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## SARDAR PATEL UNIVERSITY

M.Sc. (Electronics and Communication) (Sem – III) Examination - 2017

Day &amp; Date : 2-11-2017, Thursday

Time : Subject : Satellite Communication

Subject Code : PS03CELC01

Instructions :

[a] Figure to the right indicates full marks.

Total Marks : 70

[b] All questions are compulsory.

**Q-1 Choose the correct answers [08]**

- 1 \_\_\_\_\_ provides an accurate time reference for the burst position in frame  
a) BCW                                      b) SIC                                      c) CBR                                      d) None of above
- 2 An orbit in which the satellite moves in the same direction as the earth moves is known as a \_\_\_\_\_.  
a) Prograde orbit                              b) Retrograde orbit                              c) Inclination                              d) Line of apsides
- 3 The no. of bits transmitted as burst is given by \_\_\_\_\_.  
a) bit rate \* buffer capacity                              b) buffer capacity \* frame time                              c) bit rate \* frame time                              d) None of above
- 4 SCPC systems are used on lightly loaded routes, this type of service being referred to as a \_\_\_\_\_ service.  
a) Preamble                                      b) Postamble                                      c) Thick route                                      d) Thin route
- 5 Calculate the radius of a circular orbit from kepler's third law for which period is 1 day.  
a) 46,241 km                                      b) 42,241 km                                      c) 24,421 km                                      d) 46,000 km
- 6 SIC is used for \_\_\_\_\_.  
a) Overlap signal                                      b) Transmitting signal                                      c) Transmitting station                                      d) Both [b] & (c)
- 7 A burst at the beginning of each frame is termed as a \_\_\_\_\_.  
a) CBR                                      b) Reference burst                                      c) Guard time                                      d) All of above
- 8 The mutual information  $I(X; Y)$  is defined as \_\_\_\_\_.  
a)  $r C_s$  b/symbol                                      b)  $H(X) - H(X/Y)$  b/symbol                                      c)  $H(X)$  b/symbol                                      d)  $r C_s$  b/sec

**Q-2 Attempt Any Seven out of the followings [14]**

1. Determine which of the following years are leap years: [a] 1987, [b] 1988, [c] 2000 & [d] 2100
2. Explain Back-off loss and EIRP.
3. Differentiate between TDMA & FDMA.
4. Define the following terms :  
[a] CBR & [b] BCW
5. Draw a neat labeled diagram of Frame and burst format for TDMA system.
6. Find out the Julian day for 13 hr UT on 18 Dec 2000. (Jan 0.0 2000 = 2451543.5 Julian day)
7. Represent the data 10111101 using the following digital data formats with the help of neat figures  
[a] Unipolar RZ, [b] Unipolar NRZ & (c) Split phase Manchester
8. Give the transponder channel assignment for the earth station in FDMA.
9. Calculate the average length of the civil year in the Gregorian calendar.

Q-3 [a] State the Kepler's laws and also discuss the various terms of earth orbiting satellite. [06]

[b] For a total transmit power ( $P_t$ ) of 1000w, determine the energy per bit ( $E_b$ ) for transmission rate of 80Mbps. [06]

OR

[b] Explain the following terms : [06]

[a] Calendar [b] Geo-stationary satellite

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- Q-4 [a] Explain the function of preamble and postamble in a traffic. [06]  
 [b] Explain the need for reference burst in a TDMA system. [06]

OR

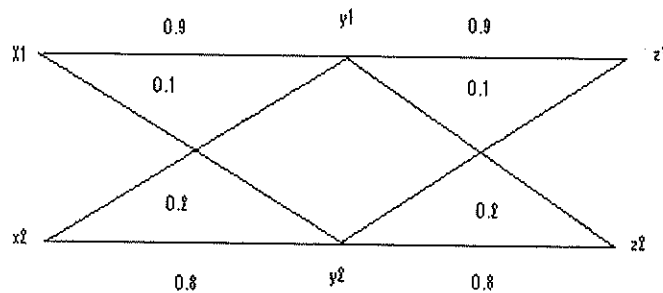
- [b] Describe the general operating principle of TDMA network. [06]  
 Q-5 [a] Explain the channeling scheme for spade system in detail. [06]  
 [b] Discuss the various methods of demand assigned FDMA. [06]

OR

- [b] Explain in detail the operation of a Preassigned SCPC network [06]  
 Q-6 [a] Explain the BPSK base band signal also sketch the BPSK waveform for the [06]  
 sequence 11100101 assuming the carrier frequency to be equal to the bit rate.  
 [b] Define Entropy. Discuss the different types of channels. [06]

OR

- [b] Two BSC are connected in cascade as shown in figure [06]  
 (i) find the overall channel matrix of the resultant channel,  
 (ii) find  $P(Z1)$  and  $P(Z2)$  when  $P(x1) = P(x2) = 0.5$



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**Q-1 Choose the correct Answer.****[08]**

1. A signal  $x(n)$  is called symmetric when  $x(-n) = \underline{\hspace{2cm}}$  in discrete time signal  
 a)  $x(n)$                       b)  $-x(n)$                       c)  $x(n-1)$                       d)  $x(n-2)$
2. Which of the following system described by input-output relationship is casual?  
 a)  $y(n) = x(n-1)$       b)  $y(n) = x(n) - x(n-1)$       c)  $y(n) = x(n-1)$       d)  $y(n) = x(n)$
3. Z – Transform of  $\delta(n)$  is \_\_\_\_\_.  
 a)  $Z^{-3}$                       b)  $Z^3$                       c) 1                      d) 0
4. \_\_\_\_\_ is the property of DFT ,for the time domain  $x(N-n)$   
 a) Time reversal      b) Linearity      c) Periodicity      d) circular convolution
5. The direct computation of DFT requires \_\_\_\_\_ real multiplication.  
 a)  $4N^2$                       b)  $4N^3$                       c)  $4N^4$                       d)  $4N^5$
6. Twiddle factor for DFT  $W_N = \underline{\hspace{2cm}}$ .  
 a)  $e^{j2\pi/N}$                       b)  $e^{-j2\pi/N}$                       c)  $e^{-j2\pi kn/N}$                       d)  $e^{j2\pi kn/N}$
7.  $W_8^4 = \underline{\hspace{2cm}}$   
 a) 0                      b) 1                      c) -1                      d) J
8. The z – transform of  $u(n)$  is \_\_\_\_\_.  
 a) 1                      b)  $\frac{1}{1-z^{-1}}$                       c)  $\frac{z^{-1}}{1-z^{-1}}$                       d)  $\frac{az^{-1}}{1-az^{-1}}$

**Q-2 Answer in short.(Any seven)****[14]**

1. Give the block diagram of digital signal processing.
2. Give the advantages of digital over analog signal processing.
3. Define unit ramp signal and exponential signal.
4. Determine the z-transform of  $(\cos \omega_0 n)u(n)$ .
5. Explain correlation of two sequences in z-transform.
6. Give the frequency analysis equation of Discrete-Time A periodic signals.
7. Compute the DFT of the four point sequence  $x(n) = (0, 1, 2, 3)$ .
8. Discuss linearity and symmetry properties of DFT.
9. Write the formulas for finding DFT and IDFT for N-point discrete time sequence.

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- Q-3 (A)** Explain block diagram representation of Discrete-Time systems. [06]
- (B)** Give the classification of Discrete Time signal. [06]

OR

- (B)** Determine the impulse response  $h(n)$  for the system describe by the second order difference equation. [06]

$$Y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$$

- Q-4 (A)** Determine the z-transform of the signal  $x(n] = \left(\frac{1}{2}\right)^n u(n)$ . [06]
- (B)** Explain any four properties of z-transform. [06]

OR

- (B)** Explain power density spectrum of periodic signal in detail. [06]

- Q-5 (A)** Explain any Three properties of Discrete Fourier Transform (DFT). [06]
- (B)** Explain Parseval's theorem for periodic discrete signal. [06]

OR

- (B)** Perform circular convolution of the following two sequences; [06]

$$X_1(n) = x(n) = \left\{ \frac{2}{7}, 1, 2, 1 \right\} \text{ and } X_2(n) = x(n) = \left\{ 1, 2, 3, 4 \right\}$$

- Q-6 (A)** Explain overlap add method for linear filtering. [06]
- (B)** Explain Symmetric and Antisymmetric FIR filters with necessary equations. [06]

OR

- (B)** Explain overlap save method for linear filtering. [06]

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(117)

SEAT No. \_\_\_\_\_

No. of printed pages: 03

Sardar Patel University

M.Sc. (Electronics & Communication) (Semester-III)

Wednesday, 8-11-2017, 2:00 p.m. to 5:00 p.m.

PS03CELC03: Control System

Total Marks: 70

Q-1 Choose the correct Answer. [08]

1. A system in which output is dependent on input but controlling action is totally independent of the output is known as ..... control system.

- a) Open loop
- b) closed loop
- c) linear
- d) time invariant

2. In control system, feedback is used to .....

- a) increase gain
- b) reduce sensitivity
- c) improve sensitivity
- d) none

3. Steady state error for a Ramp input is .....

- a)  $e_{ss} = A/K_v$
- b)  $e_{ss} = A/1+K_p$
- c)  $e_{ss} = A/K_a$
- d) none

4. If the damping ratio is equal to 1 then it is called as.....

- a) critically damped
- b) under damped
- c) over damped
- d) none

5. If the damping ratio is greater than 1, it is called as.....

- a) critically damped
- b) under damped
- c) over damped
- d) none

6. The frequency at which resonant peak occurs in closed loop frequency response is called as .....

- a) resonance peak
- b) resonant frequency
- c) cutoff frequency
- d) bandwidth

7. In translational motion system "K" indicates.....

- a) displacement
- b) flux linkage
- c) spring
- d) angular displacement

8. In rotational motion system "J" indicates.....

- a) inertia
- b) flux linkage
- c) torque
- d) angular displacement

Q-2 Answer in short. (Any seven) [14]

1. Write the difference between linear and non linear system.

2. What are the requirements of the good control system?

3. Find the inverse Laplace transform of  $\frac{1}{2s-3}$

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4. Give the classification of potentiometer.
5. Explain step input and impulse input of typical test signals.
6. Explain Ramp input for static error constant.
7. What is damping ratio?
8. Define (i) Bandwidth and (ii) Cut off frequency.
9. Define : (i) Rise time and (ii) Settling time

Q-3 (A) Find inverse Laplace transform of equation: [06]

$$X(s) = \frac{-3}{(s+2)(s-1)}, \quad \text{If ROC is: (1) } -2 < \text{Re}(s) < 1 \quad (2) \text{Re}(s) > 1$$

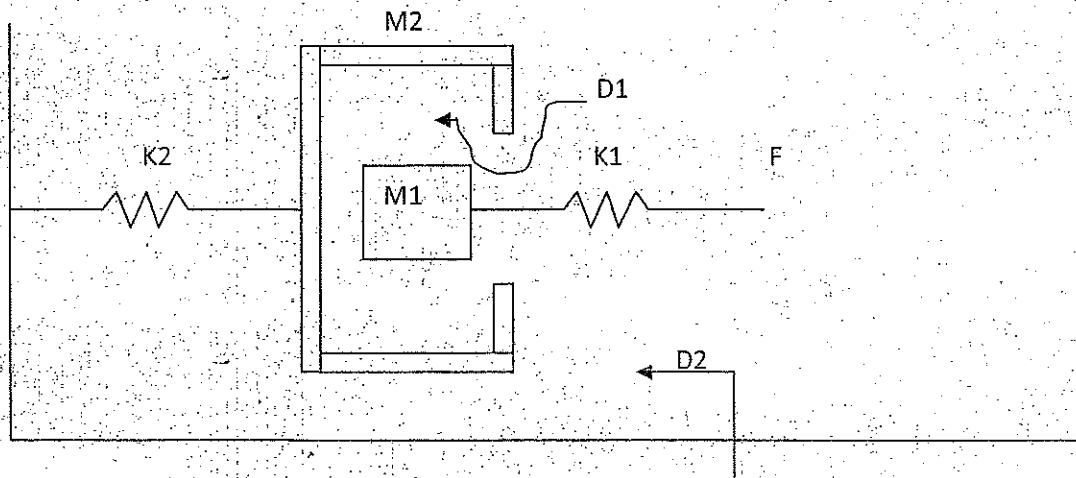
(B) Solve linear differential equation and find inverse Laplace [06]

$$\frac{d^2x}{dt^2} + 2\frac{dx}{dt} + 5x = e^{-t} \sin t \dots\dots\dots \text{at } x(0)=0 \text{ and } x'(0)=1.$$

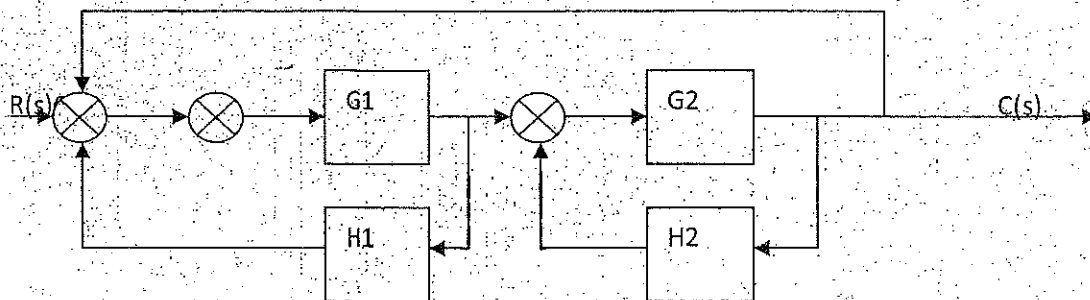
OR

(C) Find the inverse transform of  $\frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6}$  [06]

Q-4 (A) Find system equation and F-I and F-V analogous circuit. [06]



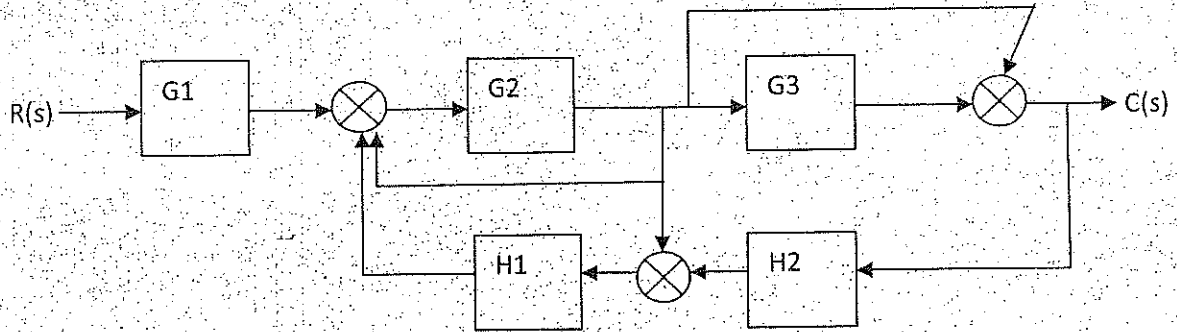
(B) Find transfer function C(s)/R(s) [06]



OR

[06]

(C) Find transfer function  $C(s)/R(s)$



Q-5 (A) Using the Routh's criterion, Determine the stability of the system of a given characteristics equation of a feedback system

[06]

$$F(s) = s^4 + 2s^2 + 1$$

(B) A unity feedback system has

[06]

$$G(s) = \frac{k}{s(s+3)(s+5)}$$

Determine ranges of  $k$  so that the system is stable.

OR

(C) A unity feedback system has

[06]

$$G(s) = \frac{k(s+1)}{s^2(s+2)(s+5)}$$

Determine ranges of  $k$  so that the system is stable.

Q-6 (A) For a second order system with unity feedback

[06]

$$G(s) = \frac{200}{s(s+8)}$$

Find the frequency domain specifications.

(B) Explain Nyquist path and give advantages of Nyquist plot.

[06]

OR

(C) Find the frequency domain specification for

$$G(s) = \frac{16}{s(s+8)}$$

For a unity feedback system.

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(116)

SEAT No. \_\_\_\_\_ Sardar Patel University No. of Printed Pages : SC

M.Sc. (Semester-III) November Examination – 2017

Subject: . Electronics & Communications

Date: 10/11/2017, Friday, Time: 2:00 PM to 5:00 PM

Paper : CMOS Technology & VLSI Design Code : PS03EELC01

Marks: 70

Figures to the right indicate marks.

Q-1 Multiple Choice Questions.

(8)

1. What does SPLD stands for?
  - a) Simple Programmable Logic Devices.
  - b) Simplex Programmable Logic Devices
  - c) Simple Programmable Log Devices
  - d) Sum Programmable Logic Devices.
2. What is meant by the fan-out of a logic gate?
  - a) The physical distance between the outputs pins on the device.
  - b) The amount of cooling required by the gate.
  - c) The number of other gates that can be connected to the gate's output.
  - d) The number of other gates that can be connected to one of the gate's inputs.
3. Which Library is used for VHDL programming
  - a) IEEE.std\_logic\_1164.All
  - b) IEEE.std\_1164.All
  - c) IEEE.std\_logic\_1164.
  - d) IEEE.std\_logic\_1264.All.
4. The number of gates that can be connected at the input?
  - a) Fan IN
  - b) Fan Out
  - c) DC Fan Out
  - d) AC Fan Out
5. The layers \_\_\_\_\_ at room temperature?
  - a) lead oxide
  - b) silicon oxide
  - c) silicon dioxide
  - d) none
6. Which of the following statement is true?
  - a) SRAM cells are non-volatile
  - b) SRAM cells are volatile
  - c) SRAM cells are Antivolatile
  - d) All are true
7. A Transmission Gate is a combination of \_\_\_\_\_ and also known as \_\_\_\_\_.
  - a) Two Parallel PMOS and NMOS, Pass gate
  - b) Parallel PMOS and NMOS, Pass gate
  - c) Parallel MOSFET AND CMOS, Basic gate
  - d) Parallel PMOS and NMOS, Basic gate
8. A design that requires high density memory is usually \_\_\_\_\_.
  - (a) a single ship
  - (b) on chip
  - (c) partitioned into several chips
  - (d) DRAMS

Q-2 Answer in short. (Any SEVEN)

(14)

1. What is meant by Packages in VHDL?
2. Draw the Flow diagram of Test bench and give short description.
3. Explain Erasable PLDs.
4. What is need of Configuration?

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(1)

(P.T.O)

5. Give the Comparison between Behavioral and Structure Modeling.
6. Define Field Programmable Logic Array.
7. What do u meant by Wire parasitic.
8. Write Down the VHDL Code for AND gate & NAND gate.
9. Give The Description Of SRC And DRC.

Q-3 (a) Explain the TEST BENCHES in detail. (6)

(b) Draw the VLSI Design Flow with Description

OR

(b) Explain the Functions, Function Declaration and Function Body of VLSI.

Q-4 (a) Describe FSM in Detail with circuit diagram. (6)

(b) Write down Programming of TLC (Traffic Light Control). (6)

OR

(b) Write down the Architecture of FPGA with diagram. (6)

Q-5 (a) Define the Switch box routing used in FPGA, in detail. (6)

(b) Discuss the Clock distribution and Power distribution issues and solutions, in detail. (6)

OR

(b) Define the global routing in detail. (6)

Q-6 (a) Describe Transmission gates and body effect of CMOS circuit. (6)

(b) Explain CMOS combinational logic design. (6)

OR

(b) What is power dissipation and power delay product of CMOS. Explain both in detail. (6)

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