MV-18458 - Microprocessors & Microcontrollers I

TE (EXTC) (V) (Rev) 21/5/2014

QP Code : MV-18458

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

- Q1. is compulsory
- Solve any four out of remaining

Q1 A. State features of ARM controller. (5- marks)

Q1 B. Explain SIM instruction of 8085. (5- marks)

Q1 C. Explain TCON register of 8051 (5- marks)

Q1 D. Compare features of 89C51, 89C52, 89C2051 and 89C2052 (5- marks)

Q2. A. Design 8085 based system with following specifications (10- marks)

a. CPU working at 6 MHz.
b. 16 KB EPROM using 8 K device.
c. 8 KB SRAM using 4 K device.

Q2 B. Write assembly language program for 8085 to move a block of 10 numbers stored at location 2100 to location 3100. (10- marks)

Q3 A. Explain ICW's and OCW's of PIC 8259. (10- marks)

Q3 B. Explain strobed input output mode of PPI 8255. (10- marks)

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Q4 A. Draw and explain internal memory organization of 8051. (10- marks)

Q4 B. Explain 8253 control word format and set up the 8253 as a square wave generator with 1 ms period if input frequency to 8253 is 1 MHz. (10- marks)

Q5 A. Explain addressing modes of ARM controller. (10- marks)

Q5 B. Given an array of 10 numbers, write assembly language program for 8051 to find smallest amongst the ten numbers stored from memory location 3000. (10- marks)

Q6 A. Draw and explain timing diagram of following 8085 instructions

a. MVI M, 25 H
b. LDA 3200 (10- marks)

Q6 B. Draw and explain internal structure of Port -1 and Port-3 of 8051. (10- marks)

Q7. A. Write a program to display message on an 8-bit 7-segment LED display that is interfaced through Port-1 and Port-3 of 8051. (10- marks)

Q7 B. Draw and explain interrupt structure of 8085. (10- marks)

TE | EXTC | sem-V CBSD
-RFCD. 27/5/14.

QP Code: **MV-18497**

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

N.B. : (1) Question 1 is compulsory.
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume suitable data whereever required and justify the same.

1. (a) Explain the term Insertion Loss, Ripple factor and Band-width related to filter design. 5
(b) Compare Microstriplines wih striplines. 5
(c) Explain Simplified Eber's-moll model for forward active mode of transister. 5
(d) Draw equivalent circuit representation of two wire transmission line. Explain primary and secondary parameters for the same. 5

2. (a) Explain Richards transformation and krudas Indentity. How they are used in realization of RF Filter? 10
(b) Explain the role of scattering parameters and it's properties at RF and microwaves. 10

3. (a) Derive power consideration for transmission line when.
(I) Load Impedance Z_L & source Impedance Z_S are matched.
(II) Z_L is matched and Z_S is mismatched. 10
(b) A transmission line of characteristic Impedence $Z_0 = 50\ \Omega$ and $d = 0.15\ \lambda$ is terminated with a Load impedence of $Z_L = (25 - j\ 30)\ \Omega$. Find reflection coefficient, input impedence at distance 'd' and VSWR by using Z - smith chart. 10

4. (a) Explain in brief the principle operation of HEMT and MESFET along with their construction. 10
(b) Find he attenuation of 4 element, 2.5 dB ripple, Low pass chebyschew filter at $\frac{W}{W_c} = 2.5$. 10

5. (a) Explain different types of diode model's (RF) and differentiate them with respect to Junction capacitance, band gap energy and conductance. 10
(b) Explain what is skin depth? Calculate the skin depth for copper and aluminum at 1GHz and 10 GHz and Find the resistance of a 10cm wire with diameter of 1mm. 10
$6_{cu} = 64.516 \times 10^6$ s/m, $6_{Al} = 40 \times 10^6$ s/m.

6. (a) Derive expressions for internal, external and loaded quality factors for standard series and parallel resonant circuit. 10

(b) For a transmission line circuit involving source and load terminations of $Z_G = 60\ \Omega$ and $Z_L = 50\ \Omega$ respectively and $Z_0 = 75\ \Omega$. Compute the input power and power delivered to Load. Assume lengh of line to be $\frac{\lambda}{4}$ with source of $V_G = 8V$. **10**

7. Write Short note on :-
   (a) Schotky contacts **7**
   (b) Equivalent circuit of Resistor's, Inductor and capacitor **7**
   (c) ABCD parameter **6**

PCS - T.E. - V (R) - 6/6/14.
EXTC

RT–Exam.–Feb.–14–1–96

QP Code : MV–18578

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

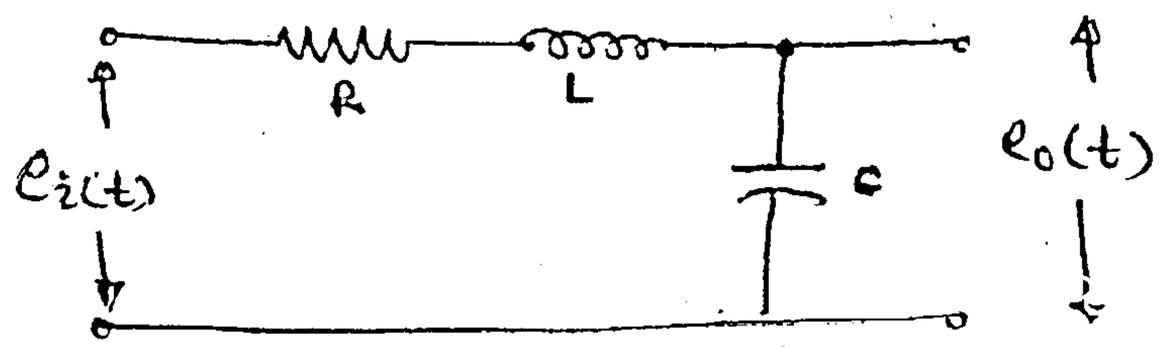
N.B. : (1) Question No. **1** is **compulsory**.
(2) Answer any **four** out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable **data** if **necessary**.

1. Answer the following :– **20**

(a) Explain the concept of relative stability.

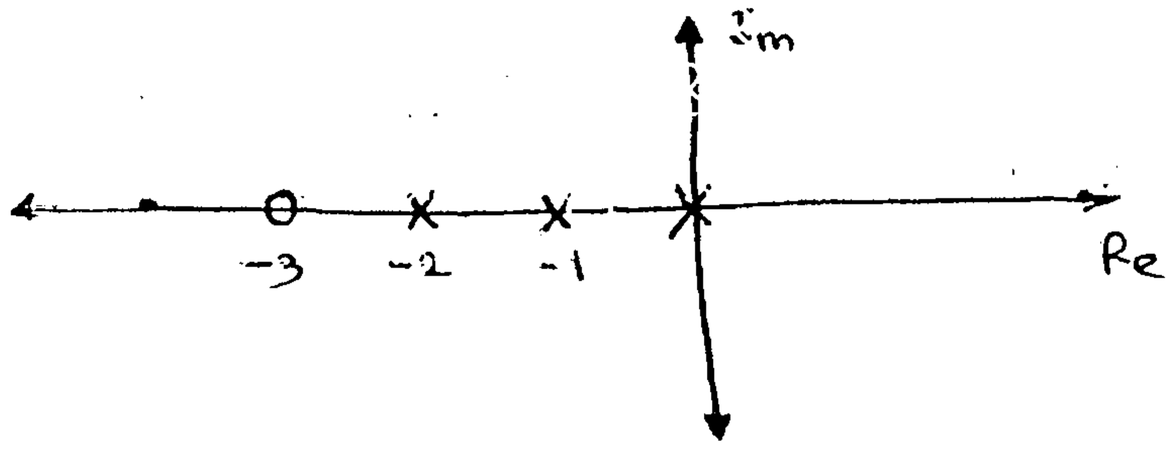
(b) What do you mean by frequency domain analysis and explain the frequency domain performance indices.

(c) Find out the T.F. of the given network.

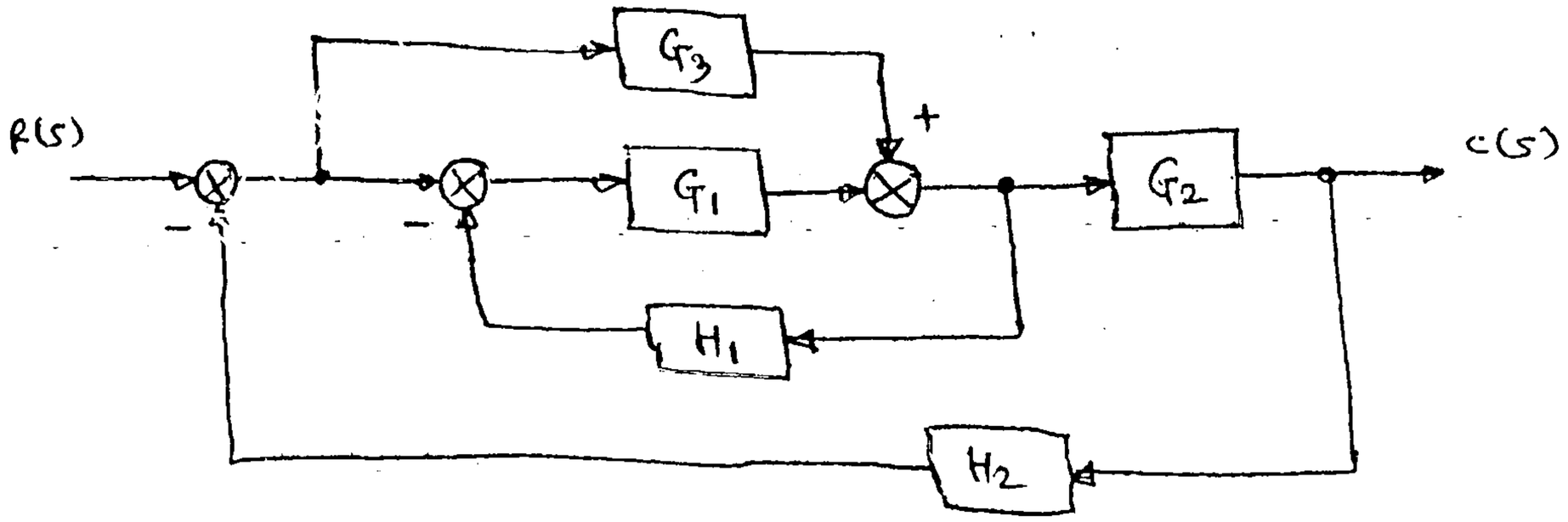


(d) State the limitations of static error coefficient method.

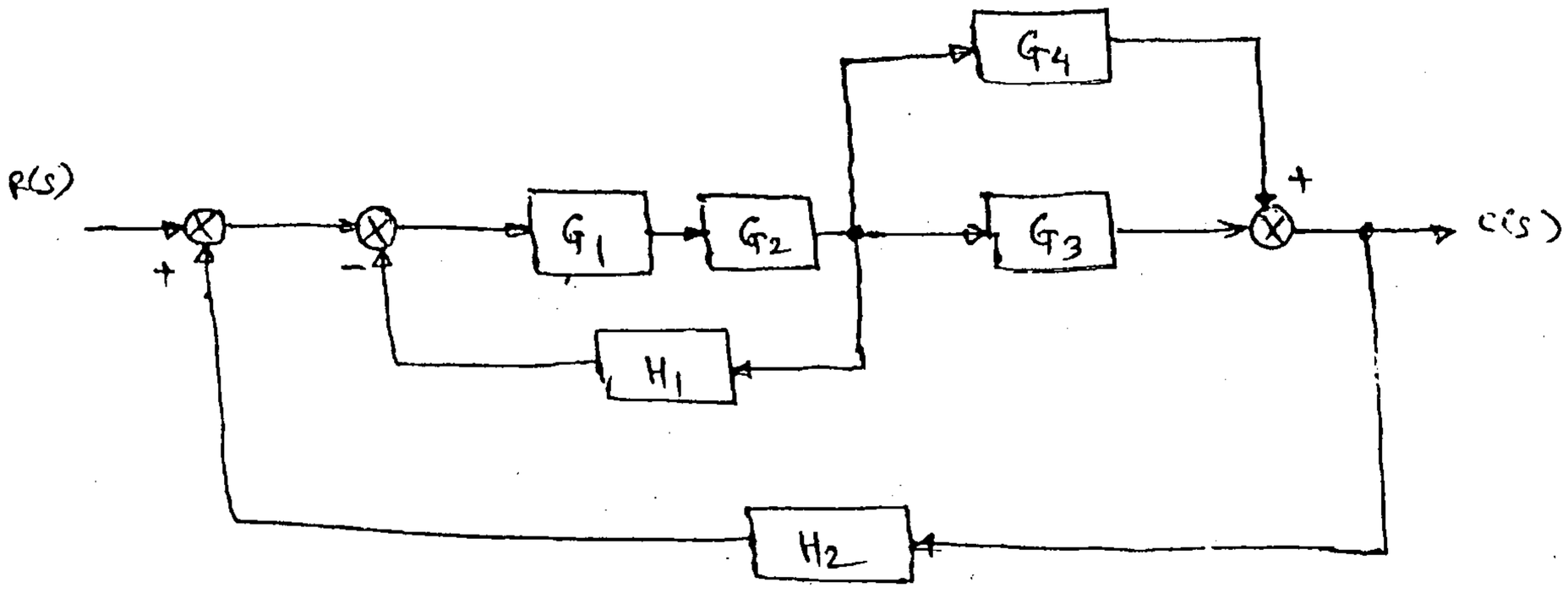
(e) The forward path gain of a system is 2.5 and Pole-zero configuration of the system is shown below, find the overall transfer function and type of the system for unity feedback.



2. (a) Reduce the block diagram and obtain its transfer function. **10**



(b) Draw the corresponding signal flow graph of given block diagram and find $\frac{C(s)}{R(s)}$. **10**



3. (a) Write detailed note on transient response specifications. **10**

(b) A unity feedback system has – **10**

$$G(s) = \frac{40(s+2)}{s(s+1)(s+4)}$$

Determine : (i) Type of the system
(ii) All error coefficients
(iii) Error for ramp input with magnitude 4.

4. (a) Discuss the stability of the following systems for given characteristic equation using Routh-Hurwitz criterion – **10**

(i) $s^6 + 4s^5 + 3s^4 - 16s^2 - 64s - 48 = 0$

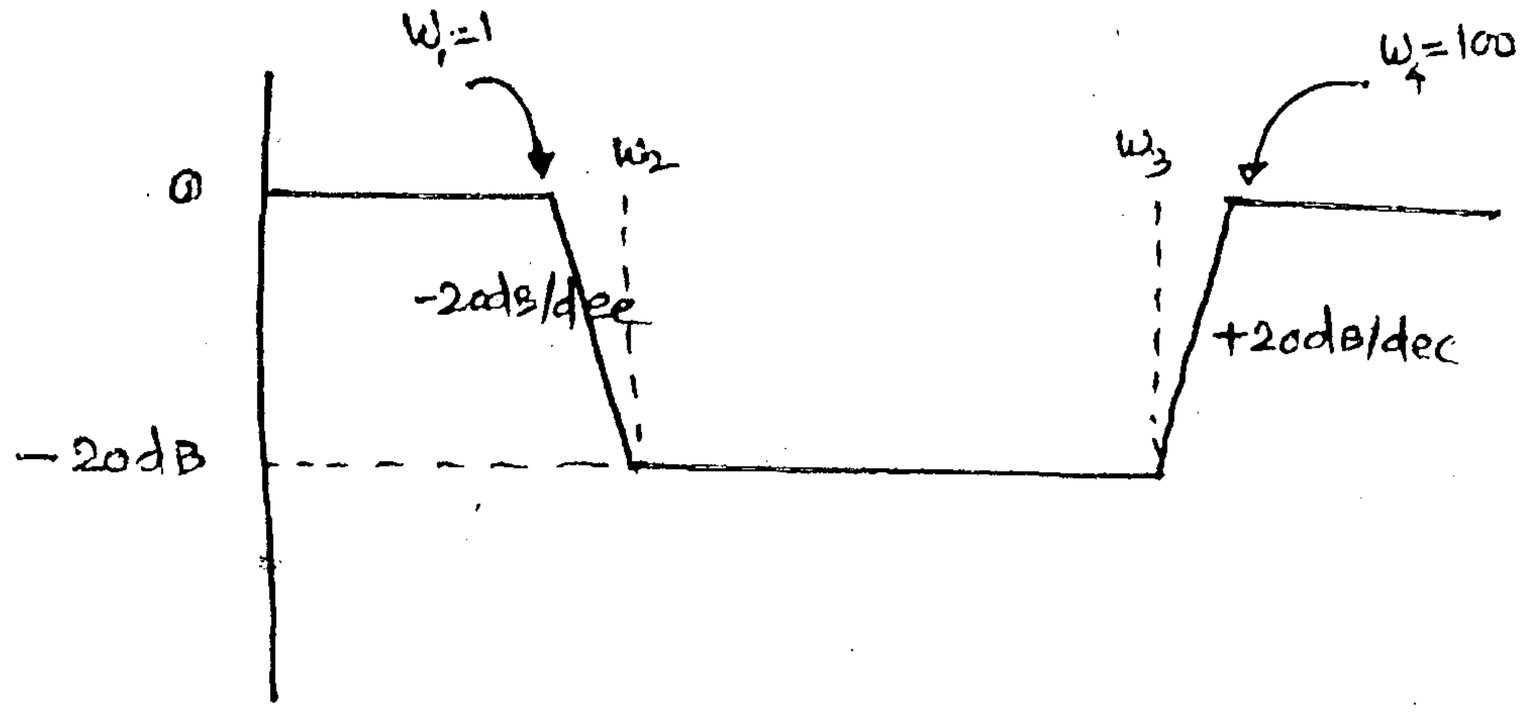
(ii) $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$

(b) A feedback control system has an open-loop transfer function. **10**

$$G(s) = \frac{K}{s(s+3)\left(s^2+2s+2\right)}$$

Find the root-locus as $K \to 0$ to ∞.

5. (a) Determine the transfer function of a system whose asymtotic gain plot is given below :— **10**



(b) For a particular unity feedback system, **10**

$$G(s) = \frac{242\,(s+5)}{s(s+1)\left(s^2+5s+121\right)}$$

Sketch the Bode plot and find W_{gc}, W_{pc}, G.M., P.M. and comment on stability.

6. (a) Obtain the transfer function of Armature controlled D.C. shunt motor. Draw the block diagram. **10**

(b) For a certain control system **10**

$$G(s)\cdot H(s) = \frac{K}{s(s+2)(s+10)}$$

Sketch the Nyquist plot and hence calculate the range of K for stability.

7. Write detailed notes on any **two** :— **20**
   (a) Constructional features, schematic diagram and working of Synchros.
   (b) Error Compensation Techniques.
   (c) Tachogenerators.

/ TE sem v extc Signal & Sy/Aero

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QP Code : MV-18541

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from the remaining **six** questions.
(3) Assumptions any **suitable** data whenever **required** but Justify the **same** and should be **clearly** stated.

1. (a) Prove time shifting property of Z-transform. **20**
(b) Given —

$$X(z) = \frac{z(z-4)}{(z-1)(z-2)(z-3)}$$

(a) State all possible region of convergence.
(b) For which ROC is X (Z) the Z-transform of a causal sequence ?

(c) Determine whether or not each of the following signals is periodic. If so, determine its fundamental period.

(i) $x(t) = \cos\left(2t + \frac{\pi}{4}\right)$

(ii) $x[n] = e^{j\frac{\pi}{4}n}$

(d) Check dynamicity, Linearity, Time Variance, Causality and Stability of—

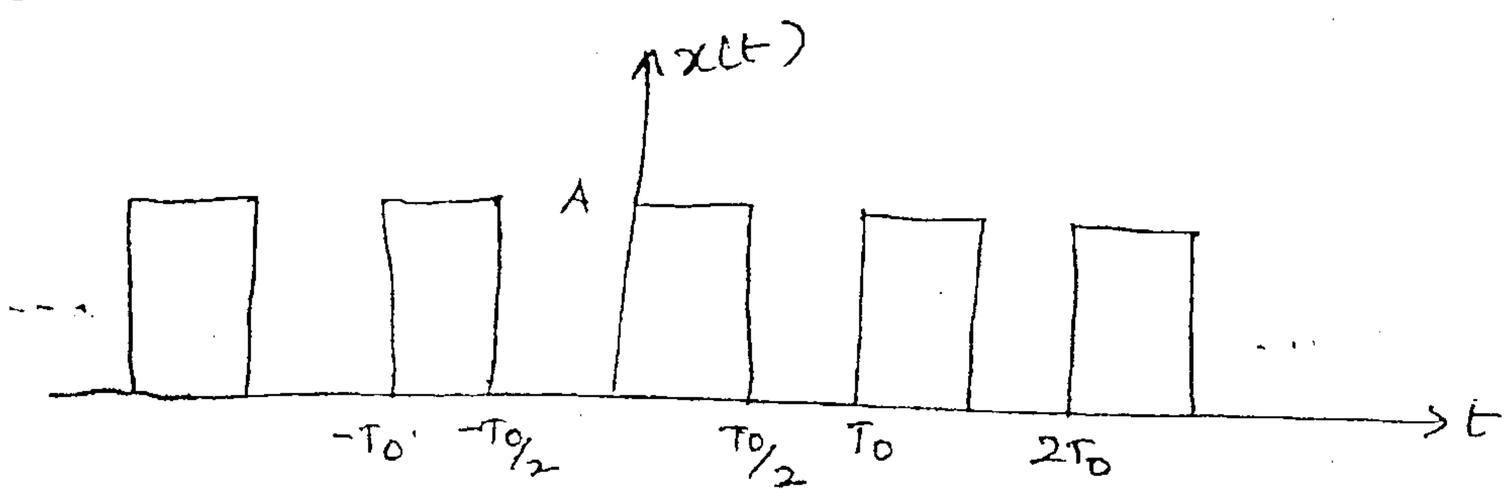
$$y[n] = x[n/2]$$

(e) Sketch the odd and even parts of the signal y (t) = t u (t–2).

2. (a) Perform convolution in time domain of — **6**

(i) x (t) = u (t) – u (t–3) with
h (t) = u (t) – u (t–2) and sketch its output.

(b) What is the output of t δ (t) and sint δ (t) ? Prove the same. **4**
(c) Consider the periodic square wave x (t). shown in figure below. Determine its Trignometric Fourier Series. **10**



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3. (a) Plot the signal x (t) w.r. to time x (t) = 2r (t) – 2r (t–1) – 2u (t–3) and hence Sketch — 8

(i) x [1 – t]

(ii) x [t + 2]

(iii) x [2t – 1]

(b) Mention the properties of ROC. 5

(c) Consider a causal discrete time filter described by the impulse response. 7

$$h[n] = \frac{1}{3}\{\delta[n] + \delta[n-1] + \delta[n-2]\}$$

(i) Sketch the impulse response h [n] of the filter.

(ii) Find the frequency response | H (Ω) | of the filter.

(iii) Sketch the magnitude response | H (Ω) |.

4. (a) Solve the second-order Linear differential equation. 6

$y''(t) + 5y'(t) + 6y(t) = x(t)$

With the initial conditions y (0) = 2,

$y'(0) = 1$ and $x(t) = e^{-t}u(t)$.

(b) Find the Inverse Laplace Transform of— 6

$$X(s) = \frac{s^3 + 2s^2 + 6}{s^2 + 3s} \text{ if ROC Re (s) > 0.}$$

(c) Find the Laplace Transform of and Draw its ROC. 8

(i) $x(t) = e^{-2t}\{u(t) - u(t-5)\}$

(ii) $x(t) = e^{-3t}\{u(t)\} + e^{2t}u(-t)$

5. (a) $x[n] = a^{|n|}$ $a > 0$ 6

(i) Sketch $x[n]$ for $a > 1$ and $a < 1$

(ii) Find X (Z) and sketch the pole-zero plot and ROC for $a < 1$ and $a > 1$.

(b) Prove differentiation in z domain property of Z-Transform. 4

(c) A causal discrete – time LTI system is described by— 10

$$y[n] - \frac{3}{4}y[n-1] + \frac{1}{8}y[n-2] = x[n]$$ where x [n] & y [n] are the input and output of the system respectively.

(i) Determine the system function H (z).

(ii) Find the impulse response h [n] of the system.

(iii) Find the step response s [n] of the system.

6. (a) A causal discrete – time LTI system is described by— 10

$$y[n] - \frac{3}{4} y[n-1] + \frac{1}{8} y[n-2] = x[n] + \frac{1}{3} x[n-1]$$

(i) Obtain Direct Form II structure of the system.
(ii) Obtain Direct Form I structure of the system.
(iii) Obtain cascade structure of the system in terms of first order sections.
(iv) Obtain Parallel structure of the system in terms of first order sections.

(b) Determine the Direct Form realisation of — 5

$$h[n] = \left(\frac{1}{2}\right)^n \{u[n] - u[n-5]\}$$

(c) A system has an impulse response h [n] as $h[n] = (0\cdot7)^n u[n] - (0\cdot5)^n u[n]$. 5
Show Parallel realisation.

7. (a) If $A = \begin{bmatrix} -3 & 0 \\ 0 & -2 \end{bmatrix}$ Find state Transition matrix [STM] in Z domain and time domain. 6

(b) Determine the state variable model (SVM) of -- 6

$y[n] + a_1 y[n-1] + a_2 y[n-2] + a_3 y[n-3] = bx[n]$

(c) The state variable model (SVM) of a CT LTI system is — 8

$$\begin{bmatrix} x_1' & (t) \\ x_2' & (t) \end{bmatrix} = \begin{bmatrix} 0 & 2 \\ -3 & -5 \end{bmatrix} \begin{bmatrix} x_1 & (t) \\ x_2 & (t) \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

Calculate the state Vector $[\, x_1(t)\ x_2(t)\,]^T$

TE- EXTC; SEM V (Rev)
R.S.A

May 2014
15/05/14

QP Code : **MV-18413**

(3 Hours) [Total Marks : 100

N. B. : (1) Question **No. 1** is **compulsory**.
(2) Attempt **any four** questions out of remaining **six** questions.

1. (a) Explain any two properties of cross correlation function. 5
(b) State and prove any two properties of Probability Distribution Function. 5
(c) Define Strict Sense Stationary and Wide Sense Stationary Process. 5
(d) State and explain joint and conditional Probabilities of events. 5

2. (a) Box 1 contains 5 white balls and 6 black balls. Box 2 contains 6 white balls and 4 black balls. A box is selected at random and then a ball is chosen at random from the selected box. 8
(i) What is the probability that the ball chosen will be a white ball?
(ii) Given that the ball chosen is white, what is the probability that it came from Box 1?
(b) The joint Probability density function of (x ,y) is given by 12
$f_{xy(x, y)} = Ke^{-(x + y)}$; $0 < x < y < \infty$
Find : K
(i) Marginal densities of x and y
(ii) Are x and y independent?

3. (a) If X and Y are two independent random variables and if Z = X + Y, then prove that the probability density function of Z is given by convolution of their individual densities. 10
(b) Find the characteristic function of Binomial Distribution and Poisson Distribution. 10

4. (a) Define Central Limit Theorem and give its significance. 5
(b) Describe sequence of random variables. 5
(c) State and prove Chapman – Kolmogorov Equation. 10

5. (a) Find the autocorrelation function and power spectral density of the random process x(t) = a cos (bt + Y) where a, b and constants and Y is random variable uniformly distributed over $(-\pi, \pi)$. 10
(b) Show that the random process given by 10
$x(t) = A \cos (w_0 t + \theta)$
Where A and w_0 are constant and θ is uniformly distributed over $(0, 2\pi)$ is wide sense stationary.

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6. (a) Explain power spectral density function. State its important properties and prove any one of the property. **10**

   (b) Prove that if input to LTI system is WSS, then the output is also WSS. **10**

7. (a) Prove that the Poisson process is Markov Process. **5**

   (b) The transition matrix of Markov chain with three states 0, 1, 2, is given by $P = \begin{array}{c} \\ 0 \\ 1 \\ 2 \end{array} \begin{array}{c} \begin{array}{ccc} 0 & 1 & 2 \end{array} \\ \begin{bmatrix} 0.75 & 0.25 & 0 \\ 0.25 & 0.5 & 0.25 \\ 0 & 0.75 & 0.25 \end{bmatrix} \end{array}$ **10**

   and the initial state distribution is

   $P(x_0 = i) = 1/3, \quad i = 0, 1, 2.$

   Find : (i) $P[x_2 = 2]$ (ii) $P[x_3 = 1, x_2 = 2, x_1 = 1, x_0 = 2]$

   (c) Define Markov Chain with an example and application. **5**

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