T.E. ETRX sem-V Old EME 13/05/15

(OLD COURSE) Q.P. Code : **3764**

(3 Hours) [Total Marks : 100

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

1. (a) For the transmission line in +x direction with characteristics impedance zo, terminated witht the load impedance, Z_L, derive the expression for the voltage reflection coefficient — 5
   (b) Derive Poisson's and Laplace's equation. — 5
   (c) A uniform volume charge density of 0.2 μ c/m³ is present throughout the spherical shell extending from r = 3cm, to r = 5cm. If $\rho_v = 0$ elsewhere, Find the total charge present throughout the shell. — 5
   (d) A uniform plane wave at a frequency of 500 MHz travels in vaccum along the +X direction. The electric field of the wave at some instant is given as $\vec{E} = 5\overline{ay} + 4\overline{az}$ V/m. Find the phase constant of the wave and also the vector magnetic field. — 5

2. (a) Derive the expression for the power radiated by a Hertzian dipole. — 20

3. (a) A 25m transmission line with characteristic inpedance of 50Ω is terminated in load of 40 +j30Ω at a frequency of 10MHZ. Use Smith Chart to find the minimum length of the short circuited stub used for matching the load to the transmission line, and the minimum distance of the stub from the load. — 10
   (b) Derive the wave equation for an electromagnetic wave propagating in a source free region. — 5
   (c) Derive the reflection and transmission coefficent for a wave normally incident at a perfect dielectric. — 5

4. (a) Derive the reflection and transmission coefficent for a wave obliquely incident at a perfect dielectric with parallel polarization. — 10
   (b) What is polarization of electromagnetic waves ? Explain linear, circular and elliptical polarization in detail. — 10

5 (a) State poynting theorem. Derive the poynting vector. — 10
   (b) Explain electromagnetic interference and its effects. — 10

[TURN OVER

6. (a) A high frequency 50 Ω lossless line is 141.6 cm long with a relative dielectric constant εr = 2.49 at 500 MHz . It is terminated with the load impedance of (100+j150) Ω. Calculate, **10**
   (i) The VSWR
   (ii) The complex reflection coefficient
   (iii) The input impedance of the transmission line
   (iv) The impedance at a distance of 100 m from the load
   DO NOT USE SMITH CHART.

   (b) Derive an expression for the characterisitcs impedance of the transmission line. A transmission line has $Z_o = 65 + j5\Omega$ and $\gamma = 1+j20$ per meter. Find the primary constants of the line at 900 MHZ. **10**

7. (a) The magnetic field in some region is given by **10**

$$\vec{H} = \left[\frac{x+2y}{z^2}\vec{ay} + \frac{2}{z}\vec{a_z}\right] e^{j1000000t} \text{ A/m}$$

   If the region has a electric constant of 3 and zero conductivity, find the electric field in the region.

   (b) Derive the boundry conditions for normal and tangential components of electric field at the boundry of two dielectric media. **10**

T.E. Sem. V – CBGS → MQA 25/05/2015

(ETRX) (Microcontrollers)

QP Code : 3308

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

N.B. 1) Question no. one is compulsory
2) Solve any three from the remaining five questions.
3) Assume suitable additional data if necessary.

Q.1. Answer the following questions. (Any FIVE) (20)
a) Explain the difference between RET and RETI instructions as implemented in 8051 architecture.
b) What is the maximum address range of conditional jump instructions for 8051 architecture and justify the reason for the same.
c) Illustrate the circuit representation for interfacing single LED and relay to the port pins of 8051 architecture based processor.
d) Explain pipelining feature in ARM7TDMI architecture. Justify advantages and disadvantages.
e) Explain the significance of letters and numbers in – 'ARM7TDMI'.
f) Explain the bit orientations of CPSR register for ARM7TDMI architecture.

Q.2. a) Write a note on the various modes of operation of ARM7TDMI based processor. (10)
b) Explain the following 8051 architecture based instructions:
i) MOV C,0X10 ii) MUL AB iii) MOVC A, A+@0x2000 iv) INC 0X45
v) ANL A,@R0 (10)

Q.3. a) With a neat circuit representation illustrate interfacing of a typical 8-bit DAC to 8051 architecture based processor. Using DAC write a program in 8051 assembly to generate a triangular wave. (12)
b) Explain the programmer's model (register structure) in ARM7TDMI architecture. (08)

Q.4. a) Explain the various addressing modes with suitable examples available in 8051-architecture. (10)
b) Using internal timers write a program in 8051 assembly to generate a square wave of 10kHz frequency and 50% duty cycle on port pin P1.0. (10)

Q.5. a) Explain the following ARM7TDMI architecture based instructions as well as their implications
i) BL Square ii) ADD R0, R1, R2, LSL#3 iii) MOVEQS R1,R0
iv) LDR R8, [R3, #4] v) STR R2, [R1, #0x100] (10)
b) Write a brief note on the process of interrupts and their mechanism of acknowledgement in 8051 – architecture. (10)

Q.6. Write brief notes on
a) ARM7TDMI thumb mode of operation. (07)
b) Interfacing stepper/continuous motor to 8051 based microcontroller. (07)
c) Serial port and modes of operation in 8051 architecture. (06)

T.E. Sem VI (Old) ETRX 25/05/15 MAM MPMC I

(OLD COURSE) **QP Code : 3770**

(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.

Q.1.a) Explain addressing modes of 8051 microcontroller 5 marks
b) What is meant by wait state?
Show how wait state is generated for 8085 Microprocessor 5 marks
c) Write a short note on flag register of 8085 Microprocessor 5 marks
d) Explain the CPSR register of ARM Processor 5 marks

Q2. a) Explain the addressing modes of the ARM processor 10 marks
b) Explain the Interrupt structure of 8051 microcontroller 10 marks

Q.3. a) Draw timing diagram for 1) Op-code fetch ii) Memory read
iii) I/O read 6 marks
b) Explain SIM & RIM instructions of 8085 microprocessor 4 marks
c) Explain interrupt structure of 8085 microprocessor 10 marks

Q.4. a) Explain following instructions used in ARM with one example each.
i) LDM/STM ii) BIC iii) ADD/SUB iv) MVN v) BEQ 10 marks
b) Write a program to multiply two numbers for 8085 microprocessor
10 marks

Q.5. Design 8085 based system with following specifications. Draw detail interface diagram.
i) CPU operating at 3 MHz
ii) 16KB EPROM using 4 KB devices
iii) 32KB RAM using 8 KB devices
iv) One 8 bit input and One 8bit output port performing simple I/O data transfer in I/O mapped I/O.
Give its memory mapping & I/O mapping and use absolute decoding approach. 20 marks

Q. 6. a) Explain timers and counters with SFRs in 8051 microcontroller 10 marks
b) Explain addressing modes with example of 8051 microcontroller 10 marks

T. E. (Electronics)
(CTSS) Sem V Old Course
29/05/15

Q.P. Code : 3774

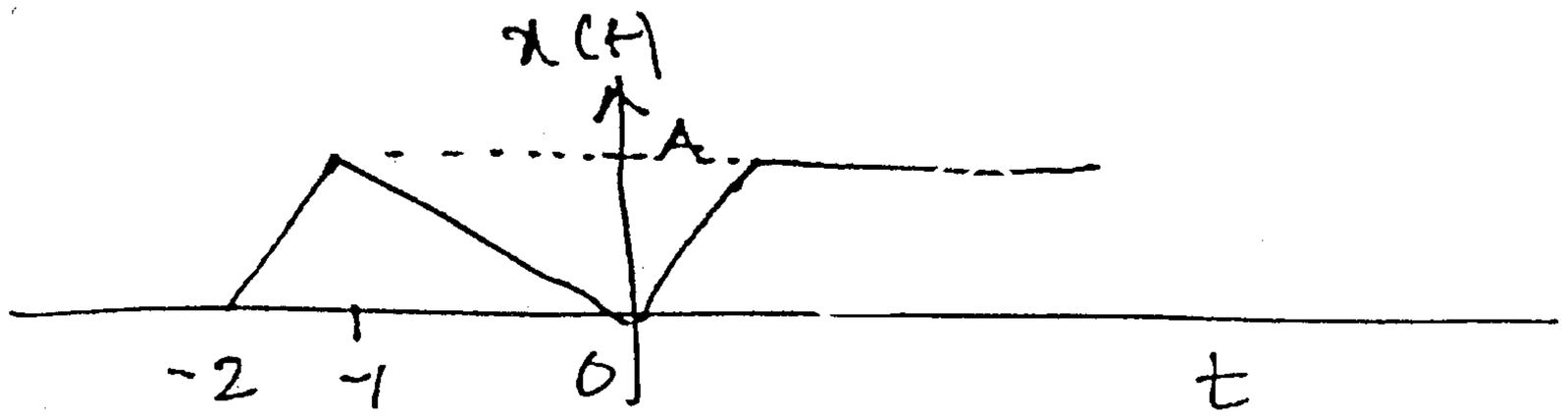
(OLD COURSE)

(3 Hours) [Total Marks : 100

N.B. : (1) Question **No. 1** is **compulsory**.
(2) Solve any **Four** questions out of remaining **Six**.
(3) Assume **suitable** data wherever necessary.

1. (a) State following properties of Fourier Transform. 5
(i) Time Shifting (ii) Frequency Shifting (iii) Scaling
(iv) Time differentiation (v) Homogeneity.
(b) Determine energy / power of signal 5
(i) $x(t) = 5u(t)$, (ii) $x(t) = 10\,t\,u(t)$.
(c) Check linearity and time invariance of following systems. 5
(i) $y(t) = t^2 x(t)+3$, (ii) $y(t) = x(t)+3x(t+1)$.
(d) State initial and final value theems of Laplace transform. 5

2. (a) Determine odd and even components signal. 10



(b) Determine Fourier transform of signum signal. 5
(c) Convolve the following signals. 5
$x(t) = 3\delta(t+3) + 2\delta(t+1) + \delta(t) - \delta(t-1)$
$y(t) = 2\delta(t+2) - 3\delta(t) + 2\delta(t+1) + 4\delta(t-2)$

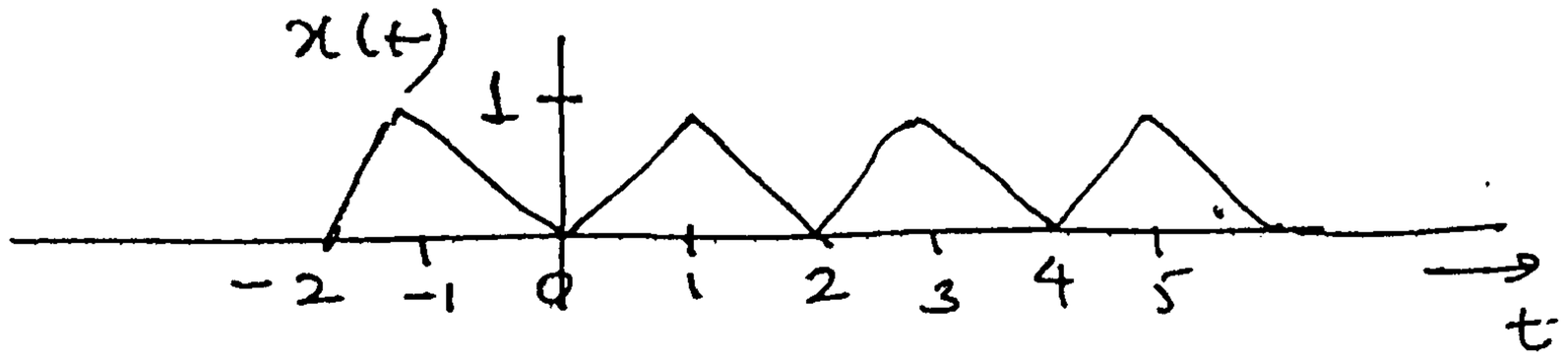
3. (a) For a LTI system described by differential equation 10

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

Find
(i) Transfer function
(ii) Impulse Response
(iii) Step Response

(b) Explain PDF of uniform, exponential & Gaussian distribution 10

4. (a) Find Fourier series of following signal 10



(b) Obtain state variable model of LTI system described by equation. 10

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

5 (a) Determine step response of system where impulse response is $h(t) = e^{-t}u(t)$. 10

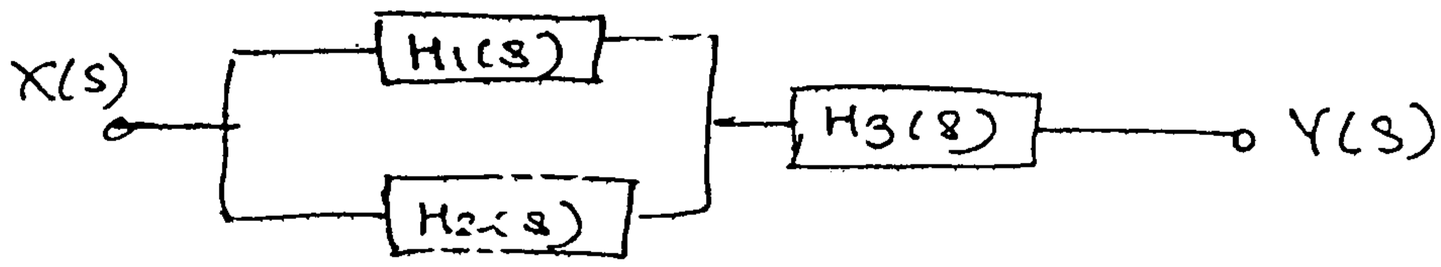
(b) Determine the different random process. 10

(a) Obtain inverse Laplace transform of 10

$$X(s) = \frac{4}{(s+1)(s+2)^2}$$

For all possible region of convergence. 10

(b) Find impulse response of overall system



$$H_1(S) = \frac{4}{S+2}, \quad H_2(S) = \frac{-3}{S+1}, \quad H_3(S) = \frac{S+2}{S-2}.$$

20

7. Write short notes on: (any Four)
   (a) Parseval's Theorem.
   (b) Dirichlet's Conditions.
   (c) Gibb's Phenomenon.
   (d) Rayleigh's Energy Theorm.
   (e) Auto correlation.
