Seat No.

**B.E. (Electronics) (Part - IV) (Semester - VII) (Revised)
Examination, November - 2017
EMBEDDED SYSTEM DESIGN
Sub. Code : 67527**

Day and Date : Monday, 13-11-2017          Total Marks : 100
Time : 2.30 p.m. to 5.30 p.m.

Instructions :   1)   All questions are compulsory. Figure to right indicate full marks.
    2)   Write answers to bits in questions at one place and in sequence. Do not place answers randomly.
    3)   Answers to the bits written randomly may not be assessed.
    4)   Write answers neatly and should be legible,
    5)   Draw diagrams neatly and giving appropriate labels and legends.

## SECTION - I

**Q1)** Solve any three ( Six marks for each question)          **[18]**

   a)   Define embedded system. What are important characteristics of embedded system?

   b)   With suitable block diagram explain process of converting assembly language program into machine implementable software.

   c)   With suitable diagram explain switching of ARM from user mode to Fiq_mode due to FIQ interrupt and back to user after serving ISR.

   d)   Fill "* "in the table below with suitable words and explain why and where return address is stored after execution of branch with link instruction, when and how return address is adjusted in link register?

| Cycle | | | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|
| Address | Operation | | | | | | | |
| 0x8000 | BL | * | * | * | * | * | | |
| 0x8004 | X | | * | * | | | | |
| 0x8008 | XX | | | * | | | | |
| 0x8FEC | ADD | | | | * | * | * | |
| 0x8FF0 | SUB | | | | | * | * | * |
| 0x8FF4 | MOV | | | | | | * | * |

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**Q2)** Solve any two [16]

    a)    Write short note on ARM data processing instructions.

    b)    Draw and explain flowchart of non-nested interrupt handler. What are the advantages and disadvantages of non-nested interrupt handler

    c)    Write an assembly language code, which copies a 32 bit words from one memory location to another. The address of start of the source array is in rl, the length (no of words) in r2 and the start of the destination address in r3. ( Use of necessary assembler directives is essential in the program).

**Q3)** Solve any two [16]

    a)    With suitable timing diagram discuss how clock synchronization achieved in 12C Bus?

    b)    List five error types of CAN bus. Explain Stuffing error in detail.

    c)    Draw and explain frame format of 12C bus for master transmitter addressing slave and writing two bytes on slave and slave receives all bytes successfully.

## SECTION - II

**Q4)** Answer any three of the following [18]

    a)    Explain with diagram the memory map of LPC 2148 Microcontroller.

    b)    Explain the role of various buffers in Memory Acceleration Module (MAM) and operation modes of MAM.

    c)    Describe with diagram the oscillator selection algorithm for LPC 2148.

    d)    Explain various types of resets used on LPC 2148.

**Q5)** Answer any two of the following [16]

    a)   Explain the registers associated with the GPIOs on LPC 2148.

    b)   Explain with block diagram the UART1 on LPC 2148 microcontroller.

    c)   Explain with Block diagram PWM unit on LPC 2148 Microcontroller.

    d)   Describe the role of ADC global Data register and ADC channel data register and differentiate between them.

**Q6)** Answer any two of the following [16]

    a)   Explain role of RTOS in development of high end microcontroller based systems.

    b)   Explain different task scheduling algorithms.

    c)   Explain role of Pipe in inter task communication.

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**B.E. (ElectronicsEngg.) (Part - IV) (Semester - VII) (Revised)**
**Examination, November - 2017**
**INFORMATION THEORY AND CODING TECHNIQUES**
Sub. Code : 67526

Day and Date : Friday, 10 - 11 - 2017                    **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

**Instructions :**   1)   All questions are compulsory.
                     2)   Figures to the right indicate full marks.
                     3)   Assume suitable data if necessary.

## SECTION - I

**Q1)** Attempt any Three of the following.                    **[18]**

    a)    Prove the following relationship:

        i)    $I(Y, X) = H(Y) - H(Y/X)$

        ii)   $H(XY) = H(X/Y) + H(Y)$

    b)    What do you mean by Binary Erasure channel? Determine the capacity of binary erasure channel, whose channel matrix is given by,

$$P(Y/X) = \begin{bmatrix} P & 1-P & 0 \\ 0 & 1-P & P \end{bmatrix}$$

    c)    Explain the encoding & decoding procedure for (n, k) linear block code.

    d)    State Shannon Hartley theorem. Prove that maximum Channel Capacity is given by, $C_\infty = \lim C = 1.44\ [S/N_0]$

$$B \to \infty$$

**Q2)** Attempt any Two of the following.                    **[16]**

    a)    i)    Determine the parity check matrix (H) for (5, 3) code. Show that $GH^T = 0$ & $CH^T = 0$ for C=[1 1 0 1 0]. The generator matrix is

$$\text{given as, } G = \begin{bmatrix} 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$

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ii) What is entropy coding? Explain the procedure for Huffman coding algorithm.

b) A discrete source transmits message $X_1$, $X_2$ and $X_3$ with probabilities $P(X_1) = 0.3$, $P(X_2) = 0.25$ and $P(X_3) = 0.45$ respectively. The source is connected to channel whose conditional probability matrix is,

$$P[Y/X] = \begin{array}{c} \\ X_1 \\ X_2 \\ X_3 \end{array} \begin{array}{ccc} Y_1 & Y_2 & Y_3 \\ \left[ \begin{array}{ccc} 0.9 & 0.1 & 0 \\ 0 & 0.8 & 0.2 \\ 0 & 0.3 & 0.7 \end{array} \right] \end{array}$$

Calculate all the entropies and mutual information with this channel.

c) i) Explain the distance properties of linear block code.

ii) A Gaussian channel has a bandwidth of 1 MHz. Calculate the channel capacity if the signal power to noise spectral density ratio is $10^5$ Hz. Also calculate the maximum information rate.

**Q3)** Solve any two of the following. **[16]**

a) A parity check matrix (H) of a (7, 4) linear block code is given by,

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

Determine:

i) Generator matrix (G)

ii) All Code vectors

iii) Minimum distance

iv) Error detection & correction capability.

v) Show that how syndrome vector helps in detecting & correcting the error

-2-

b) Apply Shannon-fano Coding procedure for the following message ensemble:

$$[X] = [X_1 \quad X_2 \quad X_3 \quad X_4 \quad X_5 \quad X_6 \quad X_7]$$

$$P[X] = [0.4 \quad 0.2 \quad 0.12 \quad 0.08 \quad 0.08 \quad 0.08 \quad 0.04]$$

Determine the entropy of source, average code ward length, Coding efficiency & redundancy.

c) i) State and explain the properties of mutual information.

d) The channel matrix is given by,

$$\begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix}$$

i) Draw the channel diagram

ii) Determine the probabilities associated with outputs assuming equiprobable inputs.

## SECTION - II

Q4) Attempt any three from the following: [18]

a) Determine the generator matrix and parity check matrix for Systematic (7, 4) Cyclic code for the given generator polynomial is, $g(x) = X^3 + X^2 + 1$.

b) What is convolutional code? Explain the time domain approach for generating output code sequence in convolutional code.

c) State the features of BCH code. Explain the decoding procedure for BCH code.

d) Determine the generator polynomial, code polynomial & code for (7, 3) RS double error correcting code for message vector ($\alpha^2$, $\alpha^3$, $\alpha^4$) using systematic form method.

**Q5)** Attempt any Two of the following: [16]

a) Determine the generator polynomial for t error correcting BCH code for the extension field GF (16) with the primitive polynomial $X^4 + X + 1$ over GF (2) and error correcting capability tc = 1, 2.

b) A Convolutional encoder using three shift registers and $r = 1/2$ has two generating vectors are as : $g_1 = [1\ 0\ 1]$, $g_2 = [1\ 1\ 1]$

    i) Sketch the encoder configuration

    ii) Determine generator matrix (G)

    iii) If the message sequence is (1 0 0 1), determine the output sequence of the encoder.

    iv) Draw Code tree and State diagram.

c) Write a short note on the following.

    i) Maximum likelihood decoding

    ii) Minimum Polynomial

**Q6)** Attempt any two of the following. [16]

a) Determine the generator polynomial for (7, 5) RS code over GF (8) if the message vector is $\{\alpha^0, 0, \alpha^3, \alpha^4\}$ and error polynomial $e(x) = \alpha^4 X^4$. Also find code vector $C(x)$ & received vector $r(x)$. Verify whether decoding of $r(x)$ results into $C(x)$.

b) Design an encoder and Syndrome calculator for the (7, 3) Cyclic code generated by, $g(X) = X^4 + X^2 + X + 1$ and verify it's operation using the message vector (1 1 0). Also determine syndrome Vector for the error pattern (0100000).

c) i) Why the need of error control coding? State the difference between block code & Convolutional code.

    ii) What is cyclic redundancy check code? Explain the procedure to obtain CRC code.

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**B.E. (Electronics) (Part - IV) (Semester - VII) (Revised)**
**Examination, November - 2017**
**COMPUTER NETWORK**
**Sub. Code: 67528**

Day and Date : Wednesday, 15 - 11- 2017                     Total Marks : 100
Time :2.30 p.m. to 6.30 p.m.

Instructions :     1)     **All questions are compulsory.**
                   2)     **Figures to the right indicate full marks.**
                   3)     **Assume necessary data wherever required.**

**SECTION-I**

**Q1)** Solve any Two:                                                    [16]

    a)   Compare microwave, infrared wave & radio wave transmission media.

    b)   What are different types of random access methods? Explain CSMA/
         CD technique.

    c)   With a neat schematic explain token bucket algorithm.

**Q2)** Solve any two:                                                    [16]

    a)   Draw header format of IPV4 datagram and explain all fields.

    b)   What are the drawbacks of STOP and WAIT protocol? Explain the
         operation of Selective Repeat ARQ technique for lost frame.

    c)   With a suitable schematic explain working principle of Bellman Ford
         algorithm.

**Q3)** Write short notes on (any three):                                [18]

    a)   Addresses in IPV6.

    b)   HDLC.

    c)   Bridge.

    d)   Sub netting and super netting.

                                                                    *P.T.O.*

**SECTION-II**

**Q4)** Solve any two of the following: [18]

    a)    What are the contents of TCP segment? Explain each in detail.

    b)    Draw and explain various TCP timers.

    c)    With suitable example explain DNS protocol.

**Q5)** Solve any two of the following: [16]

    a)    Draw and explain SMTP protocol.

    b)    State and explain application of message integrity and authentication.

    c)    Explain how process to process delivery is achieved in transport layer.

**Q6)** Solve any two of the following: [16]

    a)    State and explain cryptography.

    b)    What are the security attacks? Explain each in detail.

    c)    With suitable example explain TELNET protocol.

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### B.E. (Electronics) (Semester - VII) (Revised)
### Examination, November - 2017
### IMAGE PROCESSING
### Sub. Code: 67529

**Day and Date :Tuesday, 21 - 11 - 2017**          **Total Marks : 100**
**Time :2.30 p.m. to 5.30 p.m.**

**Instructions :**   1)   **All questions are compulsory.**
                  2)   **Figures to the right indicate full marks.**

**Q1)** Attempt any Four :                                                              **[20]**

     a)   Describe various types of pixel adjacency.

     b)   Explain spatial and intensity resolution of an image.

     c)   Explain types of interpolation method.

     d)   Explain Contrast stretching used in Image processing.

     e)   Describe different types of distance used in Image processing.

**Q2)** Attempt any Two:                                                              **[16]**

     a)   Explain various fundamental steps in digital image processing.

     b)   Describe different components used in image processing system.

     c)   Explain different types of image sensors used for image acquisition.

**Q3)** Attempt any Two:                                                              **[14]**

     a)   Explain Negative and Power law transformation.

     b)   What is Histogram? Explain histogram equalization process with an example.

     c)   Explain image averaging & Image subtraction for image enhancement.

*P.T.O.*

**Q4)** Attempt any Four: [20]

    a)    Explain basics of spatial filtering.

    b)    Explain average filtering of an image.

    c)    Explain median filter with an example.

    d)    Explain CMY color model.

    e)    Explain concept of Gradient operator used for image enhancement.

**Q5)** Attempt any Two : [16]

    a)    Explain how to detect various gray level discontinuities in digital image.

    b)    Describe Thresholding and Write an algorithm used for global Thresholding.

    c)    What is region based segmentation. ? Write basic region growing algorithm.

**Q6)** Attempt any Two : [14]

    a)    Explain RGB color model.

    b)    Explain gray level to color transformations.

    c)    Explain converting colors from RGB to HSI Model and vice versa.

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**B.E. (Electronics) (Part-IV) (Semester-VIII)**
**Examination, November - 2017**
**POWER ELECTRONICS & DRIVES**
Sub. Code :67779

Day and Date : Friday, 03- 11 - 2017                     **Total Marks : 80**
Time : 10.00 a.m. to 1.00 p.m.

Instructions :   1)   All questions are compulsory.
                 2)   Figures to the right indicate full marks.
                 3)   Assume suitable data if necessary & state it clearly.
                 4)   Use of non programmable calculator is allowed.

### SECTION - I

**Q1)** Solve any two of the following:                                      [18]

a)   Explain the working of three phase semiconverter with neat diagram and
     waveforms for $\alpha = 90°$. Derive the equation for Vdc & Vrms for $\alpha \geq \frac{\pi}{3}$.

b)   A three-phase fully-controlled bridge converter is connected to three-
     phase a.c. Supply of 400V, 50 Hz and operates with a firing angle $\alpha = \frac{\pi}{4}$.
     The local current is maintained constant at 10 Amp and the load voltage
     is 360 Volts. Compute.

     i)    Source inductance, Ls

     ii)   Load resistance R.

     iii)  Overlap angle $\mu$,

c)   With neat circuit diagram and waveform explain the operation of three-
     phase Half wave controlled rectifier for continuous conduction. Derive
     the equation for Vdc & Vrms when firing angle $\alpha < \frac{\pi}{6}$.

*P.T.O.*

**Q2)** Solve any two of the following: [16]

a) Draw the circuit diagram & waveform of IGBT based single phase full bridge inverter. Also derive the equation for the rms output voltage.

b) Explain in detail 120° mode of conduction of three phase IGBT based inverter.

c) Compare CSI & VSI inverters in details.

**Q3)** Solve any two of the following. [16]

a) Explain single phase cycloconverter which divides the supply frequency by three.

b) Compare circulating & non circulating mode operation of cycloconverter.

c) Explain three phase to three phase cycloconverter along with circuit diagram.

## SECTION - II

**Q4)** Solve any two. [16]

a) Draw & explain block diagram of Electric drive.

b) Explain speed control of separately excited DC motor using single phase full controlled converter with appropriate waveform.

c) Explain stator voltage control technique used for speed control of induction motor.

**Q5)** Solve any two. [16]

a) Compare A.C. & D.C. drives.

b) A d.c. shunt motor takes a current of 80A on a 480v supply and runs at 960rpm. The armature resistance is $0.25\Omega$ and the field resistance is $120\Omega$. A chopper is used to control the speed of the motor in the range of 400-750rpm having constant torque. The on period of the chopper is 3ms. The field is supplied directly from 480v supply. Determine the range of frequencies of the chopper.

c) Explain the variable frequency speed control of an induction motor.

**Q6)** Write note on any three.

    a)    Star-delta starter.

    b)    Dynamic breaking in D.C. Motor.

    c)    Selection criteria of a electric drive.

    d)    Types of 3 phase induction motors.

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# B.E. (Electronics Engineering) (Semester - VII) (Revised) Examination, November - 2017
## BIOMEDICAL INSTRUMENTATION (Elective - I)
### Sub. Code: 67532

Day and Date :Thursday, 23 - 11 - 2017

Total Marks : 100

Time :2.30 p.m. to 5.30 p.m.

Instructions :    1)    All questions are compulsory.

2)    Use suitable assumptions if required.

3)    Draw necessary figures on right side of answer sheet.

## SECTION-I

**Q1)** Solve any three:                                                                    [18]

a)    What is sodium pump? Explain Elementary ideas of cell structure.

b)    Draw diagrams illustrating the process of respiration and circulation.

c)    Name the different types of electrodes used for a Bio-medical Instrumentation system.

d)    Explain in brief heart and circulatory system.

**Q2)** Solve any two:                                                                      [16]

a)    What is mean by diagnostic equipment? Explain any one diagnostic equipment.

b)    With suitable diagram explain electrodes tissue interface, contact impedance, and effects of high contact impedance.

c)    What is the frequency range of biomedical signals? Explain the requirements of recorder used for these signals.

**Q3)** Solve any two:                                                                      [16]

a)    With neat sketch explain electrodes used for ECG, EEG and EMG

*P.T.O.*

b) How electrical activity of human eye can be monitored explain in brief.

c) With neat sketch explain physiology of central nervous system.

## SECTION-II

**Q4)** Solve any Three.                                                    **[18]**

a) With neat diagram explain the Spirometer working principle.

b) List the different types of amplifier used in biomedical instrumentation. Explain any one in detail.

c) Explain various methods of blood pressure measurements.

d) Classify different transducers used for detection of physiological parameters.

**Q5)** Attempt any Two:                                                    **[16]**

a) Explain ECG leads system with typical waveform for _____.

   i) Unipolar limb leads

   ii) Bipolar limb leads

b) With neat sketch explain the working principle of ultrasound blood flow meter.

c) What are different preventive measures to reduce shock hazards.

**Q6)** Attempt any Two.                                                    **[16]**

a) Describe in detail the physiological effects of electric current on human body.

b) Explain in brief the working principle of LVDT. Describe how it can be employed to measure the muscle movement?

c) Explain in detail the working and characteristics of following amplifiers...

   i) Differential Amplifier.

   ii) Carrier amplifier.

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