b) Explain in detail the principle and working of simple boost converter with the help of neat circuit diagram and waveforms. 10
3. a) Describe the effect of source inductance in 1-phase and 3-phase rectifiers. Draw relevant circuit diagrams and waveforms. 10
- b) Explain in detail the Multiple PWM as used for inverters. 10
4. a) A 220V, 1500 rpm, 10A separately excited dc motor has armature resistance of 1 ohm. It is fed from a single phase fully controlled bridge rectifier with an ac source voltage of 230, 50Hz. Assuming continuous load, compute:
- i) Motor speed at firing angle of 45 degrees and torque of 5 NM.
 - ii) Torque at firing angle of 55 degrees and at a speed of 1000 rpm. 10
- b) Explain dynamic and regenerative braking of DC motors. 10

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5. a) With the help of neat waveforms explain the torque speed characteristic of induction motor & give detail description of forward regeneration, forward motoring and reverse plugging. 10

b) Explain the working principle of stepper motor. What are different types of stepper motors? Discuss in detail permanent magnet stepper motor. 10

6. Write short notes on (any three) 20

- i) SMPS & UPS.
- ii) Kramer's drive.
- iii) Induction heating.
- iv) Harmonics reduction in inverters.

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(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) Assume **suitable** data, wherever **necessary**

- 1 Answer any four: (20)
- Explain the various types of bridges used in networks
 - Which are the various types of addresses used in OSI model? Explain each in brief.
 - In network paradigm, what is TTL? Where and why is it used?
 - Compare TCP and UDP
 - Distinguish between space division switch and time division switch
- 2 a) What are the various functions of Physical, Network and Presentation layers in ISO-OSI model. What is meant by encapsulation and decapsulation? (10)
- b) Explain Stop and Wait ARQ protocol for error control (10)
- 3 a) Classify the various congestion control strategies and explain any two closed loop congestion control methods in detail (10)
- b) Draw the header format of IP datagram and explain each field in detail (10)
- 4 a) Explain the operation of Routing Information Protocol. List the limitations of RIP and their corresponding fixes. (10)
- b) Explain how routers use link state routing algorithm to create the routing table (10)
- 5 a) Explain the various station types, configurations, response modes and frame formats in HDLC (10)
- b) Classify the various multiple access methods and explain CSMA-CA and Token ring in detail (10)
- 6 Write short notes on any four: (20)
- Berkley API
 - 802.3 MAC frame format
 - IP fragmentation
 - Domain Name Server
 - ADSL

