Sem- VII - Electronics (CBSGS) Embedded System Design

QP Code : 5860

(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) With the help of an example explain periodic task. List and explain the various types of tasks in an embedded system.

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

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

d) 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.

Q2 a) What is a task and various states that a task can be in for an embedded environment. (10)

b) Explain briefly the problem of priority inversion and mechanism to prevent the same. (10)

Q3) a) State and explain the criteria for tasks schedulability and explain various scheduling mechanism (10)

b) Explain briefly the register structure of Cortex-M3 architecture along with the function of various special registers. (10)

Q4) a)Distinguish between Cortex – M3 and M4 architecture and explain briefly the interrupt structure of M3 architecture. (10)

b) Explain the operation and significance of following Micro C/OS – II functions.(Any Three) (15)

a) OSInit(); b) OSSemPend(); & OSSemPost(); c) OSTaskCreate();

d) OSMboxPost(); & OSMboxPend();

Q5) a) Write a brief note to bring out the comparision between Cortex – M3, A8 and R4 architectures. (10)

MB-Con. 7936 -15.

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

Q6) Write short notes on (Any two) (20)

a) Serial communication standard RS-232 and comparison with RS – 485.
b) Low power features in Cortex – M 3 architecture.
c) Black box and White box testing.

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TEX/SEM-VII (CBSGS)/IC Technology

QP Code : 5901

Time: 3 Hours. Max. Marks: 80

N.B.

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

1. Solve any four of the following (20)
   (a) Explain predeposition and drive in steps in diffusion process.
   (b) Classify and discuss in brief the types of Thin Film Deposition methods.
   (c) What is Hall effect? Enlist important electrical parameters for which measurement is required before device processing begins.
   (d) Explain the need of isolation in VLSI and list the methods to accomplish it?
   (e) Explain SOI fabrication using bonded SOI and smart cut method.

2.
   (a) Explain Czochralski method for Silicon crystal growth. What are its advantages? (10)
   (b) What do you mean by Class of a clean room? Give the steps in a standard RCA cycle during wafer cleaning (10)

3.
   (a) Explain Solid source diffusion system with neat diagram. Also give one example of each source for P-type and N-type diffusion. (10)
   (b) Explain High K and Low K dielectrics with application of each. (05)
   (c) What are the basic reactions in formation of SiO_2 in dry oxidation and wet oxidation? Explain where these methods are used during MOSFET fabrication process. (05)

4.
   (a) Explain the fabrication process steps along with vertical cross-sectional views for CMOS inverter using N-well process (10)
   (b) What are the different types of design rules? Draw layout of 2 input NAND gate as per lambda (λ) based design rules (Show units in lambda). (10)

5.
   (a) Enlist important electrical parameters for which measurement is required before device processing begins. Also describe the experimental setup for the Four Probe method for resistivity measurement with the help of a neat diagram (10)
   (b) Explain the difference between SOI Finfet and bulk Finfet? (03)
   (c) State advantages of Finfet devices over single gate MOSFET devices. Also draw cross-sectional views of different multigate structures. (07)

6. Write short notes on any three of the following (20)
   (a) MESFET Fabrication
   (b) Carbon Nanotube Transistor
   (c) SOI Technology
   (d) Parametric tests and Functionality tests for IC testing

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Sem- VII -CCBSGS)-ETRX – Power Electronics-II - Nov-15

QP Code : **5939**

(3 Hours) [Total Marks :80

N.B. : (1) Question no. **1** is **compulsory.**
(2) Solve any **three** questions out of remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Solve **one complete** question together.
(5) **Assume** suitable **data** wherever **necessary.**

Attempt any **four** from the following:-

(a) What are the advantages of SVM over the conventional Sine wave PWM? Explain. 5
(b) List the merits and demerits of online and offline UPS. 5
(c) Explain regenerative braking for DC motors. 5
(d) Explain in brief the effect of sourceinductance in single phase fully controlled bridge rectifier. 5
(e) Explain the concept of UPS and give classification of UPS system. 5

(a) Explain clearly the steps involved in Space Vector Modulation for three phase voltage source inverter. 10
(b) A single phase full-wave mid-point converter with freewheeling diode as shown below in Fig. Q2(b) is supplied from a 120V, 50 Hz supply with a source inductance of 0.33 mHenry. Assuming that the load current is continuous at 4A, find the overlap angle for 10
(i) Transfer of current from a conducting thyristor to the commutating diode.
(ii) From the commutating diode to a thyristor when the firing angle is 15 degree.

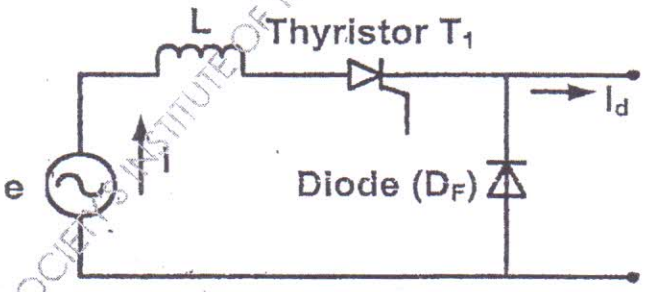

Fig.Q2 (b)

(a) Derive and explain the state-space model of Buck converter. 10
(b) Explain the PI (Proportional + Integral) control of DC-DC converter with the help of neat diagram. 10

(a) Derive the expressions for output voltage and current for a single phase fully controlled bridge rectifier with source inductance using equivalent circuit. 8
(b) What are SMPS? Give classification and explain any SMPS circuit in detail. 6
(c) Draw and explain the battery charging circuit involving power electronics system. 6

[TURN OVER

MD-Con. 9978-15.

5. (a) A separately excited DC motor is supplied from 230V, 50Hz 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 = 0.5 volts sec/rad. For a rated load torque of 15 NM at 1000 rpm and for continuous ripple-free current, determine: 10

(i) Firing angle delay of the armature converter.
(ii) RMS value of thyristor & freewheeling diode current.
(iii) Input power factor of the armature current.

(b) Explain various methods of speed control for 3-phase induction motor. 10

6. Write short notes on:

(a) Comparison of fly-back and forward converters used in SMPS. 7
(b) Power electronics applications in induction heating. 6
(c) Slip power recovery scheme for induction motor using Kramer Drive below sub-synchronous speed. 7

E- Sem-VII - ETRX - (CBSGS) - Computer Communicabon Networks - NOV - 15

QP Code : 5985

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

Instructions to candidates

1) Q.No. 1 is compulsory.
2) Solve any 3 questions from the remaining 5 questions.
3) Figures on right side indicate full marks.

~~Duration~~ Time - 3 hours Max. Marks - 80

			Marks
Q.No 1	a)	Explain the various Connecting devices used in computer networks.	05
	b)	Explain bit stuffing and unstuffing with respect to HDLC.,	05
	c)	Explain CSMA/CA method of random access.	05
	d)	Compare TCP and UDP.	05
Q.No 2	a)	Explain the ISO-OSI model of networks with the help of neat diagrams.	10
	b)	Explain the sliding window ARQ used for error control.	10
Q.No 3	a)	Explain the various station types, Configurations, response modes and Frame formats in HDLC.	10
	b)	Draw the TCP header format with the help of a neat diagram.	10
Q.No.4	a)	Explain circuit switching, packet switching and message switching.	10
	b)	Explain how routers use link state routing algorithm to create the routing table.	10
Q.No.5	a)	List the various options used in the IP datagram and explain each in brief.	10
	b)	Draw and discuss the Ethernet frame format.	10
Q.No.6		Write short notes on	
	a)	Guided and unguided media.	05
	b)	Open loop congestion control.	05
	c)	PPP Header format	05
	d)	Network topologies.	05

MD-Con. 10763-15.

Elective.

BE/ETRX/Sem-VII(CBSGS)/Digital Image Processing

NOV-15

QP Code : 6142

(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.
(3) Assume suitable data wherever necessary.

Q.1 Answer any four of the following :-

a) Explain the fundamental steps in an Image Processing System. (5)

b) State the properties of Discrete Cosine Transform. (5)

c) Differentiate between spatial and tonal resolutions. (5)

d) Justify " It is difficult to segment poorly illuminated images. " (5)

e) Justify " Butterworth lowpass filter is preferred to ideal lowpass filter. (5)

Q.2 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	100	250	100	300	150	0	0	0

b) Discuss advantages of homomorphic filtering. Also explain the steps of homomorphic filtering with the help of a neat block diagram. (10)

Q.3 a) Define segmentation. State different methods based on similarity. Explain any one method with example. (10)

b) Using Hough's Transform, find line passing through the maximum number of points given below:- (10)
(3,4), (0,-4), (1,4), (6,12), (4,1), (1.5,0), (-2,2), (-1,-3) , (3,-2)

Q.4 a) Consider an 8 pixel line of Gray 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 rms error for the decoded IGS code. (10)

b) Draw and Explain block diagram of JPEG Encoder and Decoder. (10)

Q.5 a) Apply FFT algorithms to the rows and columns of image segments shown and obtain 2D DFT. Show the Butterfly diagrams. (12)

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

b) What is Hadamard Transform? Calculate Hadamard Transform of following image. (08)

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

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

a) DWT

b) Region Filling

c) Vector Quantization

d) Opening and Closing operations on binary image

MD-Con. 11730-15.

38

QP Code : **2300**

(3 Hours) [Total Marks :100

N.B. : (1) Question no. **1** is **compulsory.**
(2) **Solve** any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.

1. (a) Explain slip S of an induction motor. 5
(b) Differentiate between online ups and off-line ups 5
(c) Explain regenerative braking in DC motor. 5
(d) Differentiate between voltage commutation and current commutation in chopper. 5

2. (a) Explain Basic series inverter with circuit diagram and waveforms. 10
(b) Explain the working of current cumulated chopper with the help of circuit diagram and waveforms. 10

3. (a) Explain the working of forward converter used in SMPS with circuit diagram and waveforms. 10
(b) Explain semiconverter drive to control the speed of DC motor in contineous current mode. Draw torque speed characteristics. 10

4. (a) Explain $\frac{V}{f}$ control scheme to control the speed of AC motor with the help of curves and implementation circuit. 10
(b) What is the effect of harmonics present in inverter output. Discuss the various methods to reduce the harmonics present in inverter output. 10

5. (a) A 210, 1200 rpm, 10 A separately excited motor is controlled by 1ϕ fully controlled converter with an a.c. source voltage of 230V, 50HZ. Assume that sufficient inductance is present in the armature circuit to make the motor current continuous and ripple free for any torque greater than 25% of rated voltage. $R_a = 1.5\ \Omega$ 10
(i) What should be the firing angle to get the rated torque at 800 rpm
(ii) Compute the firing angle for the rated braking torque-at-1200 rpm
(b) Explain the working of Kramer's drive to control the speed of AC motor for subsynchronous speed. 10

6. (a) Explain class E chopper circuit with the help of waveforms and quadrants of operation 10
(b) What do you understand dual converter. Draw diagram and waveforms. Derive the relation for $\alpha_1 + \alpha_2 = 180^0$ 10

7. Write short notes on (any **two**):-
(a) Effect of source inductance in fully controlled bridge rectifier 10
(b) Rotor resistance control of induction motor 10
(c) Parallel Inverter. 10

QP-Con. 11674-15.

Elective.

E/ETRX/Sem-VII(CBSGS)/Artificial Intelligence -Nov'15

Q.P. Code : 6145

(3 Hours) [Total Marks : 80

N.B. : (1) Question **No.1** is **compulsory.**
(2) **Attempt** any **three** questions from remaining questions.
(3) **Assume** suitable **data** whevevre **necessary.**

1. Attempt any **four** questions : 20
   (a) Compare and contrast the biological neuron and artificial neurons.
   (b) Define fuzzy logic and crisp logic. With suitable examples, explain the operations and properties of fuzzy sets, crisp sets, fuzzy relations and crisp relations.
   (c) What are the various activation functions and learning rules used in neural networks?
   (d) Explain any two types of De-fuzzification methods.
   (e) Draw a McCulloch-Pitts neuron and explain its working.

2. (a) Differentiate between supervised and unsupervised learning methods. 10
   (b) Design a Hopfield network for 4-bit bipolar patterns. The training patterns are : 10

$S_1 = [1,-1,-1,-1]$
$S_2 = [-1,1,1,-1]$
$S_3 = [-1,-1,-1,1]$

   Find weight matrix and energies for three input samples. Determine the pattern to which the sample S = [-1, 1,-1,-1] associates.

3. (a) What are the two types of BAM? Explain. How are the weights determined in a discrete BAM. 10
   (b) Find the weights required to perform the following classification using Perceptron network. The vectors (1,1,1,1) and (-1,1,-1,-1) are belonging to the class and have target value 1 and vectors (1,1,1-1) and (1 ,-1 ,-1, 1) are not belonging to the class and have a target value -1. Assume learning rate as 1 and initial weights as 0. 10

4. (a) With a neat architecture, explain the training algorithm of Kohonen self-organizing maps. 10
   (b) State the importance of back propagation algorithm and draw its architecture. 10

TURN OVER

5. (a) For the fuzzy sets A, B and C are define on discrete universe X, Y and Z repectively. 10

$$A = \left\{\frac{0.1}{x_1} + \frac{0.5}{x_2} + \frac{1.0}{x_3}\right\}, B = \left\{\frac{0.3}{y_1} + \frac{0.8}{y_2}\right\}, A = \left\{\frac{0.4}{z_1} + \frac{0.7}{z_2} + \frac{1.0}{z_3}\right\}$$

Find:

(i) Fuzzy Cartesian product P = A X B;

(ii) Fuzzy Cartesian product S = B X C;

(iii) T=P O S using min-max and max-product method.

(b) With a neat architecture, explain the training algorithm and testing algorithm of Adaline network. 10

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

(a) Simulated annealing,

(b) LVQ,

(c) Fuzzy Logic Controller,

(d) Boltzmann Machine,

(e) Adaptive Resonance Theory.