

Q.P. Code : 591502

(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 required, stating them clearly.

1. Answer the following questions:

- (a) What is the significance of AWGN channel.  
 (b) What is the capacity of a Gaussian channel and state its importance.  
 (c) Differentiate between QPSK and OQPSK.  
 (d) Discuss on code efficiency and Hamming bound.  
 (e) Explain the significance of eye pattern.

20

2. (a) Develop MSK waveform (with all intermediate waveforms) for the given bit stream 11000111 for  $m=5$  &  $n=1$  on the graph paper.

10

(b) A (7,4) cyclic code is generated using the polynomial  $x^3 + x + 1$ 

10

(a) Generate the systematic cyclic code for the data 1100.

(b) Draw the encoder &amp; show how parity bits are generated for the data 1100.

3. (a) Compare BASK, BFSK &amp; BPSK based on following parameters:- bandwidth requirement, noise immunity, transmission rate, efficiency &amp; applications.

10

(b) The parity check matrix [H] of linear (7,4) block code is as follows:

10

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

- (i) Find generator matrix  
 (ii) Determine the code vector for:  $M_1=1010$  &  $M_2=1110$ .  
 (iii) Draw the encoder using shift registers & EX-OR gates.  
 (iv) Obtain syndrome matrix for following received sequences:  
 $R_1=0100101$  &  $R_2=1110100$   
 (v) Comment on syndrome calculated in above (d).

TURN OVER

4. (a) A three digit message is transmitted over a noisy channel having a probability of error  $P_e = (2/5)$  per digit. 10
- (i) Determine Probability of occurrence of errorless message.
  - (ii) Determine Probability of message having error in any two digits
  - (iii) Determine Probability of message having error in all digits
  - (iv) Plot the all possible probabilities of occurrence of error
- (b) Compare the direct sequence spread spectrum (DSSS) and frequency-hop spread spectrum (FHSS) with respect to principle and performance. Explain processing gain and jamming margin. 10

5. (a) Find the probability of error of matched filter. Comment on your results. 10
- (b) A discrete memoryless source has in alphabet of five symbol with their probabilities as shown below: 10

Symbol	S1	S2	S3	S4	S5
Probability	0.15	0.11	0.19	0.40	0.15

- Construct :
- (a) Huffman Code for each symbol.
  - (b) Shannon Fano Code for each symbol

Determine following parameters for both coding methods (a) and (b):

- (i) Average Code-word length
  - (ii) Entropy
  - (iii) Code Efficiency
  - (iv) Code Redundancy
6. (a) Draw signal space diagram for 16-QAM system and compare probability of occurrence of error in it with QPSK system. 10
- (b) State Nyquist's Criterion for distortion less Transmission. State its significance in Duo-binary encoding. 10

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(3 Hours)

[ Total Marks : 80

- N.B. :** (1) Questions no. 1 is compulsory.  
 (2) Solve **any three** from question no. 2 to question no. 6  
 (3) **Right figures indicate** the marks.

1. Solve any **four**

- (a) Point charges  $Q_2 = 300 \mu\text{C}$  located at (2, -1, -3) m in experiences a force  $\vec{F}_2 = 8a\bar{x} - 8a\bar{y} + 4a\bar{z}$  N due to point charge  $Q_1$  at (3, -4, -2) m. Determine  $Q_1$  **5**
- (b) The height of a monopole antenna is  $\lambda/100$ . what is radiation resistance of antenna. **5**
- (c) State and explain Biot-Savart law. **5**
- (d) Find out the divergence and curl of the following function **5**  

$$\vec{F} = 2x^2y\bar{a}_x + (x^2 + z)\bar{a}_y + yz^3\bar{a}_z$$
- (e) Explain what do you mean by skin depth for lossy media with respect to signal passing through lossy media. **5**
2. (a) Derive maxwells integral and point form of equation for static fields. **10**  
 (b) Find electric field intensity  $\vec{E}$  due to an infinite line charge. **10**
3. (a) Define the polarization of wave. Explain different types of polarization. **10**  
 (b) Derive boundary condition for electric and magnetic fields at the boundary of two dielectric media. **10**
4. (a) Explain in detail FDM method also state advantage and drawback of it. **10**  
 (b) State Poynting theorem and derive the average poynting vector. **10**
5. (a) Derive the Expression for radiation power of Hertzian antenna. **10**  
 (b) Explain the principle modes of operation of helical antenna and draw its radiation pattern. **10**
6. Solve any two :
- (a) Classify and explain different type of wave propagation **10**
- (b) Explain the significance of the term "effective area of an antenna", Derive the relationship between effective area and directivity of any antenna. **10**
- (c) Explain following terms; critical frequency, virtual height, maximum usable frequency. **10**

# Microcontrollers & Application

TE Sem V CBGS

~~ETRX~~

Q. P. Code : 591300

03/12/16

(3 Hours)

~~ETRX~~

[Marks : 80]

**N.B.** (1) Question No.1 is compulsory.

(2) Solve **any three** questions from the remaining five questions.

(3) All questions carry equal marks.

- Q.1** (a) Describe the SCON and SBUF - SFR's in 8051. 05
- (b) Explain the function of the barrel shifter in the ARM7 core. 05
- (c) Draw and explain the CPSR register of the ARM processor. 05
- (d) Explain the concept of register banks in 8051. 05
- Q.2** (a) Explain the structure of the Input/Output ports of the 8051 with neat diagram. 10
- (b) Explain in detail the operating modes of the ARM7. 10
- Q.3** (a) Write an assembly language program to transfer a block of data in memory using load and store instructions of the ARM7. 10
- (b) Write a detailed note on the Interrupt structure of the 8051 and explain the related SFRs. 10
- Q.4** (a) Write an assembly language program for interfacing 'YES' serially at 9600 baud continuously using the 8051. 10
- (b) Explain the interfacing of 8051 to external memory with the help of suitable diagram. (Make necessary assumptions) 10
- Q.5** (a) "ARM-Thumb interworking improves the code density". Justify with a neat example. 10
- (b) Write a program (with and without timer) to generate a square wave on pin PL.Z. Highlight the difference in the two methods. 10
- Q.6** Write short note on (**any three**). 20
- a) DC motor interfacing with 8051.
- b) ARM7 Architecture.
- c) Power saving modes of the 8051.
- d) Thumb state of the ARM7.

Course: T.E. (SEM.-V) (REV. -2012) (CBSGS) (Prog T3225)

QP Code: 591300

Correction:

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Correction in Q. 5 b .....Instead of pin P1.Z Read as pin P1.7

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Q.P. Code : 591200

(3 Hours)

[ Total Marks : 80

- N.B. :** (1) Question No.1 is **compulsory** and Solve **any three** from remaining questions.  
 (2) Assume suitable **data** if **necessary**.

1. Solve **any four** questions :

- (a) Explain the need of dual power supply in Op-amp. 5
- (b) What is ideal integrator? How disadvantages of Basic integrator can be overcome? 5
- (c) What is difference between normal rectifier & precision rectifier. Explain half wave precision rectifier. 5
- (d) List important specifications of ADC 0808. 5
- (e) Compare voltage regulator with IC 78XX with IC 723. 5
2. (a) Give complete analysis of inverting amplifier Op-amp circuit. Hence design it for voltage gain = 10. 10
- (b) Design RC phase shift oscillator for frequency equal to 10 kHz. 10
3. (a) Design Schmitt trigger circuit to achieve UTP = 2V & LTP = -2V. 10
- (b) Explain Dual slope ADC in detail with its advantages & disadvantages. 10
4. (a) Explain PLL using block diagram of 565 PLL. 10
- (b) Design voltage regulator for given specification using 78XX & 79XX IC's 10  
 $V_o = \pm 12V$ ,  $I_L = 100 \text{ mA}$ .
5. (a) Give different filter classifications and hence explain Butterworth & Chebyshev Response. 10
- (b) Explain triangular wave generator using Op-amp. 10
6. Attempt **any four** questions : 20
- (a) Level detector
- (b) Voltage to current converter
- (c) Monostable multivibrator using IC 555
- (d) Functional diagram of IC 723

Course: T.E. (SEM.-V)

QP Code: 591200

Correction:

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In Question 6 correction is "Solve all" instead of solve any 4

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