SE IV CBGS [EXTC] 22/12/2015

SUB: CS SE Sem-IV (CBGS) NOV-DEC-15

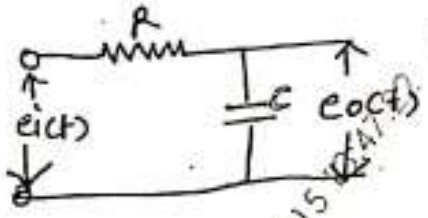
EXTC Sub.-CS

QP Code : 5535

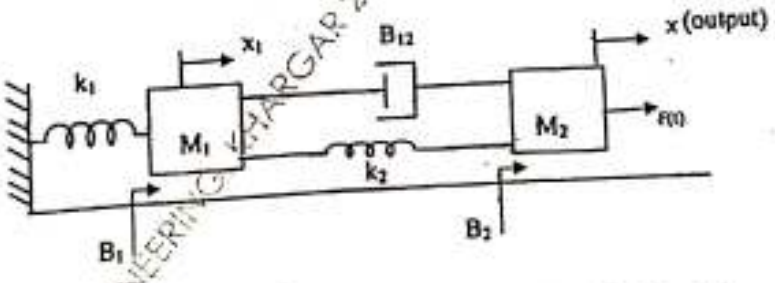
(3 Hours) [Total Marks :80

N.B. : (1) Question **No.1** is **compulsory**
(2) Attempt any **three** questions out of the remaining questions.
(3) Assume **data** whenever **necessary.**
(4) **Figures** to the **right** indicate **full** marks.

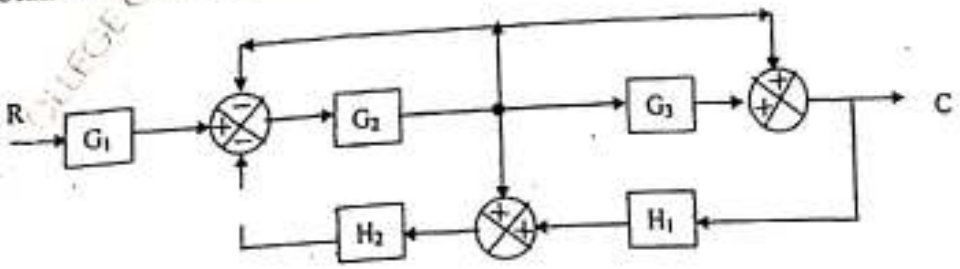
1. (a) Define rise time. 5
(b) Define gain margin and phase margin. 5
(c) What are the difficulities encountered in applying Routh stability criterion? 5
(d) Find out response of give system for a unit step I/P 5



2. (a) Obtain the transfer function of the mechanical systems shown in Fig. 11a (i). 10



(b) Draw a signal flow graph for the system shown in fig 11a (ii) and hence obtain the transfer function using Mason's gain formula. 10



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3. (a) Derive the expression for step response of second order under damped system. 10

(b) Find the impulse response of the second order system whose transfer function 10

$$G(s)=\frac{9}{(s^2+4s+9)}$$

4. (a) A unity feedback system is characterized by an open loop transfer function $G(s)=\frac{K}{s(s+10)}$ Determine the gain K so that the system will have a damping ratio of 0.5. For this value of K determine setting time peak over shoot and time to peak over shoot for a unit step input. 10

(b) An unity feedback system is given as $G(s)=\frac{1}{s(s+1)}$ The input to the system is described by $r(t) = 4 + 6t + 2t^2$. Find the generalized error coefficients and the steady state error. 10

5. (a) Sketch the Bodplate showing the magnitude in dB and phase angle in degrees as a function of log frequency for the transfer function given by 10

$$G(s)=\frac{10}{s(1+0.5s)(1+0.1s)}$$ and hence determine the gain margin and the phase margin of the system.

(b) Sketch the root locus for a unity feedback system with open loop transfer function $G(s)=\frac{K}{s(s^2+8s+32)}$. 10

6. (a) Using Routh-Hurwitz criterion for the unity feedback system with open loop transfer function $G(s)=\frac{K}{s(s+1)(s+2)(s+5)}$ find 10

(i) the range of k for stability
(ii) the value of k for marginally stable
(iii) the actual location of the closed loop poles when the system is marginally stable.

(b) Explain controllably and observably. 10

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TC

EXTC Sub:-S&S

(3 Hours) [Total Marks : 80

QP Code : 5497

N.B.:

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

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1. (20)

a) Determine the fundamental period of the following signals.

i) $x(t) = 2\cos\frac{2\pi t}{3} + 3\cos\frac{2\pi t}{7}$ ii) $x[n] = \cos^2\left[\frac{\pi}{4}n\right]$

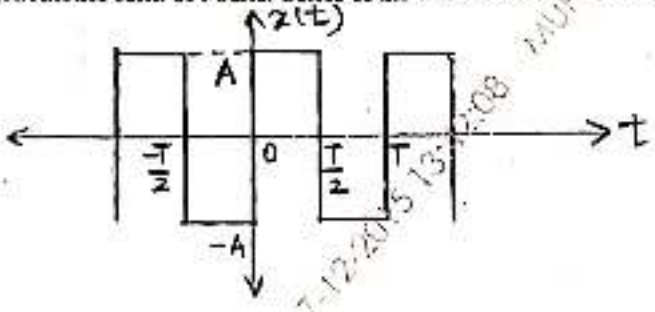
b) Prove and explain time scaling and amplitude scaling property of Continuous time Fourier Transform.

c) For the given system, determine whether it is, i) memory less, ii) causal, iii) time-invariant
y[n]=nx[n]

d) Find out even and odd component of the following signal.
$x(t) = \cos^2\left(\frac{\pi t}{2}\right)$

2.

a) Determine the trigonometric form of Fourier Series of the waveform shown below. (10)



b) State duality property of Fourier Transform. If Fourier Transform of $e^{-t}u(t)$ is $\frac{1}{1+j\Omega}$, then find the Fourier Transform of $\frac{1}{1+t}$ using duality property. (10)

3.

a) Obtain Inverse Laplace transform of the function. Write down and sketch possible ROCs. (10)

$$X(s) = \frac{8}{(s+2)^3(s+4)}$$

1

TURN OVER

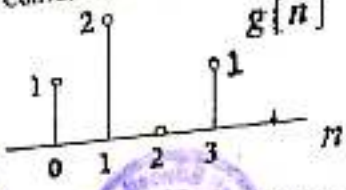
b) Using the z transform, solve the difference equation and find out impulse response. (10)

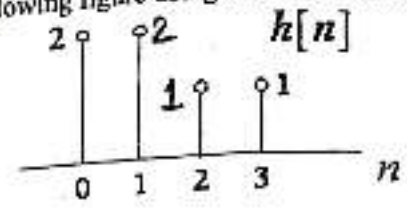
$$y[n]-2y[n-1]+y[n-2]=x[n]+3x[n-3]$$

4.

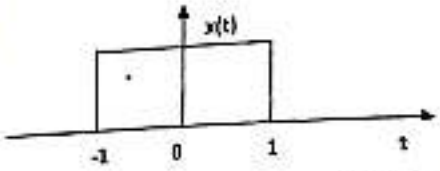
a) State and explain different properties of ROC of Z transform. (5)

b) Convolve the sequences shown in the following figure using circular convolution (5)





A continuous time signal is shown below. Sketch the following transformed versions of the sig (10)



i) x(t-3) ii) -2x(t) iii) x(t-3)-2x(t) iv) $\frac{dx(t)}{dt}$

5.

a) Convolve $x[n]=\left(\frac{1}{3}\right)^n u[n]$ with $h[n]=\left(\frac{1}{2}\right)^n u[n]$ using convolution integral. (10)

b) A second order LTI system is described by $\frac{d^2y(t)}{dt^2}+5\frac{dy(t)}{dt}+6y(t)=x(t)$ Determine the transfer function and the poles and zeros of the systems. Evaluate zero-state response to x(t)=u(t) (10)

6.

a) For the periodic signal x[n] given below find out Fourier series coefficient. (10)

$$x[n]=1+\sin\left(\frac{2\pi}{N}\right)n+3\cos\left(\frac{2\pi}{N}\right)n+\cos\left(\frac{4\pi}{N}n+\frac{\pi}{2}\right)$$

b) The input and impulse responses of continuous time system are given below. Find out output of the continuous time systems using appropriate method. (10)

$x(t)=u(t)$ $h(t)=e^{-2t}u(t)$

SE IV Rev CBGS 10/12/15

Nov-Dec-15

EXTC

Sub:- WT & P

EXTC

Q.P. Code : 5455

(3 Hours) [Total Marks :80

N.B. : (1) Question No.1 is compulsory.
(2) Answer any three questions from the remaining five questions.
(3) Assume any suitable data wherever required.
(4) Figures to the right indicate full marks.

1. Answer any four of the following. 20
   (a) With regard to ionosphere discuss the following-
      i) E layer
      ii) Sporadic E layer
   (b) Give significance of boundary conditions for electric field.
   (c) Write integral form of Ampere's law and interpret the same.
   (d) What do you mean by depth of penetration?
   (e) Derive the boundary conditions for electric and magnetic field.

2. (a) Explain earth reflection on horizontally and vertically polarized wave. 10
   (b) Derive Maxwell's equation in point and integral form. 10

3. (a) Compare scalar and vector potential. 5
   (b) Derive wave equation for good dielectric medium. 5
   (c) A media has the following properties $\mu r = 8$, $\varepsilon r = 2$, $\sigma = 10^{-4}$ mho/m at 2GHz. Determine- 10
      (i) Attenuation Constant
      (ii) Attenuation Constant in dB
      (iii) Phase Constant
      (iv) Propagation Constant
      (v) Wavelength
      (vi) Phase Velocity
      (vii) Intrinsic Impedance
      (viii) Refractive Index
      (ix) Loss Tangent
      (x) Is the medium behaving like conductor or dielectric

4. (a) Derive an expression for magnetic field intensity due to finite long straight element. 10
   (b) State the Poynting Theorem and explain meaning of each term. 5
   (c) Derive wave equation in free space. 5

TURN OVER

5. (a) Obtain the reflection and transmission coefficient of a parallel polarized wave incident between a dielectric-dielectric boundary with an oblique incidence.

(b) Explain Super refraction and Tropospheric fading.

6. (a) What is virtual height of a layer? Why is it called so? Is it more than or less than the actual height of the layer?

(b) What is ionosphere? Which layers are peresent during day and night? Define critical frequency.

(c) Prove that static electric field is irrotational and static magnetic field is solenoidal.

SE IV Old – 10/12/15 Nov-Dec-15
10-12-15
PCE – EXTC
XTC

QP Code : 1466

(3 Hours) [Total Marks : 100

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

1. Answer the following (any four) 20
   (a) Explain the function of Amplitude limiter in F.M. receiver
   (b) Explain the term companding with respect to PCM.
   (c) How power saving and Bandwidth saving is achieved in SSB-SC system.
   (d) Explain what double spotting is and how it arises?
   (e) Discuss the advantages of Digital communication over analog communication.

2. (a) Explain in brief the operation of Balanced ring modulator 10
   (b) An A.F. Signal 20 sin (2 π x500t) is used to amplitude modulate a carrier of 50 sin (2 π x10⁵t) 10
   Calculate :-
   (i) Modulation index
   (ii) Sideband frequencies
   (iii) Amplitude of each sideband
   (iv) Bandwidth required

3. (a) Explain the basic principle of FM demodulator with the help of neat block and phasor diagram explain the same in a foster seely discriminator. 10
   (b) How do you generate and modulate PAM signal? Is it an analog or digital signal? 10

4. (a) Draw and explain a block diagram of superheterodyne radio receiver, with waveforms at output of each blocks. 10
   (b) What are the advantages of superheterodyne receiver over the TRF receiver? Explain the terms tracking and image rejection. 10

5. (a) Discuss the slope over load and Granular noise error in Delta modulation. How it can be compensated in Adaptive delta modulation. 10
   (b) Draw the block diagram of a phase cancellation SSB generator and explain how the carrier and unwanted side bands are suppressed. 10

6. (a) Explain the difference between :- 10
   (i) Amplitude Modulation and Frequency Modulation
   (ii) Narrow band F.M. and wideband F.M.

(b) Sketch the circuit diagram of a practical diode detector and explain the operation it. How is AGC obtained from this detector.

7. Write short notes (any **four**)
   (a) Pre-emphasis and De-emphasis
   (b) ISB Transmitter
   (c) Sampling Theorem
   (d) TRF receiver
   (e) Quantization and Quantization error

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se sem-IV (CBGS) Nov-Dec-15

MP 04/12/2015

EXTC - Sem-IV (CBGS)

EXTC Sub:-MP

QP Code : 5413

(3 Hours) Total Marks: 80

Note: Q. 1 is compulsory and answer any 3 out of remaining questions.

Q1. A) Explain the function of following pins of microprocessor 8085. (5 Marks)

a) SOD/SID b) ALE c) HOLD

B) What are features of 80386 microprocessor? (5 Marks)

C) Explain interrupt pin of 8085 microprocessor. (5 Marks)

D) Differentiate between memory mapped I/O and I/O mapped I/O (5 Marks)

Q 2 a) Explain different addressing modes of 8086 microprocessors. (10 Marks)

b) What is 8087 math coprocessor? Explain method of its interfacing with 8086 microprocessor. (10 Marks)

Q 3) a) Describe the importance of DMA controller. Explain method of interfacing 8057 DMA controller with 8086 microprocessor (10 Marks)

b) What is data acquisition system? Explain 8086 based data acquisition system. (10 Marks)

Q4. Design 8086 microprocessor based system using minimum mode with the following specifications.

I) 8086 microprocessor working at 10 MHz
II) 64 kb EPROM using 16k devices
III) 32kb SRAM using 16k devices

Clearly show memory map with address range. Draw a neat schematic (20 Marks)

Q5.a) Write a program for 8086 microprocessor for arranging given numbers in ascending order and store the results in memory location from 08000H onwards (10 Marks)

b) Explain interrupt structure of 8086. (10 Marks)

Q 6 a) Explain the architecture of Pentium microprocessor. (10 Marks)

b) Explain the function of analog to digital converter 0809 and describe its interfacing method with 8086 microprocessor. (10 Marks)

(Sem IV EXTC) 30/11/15 Nov-Dec-15

AM- IV CBGS

QP Code : 5350

TC.

Sub:- AM-IV

Duration: 3 Hours [REVISED COURSE] Total marks assigned to the paper:80

N.B:1) Q 1 is compulsory.

2) Attempt any three from the remaining.

Q 1: a) Find the extremal of $\int_{x_1}^{x_2}(y^2 - y'^2 + 2y\cos hx)dx$ (5)

b) Find an orthonormal basis for the subspaces of R^3 by applying Gram-Schmidt process where S={(1,2,0)(0,3 1)} (5)

c) Show that eigen values of unitary matrix are of unit modulus. (5)

d) Evaluate $\int \frac{dz}{z^3(z+4)}$ where $|z| = 4$. (5)

Q2: a) Find the complete solution of $\int_{x_0}^{x_1}(2xy - y'^2)\,dx$ (6)

(b) Find the Eigen value and Eigen vectors of the matrix A^3 where $A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -5 & -2 \end{bmatrix}$ (6)

(c) Find expansion of $f(z) = \frac{1}{(1+z^2)(z+2)}$ indicating region of convergence. (8)

Q3: a) Verify Cayley Hamilton Theorem and find the value of A^{64} for the matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$. (6)

b) Using Cauchy's Residue Theorem evaluate $\int_{-\infty}^{\infty} \frac{x^2}{x^4+1}dx$ (6)

c) Show that a closed curve 'C' of given fixed length (perimeter) which encloses maximum area is a circle. (8)

Q4: a) State and prove Cauchy-Schwartz inequality. Verify the inequality for vectors $u = (-4,2,1)$ and $v = (8,-4,-2)$ (6)

b) Reduce the Quadratic form $xy + yz + zx$ to diagonal form through congruent transformation. (6)

c) If $A = \begin{bmatrix} \frac{3}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{3}{2} \end{bmatrix}$ then find e^A and 4^A with the help of Modal matrix. (8)

Q5: a) Solve the boundary value problem $\int_0^1(2xy + y^2 - y'^2)\,dx$, $0 \le x \le 1$, $y(0) = 0, y(1) = 0$ by Rayleigh - Ritz Method. (6)

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MD-Con. 8620-15.

b) If $W = \{\alpha: \alpha \in R^n \text{ and } a_1 \geq 0\}$ a subset of $V = R^n$ with $\alpha = (a_1, a_2 \ldots\ldots a_n)$ in R^n $(n \geq 3)$. Show that W is not a subspace of V by giving suitable counter example.

c) Show that the matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ is similar to diagonal matrix. Find the diagonalising matrix and diagonal form.

Q6: a) State and prove Cauchy's Integral Formula for the simply connected region and hence evaluate $\int \frac{z+6}{z^2-4} dz, \quad |z-2| = 5$

b) Show that $\int_0^{2\pi} \frac{\sin^2\theta}{a+b\cos\theta} d\theta = \frac{2\pi}{b^2}\left(a - \sqrt{a^2-b^2}\right), \; 0 < b < a.$

c) Find the Singular value decomposition of the following matrix $A = \begin{bmatrix} 1 & 2 \\ 1 & 2 \end{bmatrix}$

EXTC(OLD) A&DIC Nov-Dec-15
sesem-IV 30/11/15
EXTC Sub:- A&DIC

QP Code : 1377

Time:- 3 hrs. Maximum Marks:- 100

N. B.
1. Question no. 1 is compulsory.
2. Answer ant four out of the remaining six questions.
3. Assumption made should be clearly stated.
4. Assume any suitable data wherever required but justify the same.
5. Figures to the right indicate marks.
6. Illustrate the answers with sketches wherever required.
7. Answer to the questions should be grouped and written together
8. Use Blue/Black ball ink pen to write answers. Use of pencil should be done only to draw sketches and graphs

Q.1. a Explain logarithmic amplifier and derive the expression for the output voltage. 5

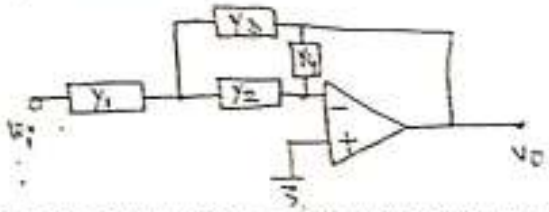
b. Draw the block diagram of a typical Op-amp and explain the function of each block 5

c. With neat circuit explain how a resistor can be simulated using switch capacitors 5

d. What are the differences between FPGAs and CPLDs. 5

Q.2. a Explain the basic requirement of Instrumentation Amplifier and find output voltage expression for Instrumentation Amplifier using three Op-Amp. 10

b. Derive an expression for the voltage transfer function. How will you realize an active RC Band Pass filter using this circuit. 10



Q.3. a Design an astable multivibrator using IC 555 with output frequency 1 KHz with 60% duty cycle. Modify the circuit design to obtain 1 KHz output frequency with 40% duty cycle. 10

b. With the help of block diagram explain the working of iC565. Explain the following terms with respect to a PLL : 10
1: Lock Range 2. Capture range 3. Pull in time

Q.4.a Explain the operation of monostable multivibrator using IC555 with the help of waveforms. How can this circuit be used as frequency divider. 10

b. Write a VHDL code for 8-bit shift-left / shift-right register with positive edge clock, serial-in and parallel out. 10

Q.5.a. Give three most important advantages of 3-op-amp Instrumentation amplifier. Design an instrumentation amplifier using 3-op-amp to vary the gain between 1 to 100. 10

b. What are the performance parameters of DAC. Explain R-2R ladder type of DAC. 10

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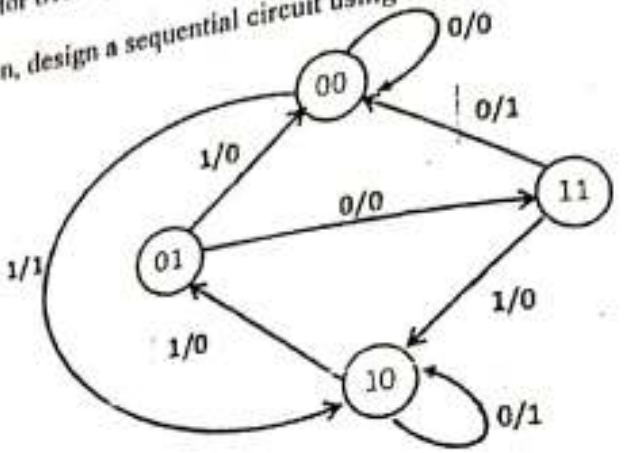
Q.6.a. Design a Moore machine for overlap sequence detector for the string" 1011".

b. For the state diagram given, design a sequential circuit using D Flipflops



Q.7. Write short notes on:

a IC 8038 : Function Generator

b Non Inverting Schmitt Trigger

c Compare Static and Dynamic RAM

d Multiplier using transconductance method

Sem IV (EXTC) 23/11/15 Nov-Dec-15

AE-II CBGS 23/11/15

EXTC

Sub:- AE-II

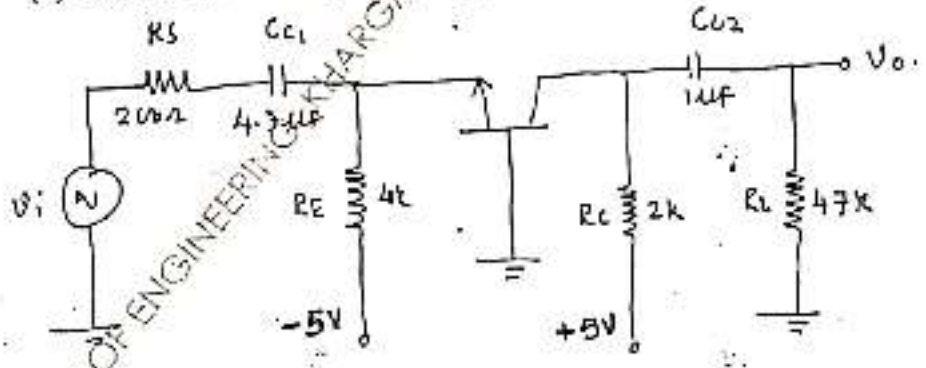
Q.P. Code: 5328

(3 Hours) [Total Marks :80

N.B. : (1) Question No.1 is compulsory
(2) Solve any three from remaining five questions.
(3) Figure to the right indicates full marks.
(4) Assume suitable data if necessary.

1. Solve Any four:- 20
   (a) In case of CE amplifier, Why does the bandwidth of amplifier decrease with increase in gain? Support the answer with relevent mathematical equation.
   (b) Instead of single Power Supply, why we use Dual power supply biasing for differential amplifier?
   (c) Why Efficiency of class A power Amplifier is less than class B.
   (d) What is the drawback of current mirror circuit using MOSFET? How it is overcome?
   (e) Why we prefer series voltage Regulator over shunt voltage Regulator? Explain in detail.

2. (a) The Parameters of transistor are $V_{BE} = 0.7V$ and $\beta = 100$, $V_A = 0V$, Determine 10
   (a) Q point of BJT
   (b) Time constant associated with C_{C1} and C_{C2}
   (c) Lower cut-off freq. due to C_{C1} and C_{C2}



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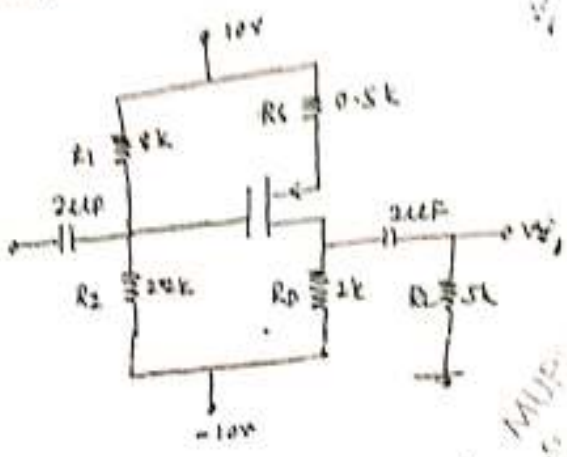
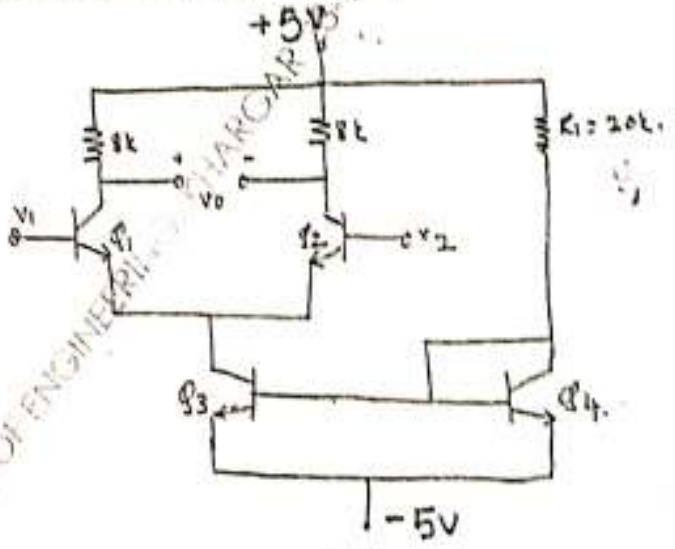
MD-Con. 8178-15.

(b) For the PMOS CS amplifier, transistor parameters are $V_{tp} = -2V$, $K_p = 1$ mA/V², $\lambda = 0$, $C_{gs} = 15pf$, $C_{gd} = 3pf$
Determine (a) Equivalent Miller capacitance
(b) upper 3dB frequency



3. (a) For the given circuit, Determine
(i) Differential mode gain Ad
(ii) Common mode gain Ac
(iii) CMRR
For BJT $\beta = 100$ $V_{BE} = 0.7V$, $V_A = 100V$.



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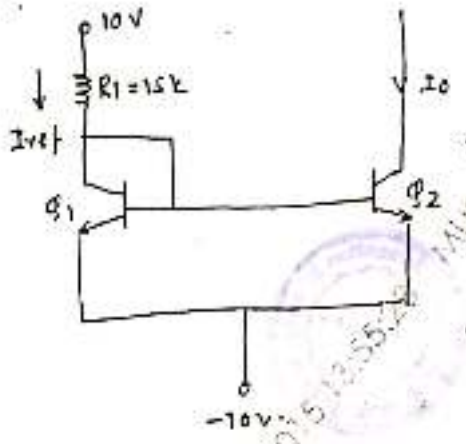
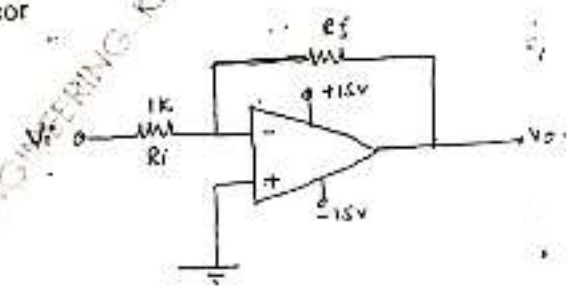
(b) Draw and explain the working of class A power amplifier (Transformer coupled). Derive the expression for efficiency. 10

4. (a) Draw and explain current mirror circuit using MOSFET, for the given circuit determine the value of I_{ref} and I_o. 10



(b) Draw the circuit diagram of darlington pair using BJT, and derive the expression for Av, Ai, Zi and Zo. 10

5. (a) For the given circuit, derive the equation for voltage gain A_f and find V_o for given cor 10



Vi	Vo	Ri	Rf
+1VDC	?	1K	10k
+1VDC	?	1K	100K
+1VDC	?	1k	1M

(b) Draw the circuit diagram of MOS differential amplifier and derive the expression for A_d, A_{cm} and CMRR.

6. Write short notes on (Attempt any **Four.**)
   (a) High pass and low pass filter using OPAMP
   (b) Cascode amplifier using BJT.
   (c) Widlar current source using MOSFET.
   (d) Transistor shunt voltage regulator
   (e) High frequency hybrid-π model of BJT.

SE EXTC (AM - IV) OLD Nov-Dec-15

23/11/15 23/11/15

EXTC Sub:- AM-IV

QP Code : 1331

[OLD COURSE]

(3 Hours) [Total Marks:100]

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

(2) Attempt **Any FOUR** questions out of the remaining **SIX** questions.

(3) Figures to the right indicate full marks.

1(a) Prove that eigen values of Hermitian matrix are real. [5]

(b) Construct an analytic function whose real part is $x^4 - 6x^2y^2 + y^4$ [5]

(c) A vector field is given by $\overline{F} = (x^3 + xy^2)\hat{i} + (y^3 + x^2y)\hat{j}$. Show that $\overline{F}$ is irrotational and find its scalar potential. [5]

(d) Prove that $J_{-\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}}\cos x$. [5]

2(a) Verify Green's theorem in plane for $\int (xy + y^2)dx + x^2dy$ where C is the close curve of the region bounded by $y = x$ and $y = x^2$. [8]

(b) If $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ then find A^{66} [6]

(c) Find the image of a circle $|z|=2$ under the transformation $w = z+3+2i$. Also draw the figure [6]

3(a) Show that the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ is diagonalizable. Find the transforming matrix and the diagonal matrix. [8]

(b) Evaluate $\int_A^B (y^2dx + xydy)$ along $x = t^2, y = 2t$ from (1,-2) to B(0,0) [6]

(c) Evaluate $\int \frac{3z^2 + z}{z^3 - 1}dz$ where C is circle $|z|=2$. [6]

4(a) Reduce the given quadratic form $2x^2 + y^2 - 3z^2 + 12xy - 4xz - 8yz$ to canonical form and find rank and signature. [8]

(b) Evaluate by Residue theorem,

$$\int_0^{2\pi} \frac{\cos 2\theta}{5 + 4\cos\theta}d\theta$$ [6]

(c) Prove that $J_{\frac{3}{2}}(x) = \sqrt{\frac{2}{\pi x}}\left\{\frac{3 - x^2}{x^2}\sin x - \frac{3}{x}\cos x\right\}$ [6]

P.T.O.

5(a) Expand $f(z)=\frac{1}{z(z+1)(z-2)}$ when i) $0<|z|<1$ ii) $1<|z|<2$ iii) $|z|>2$ [8]

(b) Using Cayley Hamilton theorem find $A^6-6A^5+9A^4+4A^3-12A^2+2A-I$

where $A=\begin{bmatrix}3 & 10 & 5\\ -2 & -3 & -4\\ 3 & 5 & 7\end{bmatrix}$ [6]

(c)Find the bilinear transformation which maps the points z= 1,i,-1 on to the points i,0,-i in W plane [6]

6(a) By using Stoke's theorem evaluate $\int_C[(x^2+y^2)\hat{i}+(x^2-y^2)\hat{j}].d\bar{r}$ where C is the boundry of the region enclosed by circles $x^2+y^2=4,\ x^2+y^2=16$. [8]

(b) Show that the matrix $A=\begin{bmatrix}2 & -2 & 3\\ 1 & 1 & 1\\ 1 & 3 & -1\end{bmatrix}$ is non derogatory. [6]

(c)Show that the following function

$$f(z)=\frac{x^2y^5(x+iy)}{x^4+y^{10}},\ z\neq 0$$

$=0$ $z=0$ .Is not analytic at the origin although Cauchy Riemann equations are satisfied. [6]

7(a) Evaluate $\iint \bar{F}.d\bar{s}$ using Gauss Divergence theorem, where $\bar{F}=4x\hat{i}-2y^2\hat{j}+z^2\hat{k}$ and S is the region bounded by $y^2=4x, x=1, z=0, z=3$ [8]

(b) Show that the map of real axis of the Z plane is a circle under the transformation $w=\frac{2}{z+i}$ Find its center and radius. [6]

(c)Expand f(x)=1 in (0<x<1) in a series as $1=\sum\frac{2}{\lambda_n J_1(\lambda_n)}J_0(\lambda n(x))$ where $\lambda_1,\ldots,\lambda_n\ldots$ are positive roots of $J_0(x)=0$ [6]