Sem IV (EXTC) CBGS

AE-II 13/05/2016

Q.P. Code : 545702

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

N.B.: (1) Question **No.1** is **compulsory**.
(2) Solve **Any Three** questions from remaining **Five** questions.
(3) **Figures** to the **right** indicate **full marks**.
(4) Assume suitable **data** if **necessary** and mention the **same** in the **answer sheet**.

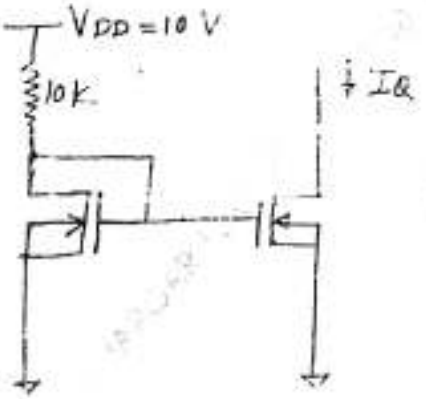
1. Solve **any Five** : **20**

(a) Define CMRR. Derive the expression for CMRR of a BJT differential amplifier.

(b) Draw the circuit diagram of an inverting amplifier using Op-Amp and derive expression for its voltage gain.

(c) Differentiate between small signal BJT and power BJT.

(d) For the circuit shown below find IQ.



For both MOSFETs $V_{TN} = 1V$, $K_n = 100\ \mu A/V^2$.

(e) Explain working of Integrator using Op-Amp.

(f) For differential amplifier with $A_d = 100$ and $A_c = 0.1$. If two sets of inputs are applied as given below.

(i) $V_1 = 100\mu V$, $V_2 = 80\mu V$

(ii) $V_1 = 200\mu V$, $V_2 = 160\mu V$

Determine output voltage in each case.

2. (a) Determine the corner frequency and maximum gain of the MOSFET amplifier shown in figure.

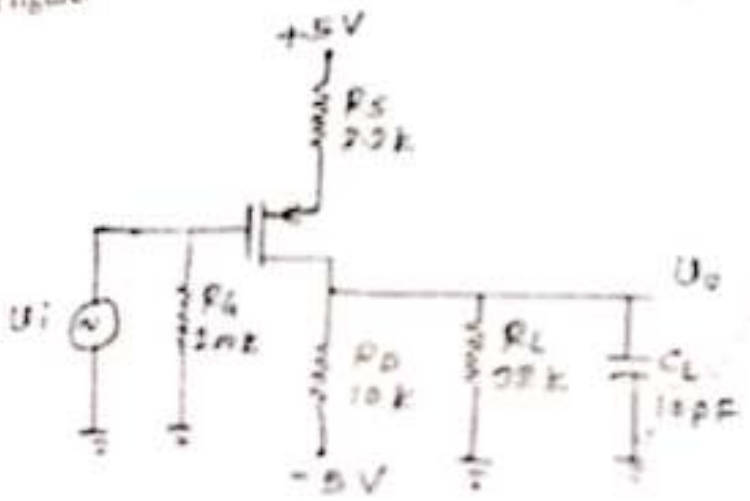


Fig. 2a

(b) For the circuit in Fig. 2b. Find midband gain and corner frequencies.

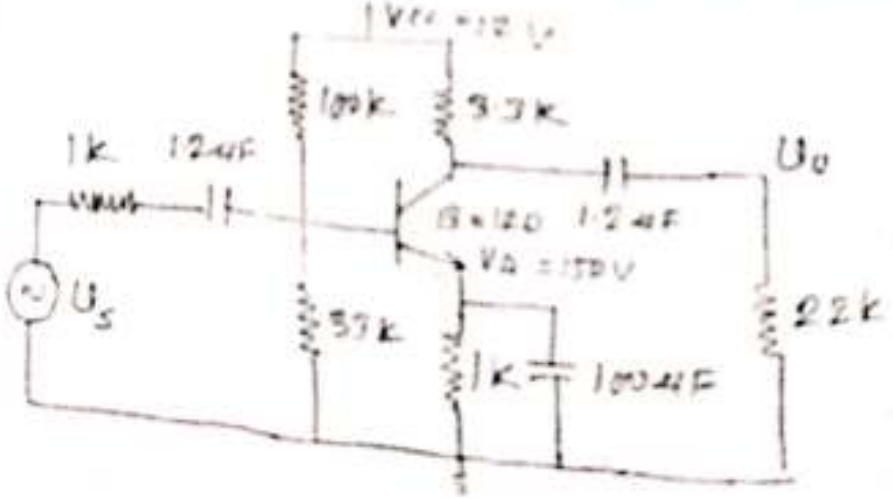


Fig. 2b

3. (a) The cascode circuit shown in Fig. 3a has parameters $V^+ = 12V$, $V^- = 0V$, $R_1 = 58.8k\Omega$, $R_2 = 33.3k\Omega$, $R_3 = 7.92k\Omega$, $R_C = 7.5k\Omega$, $R_S = 1k\Omega$, $R_E = 0.5k\Omega$ and $R_L = 2k\Omega$. The transistor parameters are $\beta = 100$, $V_{BE} = 0.7V$, $VA = \infty$, $C\pi = 24pf$ and $Cu = 3pf$. 10

(i) Determine upper 3dB frequencies corresponding to the input and output portions of the equivalent circuit.

(ii) Calculate small signal midband voltage gain.

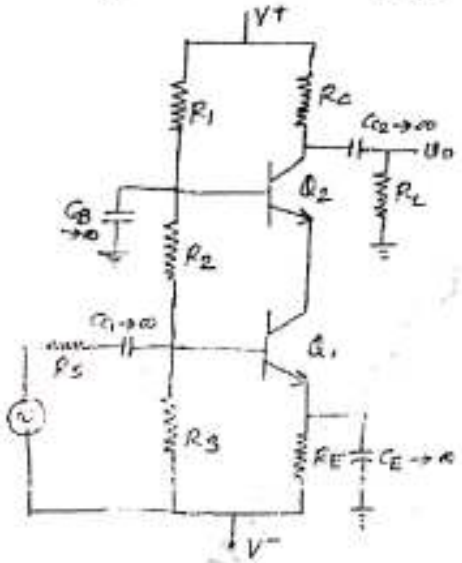
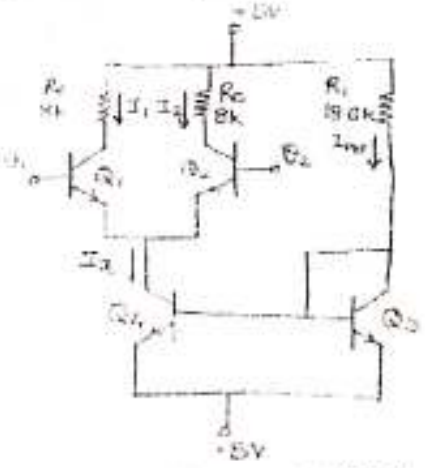


Fig. 3a

(b) Determine the differential and common-mode input resistances of a differential amplifier shown in figure below : 10



The transistor parameters are $V_{BE(ON)} = 0.7V$, $\beta = 100$ and $V_A = 100V$.

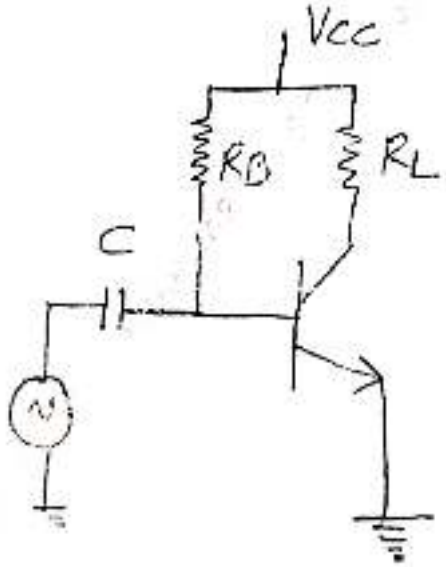
TURN OVER

4. (a) Draw a neat circuit diagram and explain working of the improved 3 transistor (MOSFET) current source. Derive the relationship between the output current and reference current.

(b) Draw the circuit diagram for an inverting summing amplifier using operational amplifier. Derive the relationship for its output voltage V_0 for four inputs V_1, V_2, V_3 and V_4.

5. (a) Explain Class - B operation of power amplifiers. What is crossover distortion? How is it eliminated.

(b) For the circuit shown in fig. 5b, the transistor parameters are $\beta = 100$, $P_{DMAX} = 2.5$ W, $V_{CEMAX} = 25$V , $I_{CMAX} = 500$mA. If $R_L = 100\Omega$ then find Vcc and R_b to deliver maximum power to the load. With the obtained values of Vcc and R_b calculate the maximum undistorted ac power that can be delivered to R_L.



6. Write short notes on **any Four** :
   (a) Zener Shunt Regulator
   (b) Power MOSFET
   (c) Active Filters
   (d) Multistage Amplifiers
   (e) Millers Theorem.

SE (Sem IV/Old) ADIC (EXTC) May-16
SE Sem-IV (Old)
19/05/2016
EXTC
Sub:- A & DIC

QP Code : 28881

(3 Hours) [Total Marks : 100

N. B. : (1) Question No.1 is compulsory.
(2) Attempt any four questions out of remaining six questions.
(3) Figure to right indicate full marks.
(4) Assume suitable data whenever required.

1. (a) Explain inverting Schmitt trigger. 5
(b) Explain antilog amplifier. 5
(c) Explain FPGA. 5
(d) Differentiate between Moore and Melay circuit. 5

2. (a) With neat diagram explain 'two techniques of A to D conversion. 10
(b) Draw and explain the block diagram of IC 810 audio power amplifier in detail. 10

3. (a) What is Instrumentation amplifier,explain it with three opamp, and write down advantages and disadvantages of it. 10
(b) Explain opamp as voltage to current converter and mention the application of V-I converter. 10

4. (a) ExplainMonostablemultivibrator using IC 555 with the internal circuit diagram of IC 555, draw the wave form. Calculate the value of R and C for pulse width of 20 ms. 10
(b) What are the performance parameters of DAC. Explain anyone technique of DAC. 10

5. (a) Draw the internal block diagram IC XR 2206 and explain it. 10
(b) Draw the ckt of basic integrator using op-amp. Find expression for output voltage. Explain disadvantage of basic integrator. 10

6. (a) Obtain the transfer function for KRC low pass filter and draw the circuit. Calculate the component value if fo = 2 kHz. and Q = 4. 10
(b) Explain VCO IC 566 and its features. 10

7. Write short notes on (any three) :- 20
(a) Explain current amplifier with grounded load.
(b)Explain the followingterm in relation to PLL:
(i) Lock range (ii) Capture range
(c)Compare active filter and passive filter.

GE-Con. 10750-16.

MC (EXTC) BE Sem VII (CBGS) 19/05/16

May-16

EXTC Sub:- MC

QP Code : 31308

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

N.B. : (1) Question no.1 is compulsory.
(2) Write any three questions from remaining five questions.
(3) Assume suitable data where ever necessary.

1. (a) What is the role of GPRS in enhancing 2G GSM systems. 20
(b) Explain factors affecting small scale fading.
(c) Elaborate the concept of IMT 2000 family.
(d) Differentiate between WCDMA & CDMA 2000.

2. (a) Describe the difference between service data units & protocol data units. How is mapping from one to other is done. 10
(b) Explain IS-95 forward & reverse channel structure in detail. 10

3. (a) Explain GSM architecture & elaborate function of each block. 10
(b) Draw the block diagram of LTE transmitter & Receiver. Explain them in detail. 10

4. (a) Consider geographical area of a cellular system is 480sqkm. A total of 910 radio channels are available for traffic handling suppose, area of a cell is 8sq km. 10
(1) How many times would the cluster size of 7 have to be replicated in order to cover the entire service area? Calculate the number of channels per cell and system capacity.
(2) If the cluster size is decreased from 7 to 4 then does it result into increase in system capacity.
(b) Explain power control mechanism in 3G. 10

5. (a) Compare & contrast FDMA, TDMA, SDMA, OFDM, SSMA. 10
(b) Explain concept of MIMO w.r.t. 4G technology. 10

6. Write notes on (any two) 20
(a) EDGE architecture
(b) Call procedures in GSM
(c) Software defined radio.

BE Sem IV (CBGS) AM-IV EXTC May-16

Sem-IV

Sub:- AM-IV

19/05/2016

EXTC

QP Code : 545802

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

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

(2) Attempt **any Three** from the remaining.

1. (a) Find the extremal of the functional 5

$$\int_0^1 [y'^2 + 12xy]dx \text{ subject to } y(0) = 0 \text{ and } y(1) = 1.$$

(b) Verify Cauchy - Schwartz inequality for $u = (1,2,1)$ and $v = (3,0,4)$ also find the angle between u & v. 5

(c) If λ & X are eigen values and eigen vectors of A then prove that $\frac{1}{\lambda}$ and X are eigen values and eigen vectors of A^{-1}, provided A is non singular matrix. 5

(d) Evaluate $\int_C \frac{e^{2z}}{(z+1)^4} dz$ where $C : |z| = 2$ 5

2. (a) Find the extremal that minimises the integral 6

$$\int_{x_0}^{x_1} (16y^2 - y'^2)dx$$

(b) Find eigen values and eigen vectors of A 6

where $A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$

(c) Obtain Taylor's and two distinct Laurent's expansion of $f(z) = \frac{z-1}{z^2 - 2z - 3}$ 8

indicating the region of convergence.

[TURN OVER

3. (a) Verify Cayley-Hamilton Theorem for

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$ and hence find A^{-1}

(b) Using Cauchy Residue Theorem, evaluate

$$\int_{-\infty}^{\infty} \frac{x^2 - x + 2}{x^4 + 10x^2 + 9}\, dx$$

(c) Show that a closed curve 'C' of given fixed length (perimeter) which encloses maximum area is a circle.

4. (a) Find an orthonormal basis for the subspace of R^3 by appling Gram-Schmidt process where $S = \{(1,1,1), (0,1,1), (0,0,1)\}$.

(b) Find A^{50}, where

$$A = \begin{bmatrix} 2 & 3 \\ -3 & -4 \end{bmatrix}$$

(c) Reduce the following Quadratic form into canonical form & hence find its rank, index, signature and value class where,

$$Q = 3x_1^2 + 5x_2^2 + 3x_3^2 - 2x_1x_2 - 2x_2x_3 + 2x_3x_1$$

5. (a) Using the Rayleigh-Ritz method, find an approximate solution for the extremal of the functional $\int_0^1 \left\{xy + \frac{1}{2}y'^2\right\} dx$ subject to $y(0) = y(1) = 0$.

(b) Prove that $W = \{(x,y) \mid x = 3y\}$ subspace of R^2. Is $W_1 = \{(a,1,1) \mid a \text{ in } R\}$ subspace of R^3?

[TURN OVER

(c) Prove that A is diagonizable matrix. Also find diagonal form and transforming matrix where $A = \begin{bmatrix} 1 & -6 & -4 \\ 0 & 4 & 2 \\ 0 & -6 & -3 \end{bmatrix}$ 8

6. (a) By using Cauchy Residue Theorem, evaluate $\int_0^{2\pi} \frac{\cos^2\theta}{5+4\cos\theta}\, d\theta$. 6

(b) Evaluate $\int_C \frac{z+4}{z^2+2z+5} dz$ where $C : |z+1-i| = 2$. 6

(c) (i) Determine the function that gives shortest distance between two given points. 5

(ii) Express any vector (a,b,c) in R^3 as a linear combination of v_1, v_2, v_3 where v_1, v_2, v_3 are in R^3. 3

(IV)/ CBGS/ EXTC/ MP May-16
25/5/2016
Sub: MP
EXTC

U.P. Code : 545902

(3 Hours)] Total Marks :80

: (1) Q.1 is compulsory. Solve any 3 questions out of remaining.

a) Write features of Pentium microprocessor. 4
b) Differentiate between I/O mapped I/O and Memory Mapped I/O of 8086. 4
c) Describe in brief architecture of 8085 microprocessor. 4
d) Sketch read and write bus cycle of 8086 with example. 4
e) Explain in brief about programmable interval timer 8254. 4

a) Describe the various addressing modes supported by 8086 with examples. 10
b) Explain with suitable examples the following instructions of 8086. 10
i) MOVSB ii) LEA iii) ROL iv) CLC v) CBW

a) Write an assembly language program of 8086 to add two 32 bit numbers and also draw flowchart. 10
b) Discuss the functions of general purpose registers of 8086. Explain the function of each register and instruction support for these functions. 10

a) Describe the function of following pins in 8086 Microprocessor in maximum mode of operations. 10
1) TEST 2) RQ/GT0 3) RQ/GT1 4) QS0 and QS1
5) S0, S1, S2
b) Explain pin diagram of ADC 0808/0809 and method of interfacing to 8086 microprocessors with a suitable example. 10

esign 8086 microprocessor based system using minimum mode with the following 20
ecifications:
(i) 8086 microprocessors working at 10 MHz.
(ii) 128Kb EPROM using 32 k Devices.
(iii) 64 Kb SRAM using 16 k devices.
Clearly show memory map with address range. Draw the neat schematic.

a) Explain 8086 interrupt structure and its method of interfacing with 8086 microprocessor with a suitable example. 10
b) Describe in brief and compare architecture of 80286 and 80486 microprocessors. 10

Transistor type:	P_{dmax} @ 25°C Watts	I_{cmax} @ 25°C Amps	V_{cx} volts d.c.	V_{ceo} volts d.c.	V_{ces} (Sus) volts d.c.	V_{cex} (Sus) volts d.c.	V_{ceo} volts d.c.	V_{eeo} volts d.c.	T_j max °C	D.C. current gain min	typ.	max.	Small Signal h_{fe} min.	typ.	max.	V_{ce} max.	θ_{ja} °C/W	Derate above 25°C W/°C
2N 3055	115·5	15·0	1·1	100	60	70	90	7	200	20	50	70	15	50	120	1·8	1·5	0·7
ECN 055	50·0	5·0	1·0	60	50	55	60	5	200	25	50	100	25	75	125	1·5	3·5	0·4
ECN 149	30·0	4·0	1·0	50	40	—	—	8	150	30	50	110	35	60	115	1·2	4·0	0·5
BC147A	0·25	0·1	0·25	50	45	50	—	6	200	50	90	280	50	90	280	0·9	'35	0·01
2N 525(PNP)	0·225	0·5	0·25	85	30	—	—	6	125	115	180	220	125	220	260	0·9	—	—
BC147B	0·25	0·1	0·25	50	45	50	—	—	100	35	—	65	—	45	—	—	—	—
								6	125	200	290	450	240	330	500	0·9	—	—

Transistor type	hfe	hoe	hre	θja
BC 147A	2·7 K Ω	18μ ℧	$1·5 \times 10^{-4}$	0·4°C/mw
2N 525 (PNP)	1·4 K Ω	25μ ℧	$3·2 \times 10^{-4}$	—
BC 147B	4·5 K Ω	30μ ℧	2×10^{-4}	0·4°C/mw
ECN 100	500 Ω	—	—	—
ECN 149	250 Ω	—	—	—
ECN 055	100 Ω	—	—	—
2N 3055	25 Ω	—	—	—

BFW 11—JFET MUTUAL CHARACTERISTICS

−Vgs volts	0·0	0·2	0·4	0·6	0·8	1·0	1·2	1·6	2·0	2·4	2·5	3·8	3·5	4·0
Ids max. mA	10	9·0	8·3	7·6	6·8	6·1	5·4	4·2	3·1	2·2	2·0	1·1	0·5	0·0
Ids typ. mA	7·0	6·0	5·4	4·6	4·0	3·3	2·7	1·7	0·8	0·2	0·0	0·0	0·0	0·0
Ids min. mA	4·0	3·0	2·3	1·6	1·0	0·5	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0

N-Channel JFET

Type	V_{ds} max. Volts	V_{ds} max. Volts	V_{gs} max. Volts	P_d max. @25°C	T_j max.	I_{dss}	g_{fs} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{ja}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ ℧	6	50 KΩ	2 mW/°C	0·59°C/mW
BFW 11 (typical)	30	30	30	[illegible]	[illegible]	7 mA	5600 μ ℧	2·5	50 KΩ	—	0·59° C/mW

IdTP EXTC Sem IV (CBGS). 31/05/16

May-16

Sub:-WTP

QP Code : 546002

TC

(3 Hours) [Total Marks : 80

N. B. : (1) Question No.1 is **compulsory**.
(2) Attempt any **three** out of remaining questions.
(3) Use suitable data whenever is required.

Solve any **four** :– 20

(a) Describe significance of Boundary Conditions for Electric Field.
(b) Explain the operation of Electromagnetic Pump.
(c) Define Reflection and Transmission Coefficient.
(d) Compare parallel with perpendicular polarization.
(e) Define and explain Vector Magnetic Potential.

a) Describe Poynting Theorem and explain various terms associated with the same 5

b) Compare various numerical techniques such as FDM, FEM and MOM 5

c) Obtain the Laplace's Equation for as infinitely long through whose cross section is shown in figure 1. 10
let V1= 10 V, V2=100 V, V3=40 V, V4=0V. USING ITERATION METHOD.

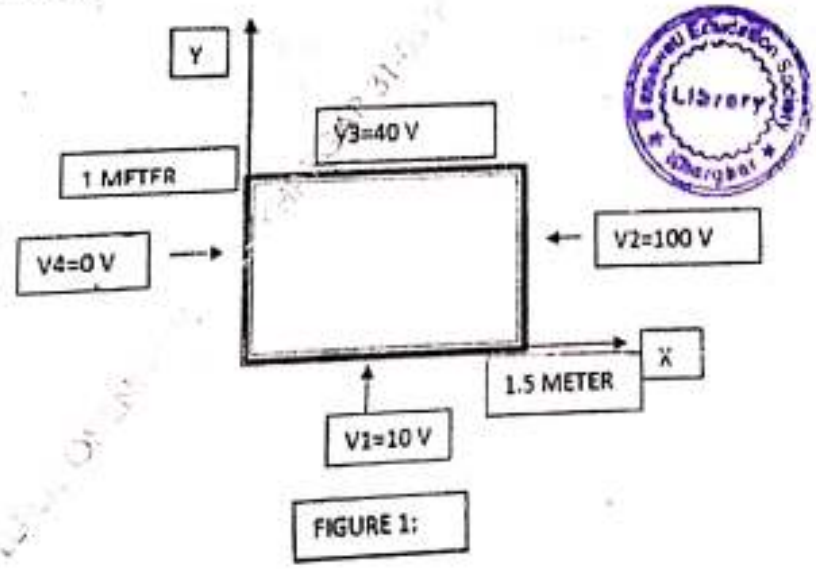


FIGURE 1:

[TURN OVER

3. (a) A zero potential reference is at r=10 meter and point charge Q= 0.5 nC is placed at origin. Find potential at r=5 meter and 15 meter.
   (b) Use MOM to find out the capacitance of parallel plate capacitor having plate area as 1* 1 meter and distance between two plates is 1 meter. Assume air dielectric capacitor. Voltage across capacitor is 2 volts.
   (c) Derive the expression for magnetic field intensity due to infinite line conductor.

4. (a) Circular loop conductor carrying current of 1 A is placed in x–y plane centred at origin. Find expression for Magnetic field intensity at any point P on Z- axis.
   (b) Four like charges of 40 µC each are located at four corners of a square. The square diagonal is 12 meters. Find the force on 200 µC charge located 5 meter above the centre of a square.

5. (a) Define the following terms-
      1) Wave Impedance
      2) Intrinsic Impedance
      3) Propagation Constant
      4) Attenuation Constant
      5) Phase Constant
   (b) In free space, $V= 6xy^2z+8$. At point P (1,2,-5) find E and volume charge density.

6. (a) Describe the space wave propagation and derive relation for maximum distance between transmitting and receiving antenna. Earth is assumed to be flat.
   (b) Explain ducting effect. Under what conditions this effect takes place.
   (c) Describe the Fading.

EXTC Sem IV - CBGS (5 & 5) May-June-16 6/6/16

Sub: S & S : -

QP Code : 30797

EXTC

(3 Hours) [Total Marks : 80

N.B.:

1. Question no.1 is compulsory
2. Attempt any three questions out of the remaining five.
3. Assume suitable data wherever necessary.

Q1] Answer the following [20]

a) Determine if the following system is memoryless, causal, linear, time invariant

$y(t) = x^2(t-t_0) + 2$

b) Explain in brief ROC (Region of Convergence) conditions of Laplace transform.

c) Consider two LTI systems connected in series. Their impulse responses are $h_1[n]$ and $h_2[n]$ respectively. Find the output of the systems if $x[n]$ is the input being applied to one of the systems.

$x[n] = \{1, 2\}$ $h_1[n] = \{1, 0, -1\}$ $h_2[n] = \{2, 1, -1\}$

d) State and prove time reversal property of Continuous time Fourier Series.

e) Find energy of a causal exponential pulse $x(t) = e^{-at}u(t)$ $a > 0$

Q 2] a) A DT signal is given by the following expression. Find its Z transform [10]

$x[n] = n(-\frac{1}{2})^n u[n] * (\frac{1}{4})^n u[-n]$

b) A CT signal x(t) is applied as the input to a CT LTI system with unit impulse response h(t). Find out y(t) using Convolution integral [10]

$x(t) = e^{-at}u(t)$ $a > 0$

$h(t) = u(t)$

Q3] a) Consider a causal LTI system with $H(j\omega) = \frac{1}{j\omega + 2}$. For a particular input x(t), this system produces output $y(t) = e^{-2t}u(t) - e^{-3t}u(t)$. Find out x(t) using Fourier Transform. [10]

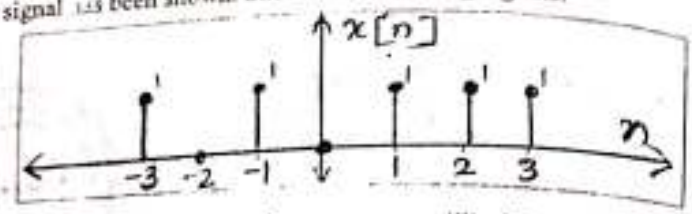
b) Obtain inverse Laplace Transform of the function $X(s) = \frac{3S + 7}{S^2 - S - 12}$ for following ROCs. Also comment on the stability and causality of the system for each of the ROC conditions. Support your answer with appropriate sketches of ROCs. [10]

i) Re(S)>4

ii) Re(S)<-3

iii) -3<Re(S)<4

Q. 4] a) A DT signal has been shown. Sketch the following signals.



i) x[n-4] ii) x[4-n] iii) x[-2n+2] iv) $x[n]u[1-n]$

b) Find out DTFT of the following

i) x[n]={ 1,-1,2,2}

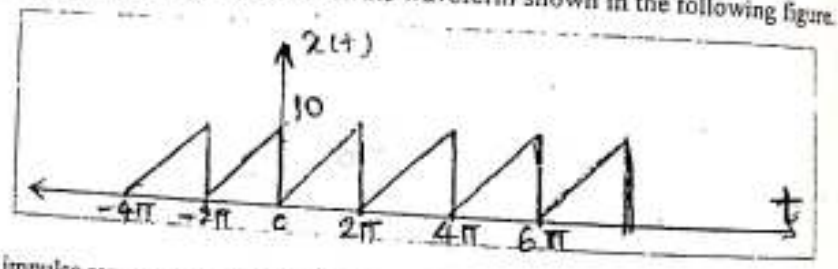
ii) $x[n]=\sin\left[\frac{\pi n}{2}\right]u[n]$

QP Code : 30787

c) Determine inverse Z Transform of

$$X(Z)=\frac{3}{(1-Z^{-1})(1+Z^{-1})(1-0.5Z^{-1})(1-0.2Z^{-1})}$$

Q5) a) Find the trigonometric Fourier Series for the waveform shown in the following figure.



b) Determine impulse response of h[n] for the system described by the second order difference equation $y[n]-4y[n-1]+4y[n-2]=x[n]-x[n-1]$ when $y[-1]=y[-2]=0$

Q6) a) A LTI system has the following transfer function

$$H(z)=\frac{Z}{(Z-\frac{1}{4})(Z+\frac{1}{4})(Z-\frac{1}{2})}$$

i) Give all possible ROC conditions
ii) Show pole-zero diagram of a system
iii) Find impulse response of system
iv) Comment on the system stability and causality for all possible ROCs

b) Answer any two. [10]

1) The Impulse response of D.T. system is given by h[n]={1,2,3} and the output response is given by y[n]={1,1,2,-1,3}. Using Z transform, determine x[n] by long division method.

2) Determine the autocorrelation of the CT signal given by x(t)=A rect $\left(\frac{t}{2}\right)$.

3) For the following discrete time signals with a fundamental period of N=6, determine the Fourier Series Coefficients.

a) $x[n]=1+\cos\left(\frac{2\pi}{6}n\right)$

b) $y[n]=\sin\left(\frac{2\pi}{6}n+\frac{\pi}{4}\right)$

SE SEM IV CBGS EXTC B.No 29 10/6/16

Sub:- CS

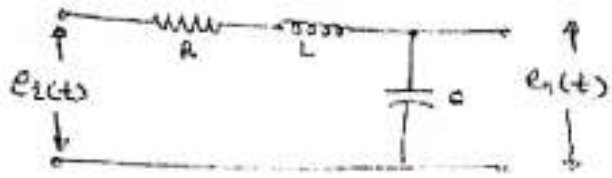
Exte

Q.P. Code : 546202

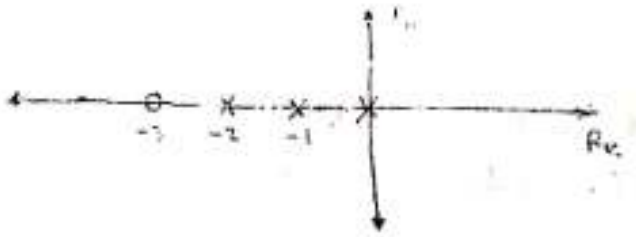
(3 Hours) [Total Marks : 100

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.

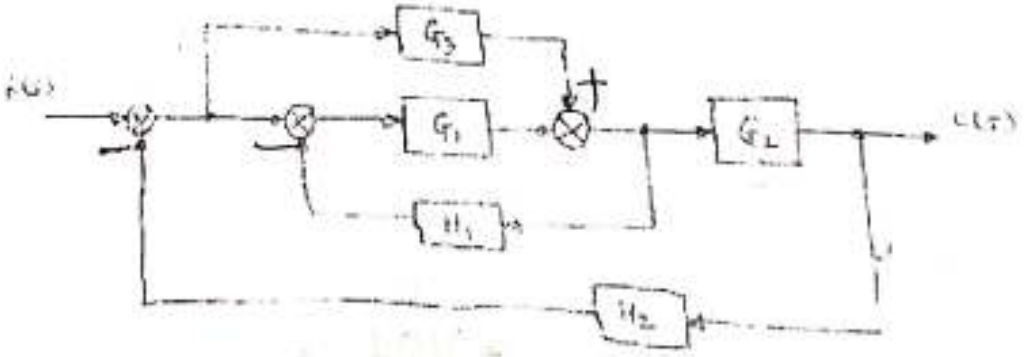
1. Answer the following :- 20
   (a) Explain the concept of relative stability.
   (b) What do you mean by frequency domain analysis and explain the frequency domain performance indices.
   (c) Find out the T.F of the given network.



   (c) 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.

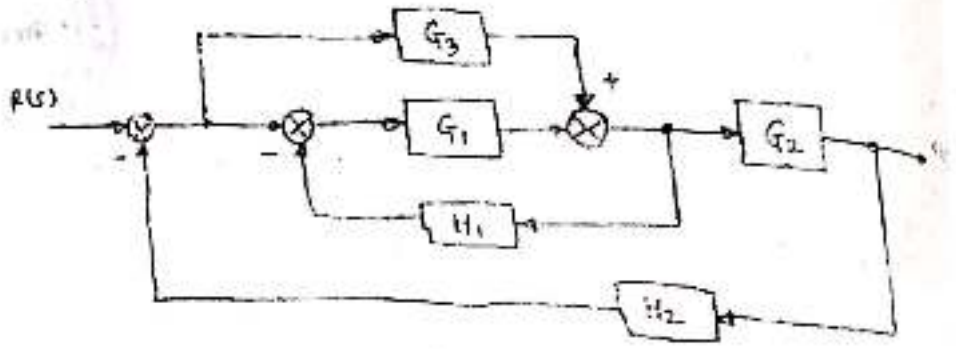


2. (a) Reduce the block diagram and obtain its transfer function. 10



TURN OVER

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



3. (a) State and prove properties of state transision matrix and check controllability and observability for the system.

$$\dot{x} = \begin{bmatrix} 0 & 6 & 5 \\ 1 & 0 & 2 \\ 3 & 2 & 4 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix} u$$

$$y = \begin{bmatrix} 1 & 3 & 0 \end{bmatrix} x$$

(b) A unity feedback system has -

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

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 eqn using Routh Hurwitz criterion.
(i) $s^6 + 4s^5 + 3s^4 + 16s^3 - 64s - 48 = 0$
(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.

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

Find the root-locus as $K \to 0$ to ∞

5. (a) For a particular unity feedback system

$$G(s) = \frac{24(s+5)}{s(s+3)(s^2+5s+20)}$$

Sketch the Bode plot and find W_{gc}, W_{pc}, G.M., P.M. and comment on stability. 10

(b) For a certain control system

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

Sketch the Nyquist plot and hence calculate the range of K for stability. 10

6. (a) Explain the frequency domain specifications. 20

(b) Explain the concept of Neuro-Fuzzy adaptive control system.

(c) Write short note on : Steady state errors in feed back control system and their types.