SEM V ELEX EME 15/5/14

QP Code : **MV-18401**

(3 Hours) [**Total Marks : 100**

N. B. : (1) Question **No. 1** is **compulsory.**
(2) Attempt any **four** questions from Q. No. **2** to **7.**
(3) Vector notation should be used wherever necessary.
(4) Assumptions made should be clearly stated.

1. (a) Derive wave equations for homogeneous unbounded source free medium starting with Maxwell's equations. **5**
(b) Derive Poisson's and Laplace's equations. **5**
(c) State the characteristics of Smith Chart. **5**
(d) In a medium characterized by **5**
$\sigma = 0$, $\mu = \mu_o$ and $\varepsilon = \varepsilon_o$.
$\vec{E} = 20 \sin(10^8 t - \beta z)\vec{a}_y$ V/m
Find β and $\vec{H}$.

2. (a) Derive boundary conditions for electric and magnetic fields at the boundary of two dielectric media. **10**
(b) For an electromagnetic wave prove that $\vec{E}.\vec{H}$ and $\vec{E}\times\vec{H}$ gives the direction of propagation of the wave. **10**
(c) Determine Υ and η at 100 MHz for a medium in which $\mu r = 1$, $\varepsilon_r = 10$, $\sigma = 0$. At what velocity will an EM wave travel in this medium? **10**

3. (a) State and prove Poynting theorem. Explain the integrals involved in the statement. **10**
(b) Explain various types of electromagnetic interferences. **10**

4. (a) Derive the expressions for the reflection and transmission coefficients in case of reflection from perfect dielectric at normal incidence. **10**
(b) Explain Brewster angle. Derive the expression for it. **5**
(c) Determine the amplitudes of the reflected and transmitted E and H fileds at the interface of two regions at z = 0. **5**
Given : Incident Ei = 1 mV/m, $E_{r1} = 3.5$, $\mu_{r1} = 1$, $\sigma_1 = 0$.
Region 2 is free space.

5. (a) A 50Ω transmission line is to be matched to a load of 50 + j75Ω using a short circuited stub. Use Smith Chart to design the minimum length of the stub and minimum distance of the stub from the load. **8**
(b) Explain the use of a loss-less transmission line as circuit elements at UHF. **7**
(c) Find the input inpedance, VSWR and reflection coefficient at 0.6λ from the load $Z_L = 60\text{-}j30\,\Omega$. Given : Zo = 50Ω. **5**

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6. (a) Explain potential functions for sinusoidal radiation oscillations. 5
   (b) For silver, $\sigma = 3$ MS/m. At what frequency will the depth of penetration, δ, be 1 mm? 5
   (c) Define polarizationof a wave Explain the types of polarization. 10

7. Write a short note on :–
   (a) The need of electromagnetic compatibility 7
   (b) Surface impedance of a conductor 7
   (c) Wave propagation in dispersive media. 6

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QP Code : MV-18440

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory.**
(2) Answer any **four** out of the remaining **six** questions.
(3) Assume **suitable** data wherever **necessary.**
(4) Figures to **right** indicate **full** marks.

1. Solve any **four** :— **20**
   (a) Explain CMRR measurement procedure with examples.
   (b) How is current boosting achieved in a 723 IC ?
   (c) What are the different linear IC packages ?
   (d) What is rolloff rate of first order filter ?
   (e) Draw sample and hold Amplifier and list its applications.
   (f) Explain first order Active filter circuit.

2. (a) Draw simplified Op-Amp circuit diagram and explain the following stages alongwith the working of this circuit :— **10**
   (i) Input Stage
   (ii) Second Stage
   (iii) Output Stage.
   (b) Draw the circuit diagram of three Op-Amp instrumentation amplifier. Get an expression for the output. State its characteristics. **10**

3. (a) Design a fourth order Butterworth Low pass filter having upper cut-off frequency of 1khz. **10**
   (b) What is a Switched Capacitor ? Give the circuit of a Switched Capacitor Low pass filter and discuss various types of Switched Capacitor ? **10**

4. (a) What are the different types of Digital to analog Converters ? Explain one of the techniques in detail. **10**
   (b) What is Comparator ? Draw the characteristics of an ideal Comparator and that of a commercially available Comparator. What is the difference between a basic Comparator and the schmitt trigger ? **10**

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5. (a) Draw and explain the functional diagram of Timer IC 555 and explain its operation in astable mode. **10**

(b) Draw and explain the circuit diagram to generate square and triangular waveforms using Op-Amp. Derive the expression for frequency and Comment about the range of frequency. **10**

6. (a) What is the function of voltage regulator ? Explain in detail about fixed voltage series regulator. **10**

(b) Design a voltage regulator using IC 723 for V_o = 5V, I_o = 50 mA, I_{SC} = 75 mA, Vin = 15 V. Assume Vsense = 0·6 V. **10**

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

(a) RC phase shift oscillator

(b) KRC filter

(c) Peak detector

(d) Phase Locked Loop

(e) Voltage to frequency converters.

Sem I (Rev) Elex. 27/05/14.
(MP & ME-1)

QP Code : MV-18485

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. one is compulsory.
(2) Attempt any four from remaining six questions.
(3) Assume suitable data if require.

Q1 a) Explain the interrupt structure of 8085 Microprocessor 5 marks

b) Explain the control word format of PPI 8255 5 marks

c) Explain the interrupt structure of 8051 Microcontroller 5 marks

d) Explain addressing modes of ARM processor 5 marks

Q2. Design 8085 based system with following specifications.

i) CPU operating at 3 MHz

ii) 8KB EPROM using 2 KB devices

iii) 16KB SRAM using 4 KB devices

iv) Two 8 bit ports performing simple I/O data transfer

Draw detail interface diagram and its Memory mapping & I/O mapping using absolute decoding approach. 20 marks

Q3. a) a) Draw the timing diagram for i)STA 8000H ii) IN 85H 10 marks

b) Explain with the instructions used for serial communication in 8085 microprocessor. 10 marks

Q4. a) Explain with SFR used for timers and counters operation in 8051 microcontroller 10 marks

b) Explain addressing modes with one example of 8051 microcontroller 10 marks

Q5. a) Write the control word format for the I/O mode and BSR mode of the 8255. 10 marks

b) List the various operating modes of 8254? Explain with waveforms mode 2 & 3 operations. 10 marks

Q6 .a) Write an assembly language program to sort a given list of 10 numbers starting at memory location 8000H in ascending order for 8085 microprocessor 10 marks

b) Write an assembly language program to find biggest number in a block of data stored in the memory locations 80H- 8FH for 8051 microcontroller 10 marks

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Q. 7 Write a short note on

a) Mapping techniques -I/ O mapped I /O and memory mapped-I/O
b) Power saving modes of 8051 microcontroller
c) Addressing modes of ARM processor
d) Salient features of 8051

20 marks

T.E. (Elex) (rev) Sem V

02/06/14

CTSS

QP Code : **MV-18523**

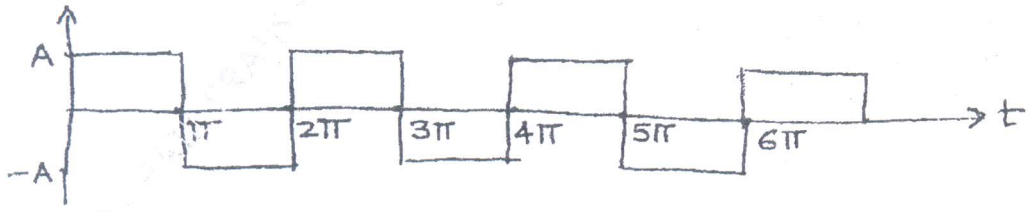
(3 Hours) **[Total Marks : 100**

N.B. : (1) Questions No. **1** is **compulsory.**
(2) **Solve** any **four** out of remaining **six.**
(3) **Assume** suitable **data** wherever **necessary.**

1. Solve any **four** :– **20**
   (a) Define ESD and PSD. What is the relation of ESD and PSD with autocorrelation ?
   (b) State the conditions which are required to be satisfied by function f(t) for Fourier series to exist.
   (c) Find whether following signal is energy or power signal :–
   $$x(t) = A\,e^{-at}\,u(t),\ a > 0$$
   (d) Explain the relationship between Fourier Transform and Laplace Transform of the signal.
   (e) State initial and final value theorem in Laplace Transform. Also find initial and final value if :– $x(s) = \dfrac{s+10}{s^2+2s+2}$

2. (a) A LTI system is given by :–
   $$\frac{d^2y}{dt^2} + \frac{5\,dy}{dt} + 6y(t) = 2x(t) \text{ with } y(0) = 2,\ y^1(0) = 4 \text{ and } x(t) = u(t)$$
   Find :–
   (i) Zero Input Response **4**
   (ii) Zero State Response **4**
   (iii) Total Response. **2**

   (b) Find the trigonometric Fourier series of the following function :– **10**



3. (a) Convolute the following signal :– **10**
   $$x(t) = e^{-t}u(t);\ \ h(t) = e^{-2t}u(t)$$
   (b) What are random functions ? Explain moments of random functions with suitable example. **10**

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4. (a) $x(s)=\frac{2s^2+5s+5}{(s+2)(s+1)^2}$ Find x(t) for all possible ROC. 10

(b) Classify the system based on Linearity, Time variance, Causality, Stability, Static/Dynamic :– 10

(i) $y(t) = \text{sint}\ x(t)$, Sin (t) · X(t)

(ii) $y(t) = e^{x(t)}$

5. (a) What is the PDF of Uniform, Exponential and Gaussian Distribution ? 10

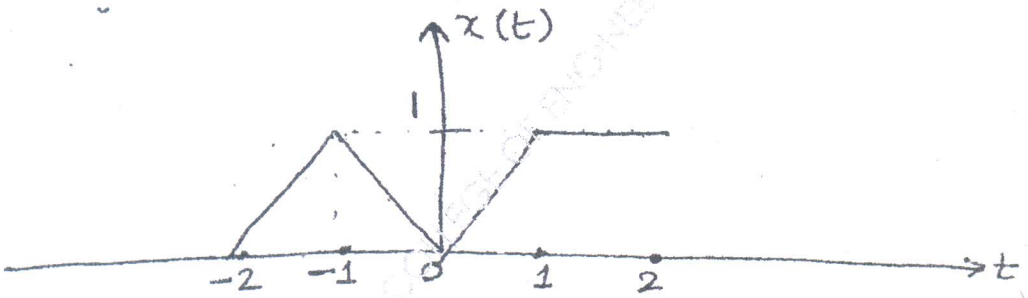
(b) Find the Fourier transform of ~~signal~~ function :– 10

Signum

6. (a) Obtain state variable model of continuous time LTI system described by differential equation :– 10

$$2\frac{d^2y}{dt^2}+3\frac{dy}{dt}+6y(t)=2x(t)$$

(b) Determine even and odd components of the signal :– 10



7. Write short notes on any **four** :– 20

(a) BIBO Stability and ROC

(b) Properties of Fourier Transform

(c) Gibb's phenomenon

(d) Random processes

(e) Rayleigh's energy theorem.

T.E. (Elex), Sem. V

06/06/2014

DCCT

QP Code : MV-18566

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of **remaining** questions.
(3) Assume **suitable** data if **required,** stating them **clearly**.

1. Answer any **four** :–
   (a) Differentiate between source coding and channel coding techniques with suitable example. **5**
   (b) Differentiate between systematic and nonsystematic codes with example. **5**
   (c) Explain the following terms :– **5**
      (i) Code rate
      (ii) Code effiency
      (iii) Hamming distance
      (iv) Hamming weight
      (v) Entropy.
   (d) Write a note on PN sequence generator. **5**
   (e) Justify in DEPSK transmission error always exists in pairs. **5**

2. (a) A discrete memoryless source has in alphabet of five symbols with their probabilities as shown :– **10**

Symbol	S1,	S2	S3	S4	S5
Prob.	0·15	0·11	0·19	0·4	0·15

   (i) Construct the Huffman code and calculate code efficiency and redundancy of the code.
   (ii) Repeat the same for shannon fano code and compare the Result.
   (b) How the capacity of a white Gaussian channel is calculated. Explain Bandwidth S/N trade off for the same. **10**

3. (a) For the binary data sequence 1011001 sketch waveforms of :– **10**
      (i) NRZ (Polar)
      (ii) BASK
      (iii) B FSK
      (iv) QPSK.
   (b) Explain QPSK system with respect to; transmitter Receiver block diagram, Bandwidth, signal space representation and euclidian distance. **10**

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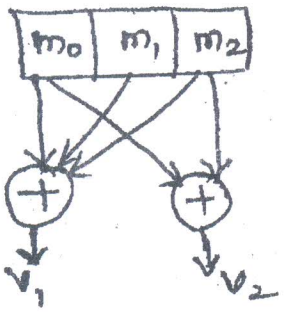
4. (a) The parity check matrix of a (7, 4) linear block code is given by :- 10

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

(i) Find the generator matrix
(ii) List oll code words
(iii) For the Received codeword R = 1011110 find the syndrome.

(b) For the conventional Encoder shown below sketch the code tree and trellis diagram . 10



Obtain the convolution code for the input bit sequence 110011.

5. (a) Explain the Nyquist criteria for distortionless baseband transmission. 10
(b) What is duobinary encoding. Explain with neat block diagram. How the duobinary encoder reduces the Bandwidth requirement. 10

6. (a) With a neat block diagram. Explain DSSS technique. What is processing gain and jamming margin. 10
(b) Why MSK is called shaped QPSK. Justify with relevent expressions and waveforms. 0

7. Write short not (any **four**) :- 20
(a) Eye pattern
(b) Matched Filter Receiver
(c) Viterbi algorithm
(d) Central limit theorem
(e) LZ coding.

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