26/12/2011 SE EXTC - III (R)
EN

ws Sept-2011-199

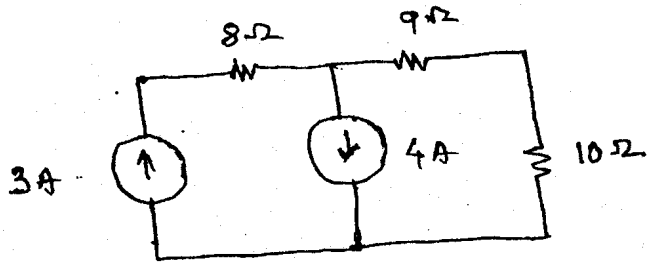
Con. 6901–11.

MP–4147

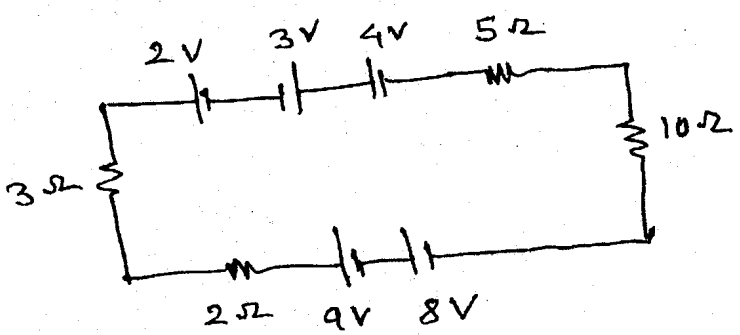
(3 Hours) **[Total Marks : 100**

N. B. : (1) Question No. **1** is **compulsory** and solve any **four** from remaining Questions **2** to **7**.
(2) In all **five** questions to be attempted.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume **suitable** data if any.

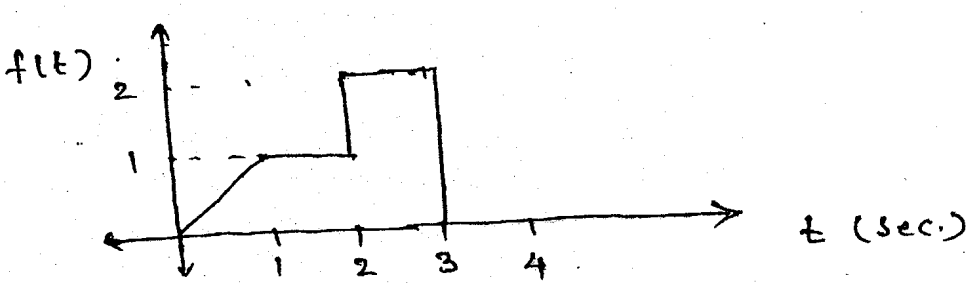
1. (a) (i) For the circuit shown below determine current through 10Ω resistance. **20**



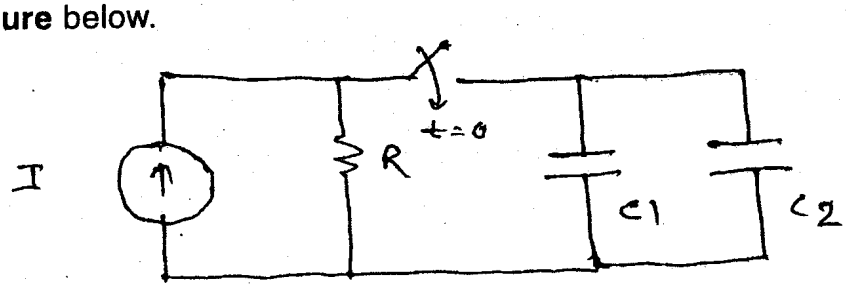
(ii) For the circuit shown below determine current through 10Ω resistance.



(b) Find the Laplace transform of the signal given below.

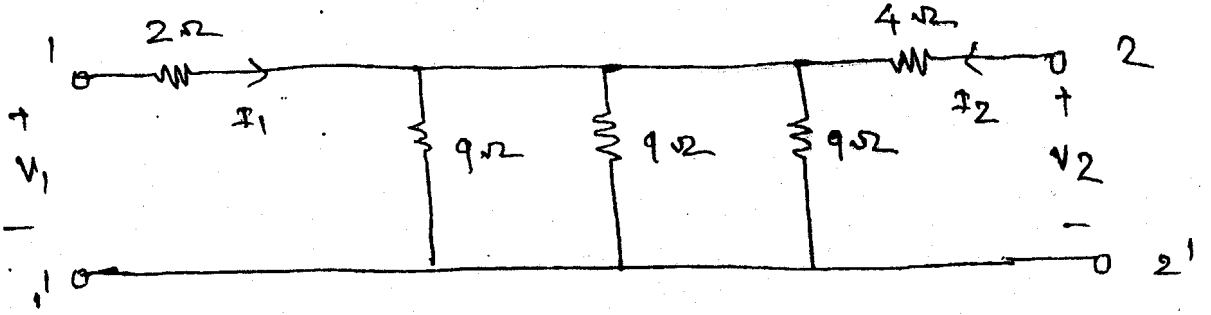


(c) Find $V_{c1}(f)$ when switch 's' is closed at t = 0, with initial conditions shown in **figure** below.



$Vc_1(0) = 0V$
$Vc_2(0) = 0V$

(d) Determine z parameters for the two port network shown below.



(e) Find the time domain response for the network function give below. Use graphical and partial fraction method both and prove that the results are matching.

$$F(s) = \frac{3s}{(s+6)(s+2)}$$

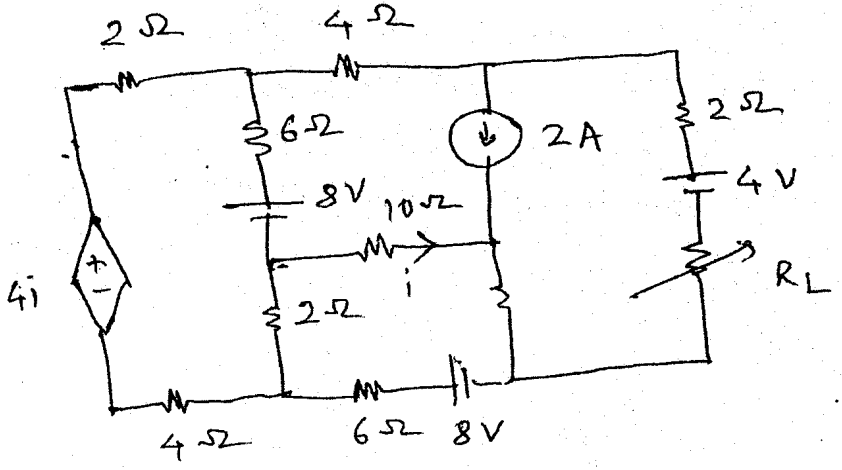
2. (a) (i) State and explain significance of initial and final value theorems with reference to network analysis. 10

(ii) Derive the equation for Laplace transform of specific functions given below :

(1) Unit ramp function

(2) Unit impulse function.

(b) For the circuit shown determine R_L for maximum power transfer and maximum power transferred P_L (max) 10



3. (a) (i) In case of series R-L circuit excited by DC supply (V), derive equation for transient current I_L with initial conditions (Assume initial condition). 10

(ii) Define transmission line parameters in case of two port network. Also derive condition for symmetry.

(b) The driving point impedance of a one port network function is as follows. Obtain Foster 1 and Foster 2 form of equivalent circuit. 10

$$Z(s) = \frac{6(s^2+4)s}{(s^2+1)(s^2+64)}$$

4. (a) Explain concept of poles and zeros. Using suitable example. Plot pole-zero plot and hence explain how to use such plot to get time domain response for the given network function. **10**

(b) Reaslise the given Y(s) L-C function into Cauer 2 form. **10**

$$Y(s) = \frac{s^4 + 6s^2 + 4}{2s^3 + 4s}$$

5. (a) (i) Check following functions for positive real functions. **10**

(1) $Z(s) = \dfrac{6(s^2+4)s}{(s^2+1)(s^2+64)}$

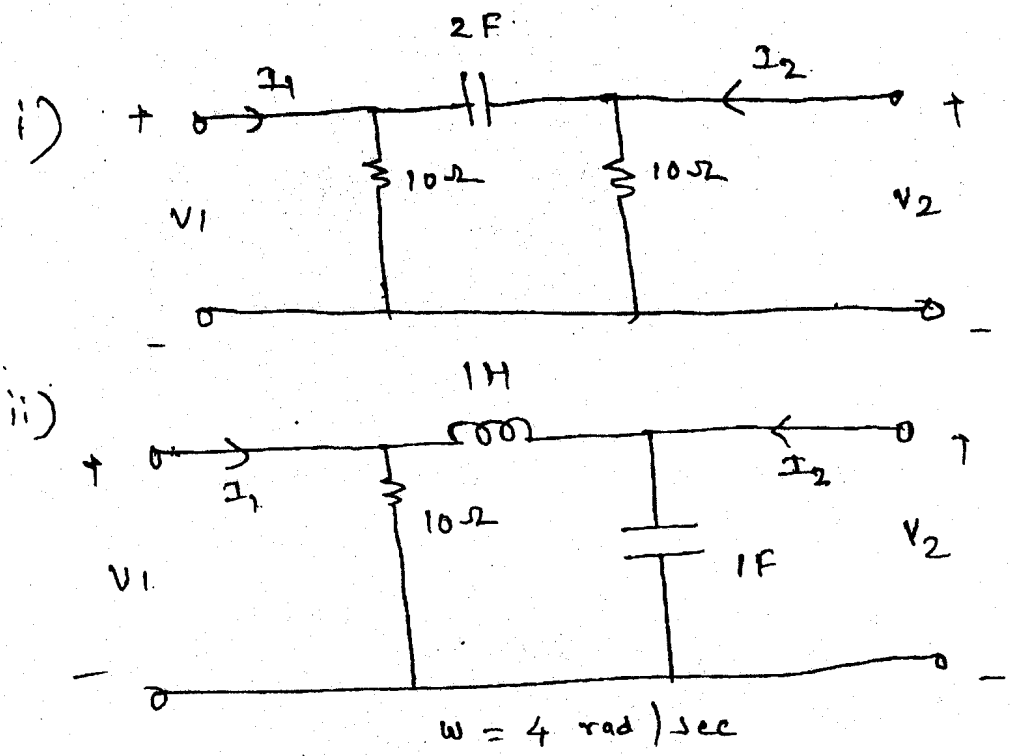
(2) $Z(s) = \dfrac{s(s^2+3)}{(s^2+1)}$

(ii) Check the following polynomials for Hurwitz

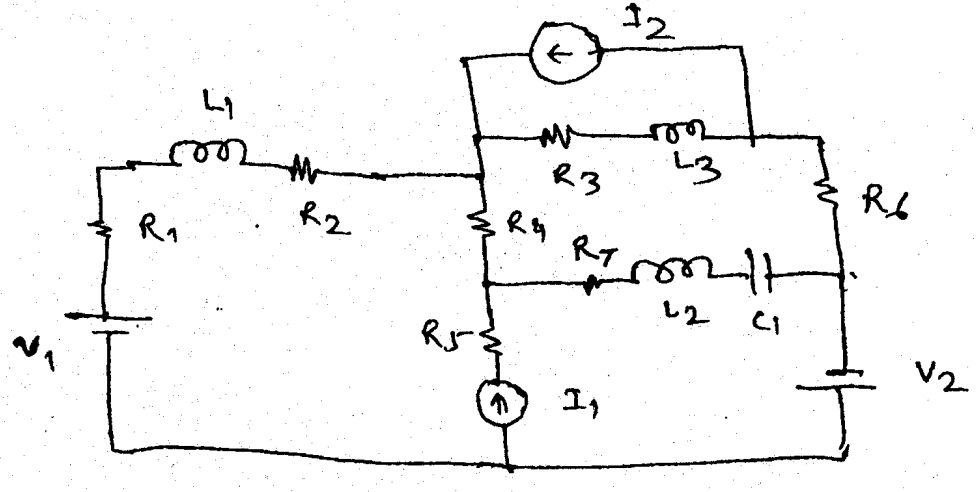
(1) $P(s) = s^5 + 4s^4 + 3s^3 + s^2 + 4s + 1$

(2) $P(s) = s^4 + 4s^2 + 8.$

(b) Obtain ABCD parameters for following two port networks. 10

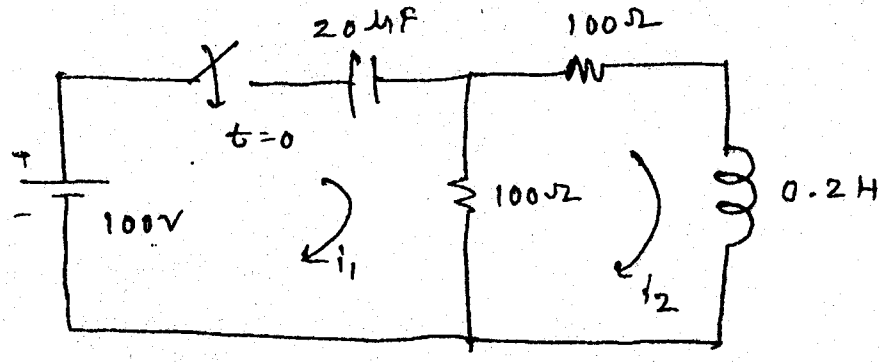


6. (a) (i) Derive network equilibrium equation on loop current basis (KVL). 10
(ii) For the network shown below get incidence matrix and tieset matrix.

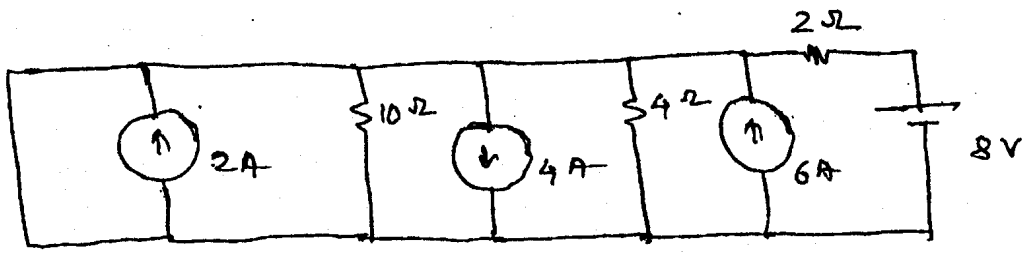


(b) For the network shown below determine i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$, $\frac{d^2i_1}{dt^2}$, $\frac{d^2i_2}{dt^2}$ for $t = 0^+$. **10**

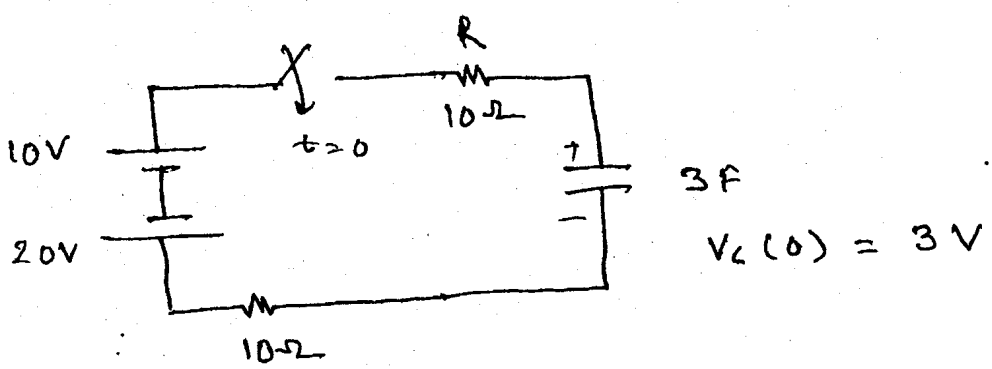
The switch is closed at t = 0.



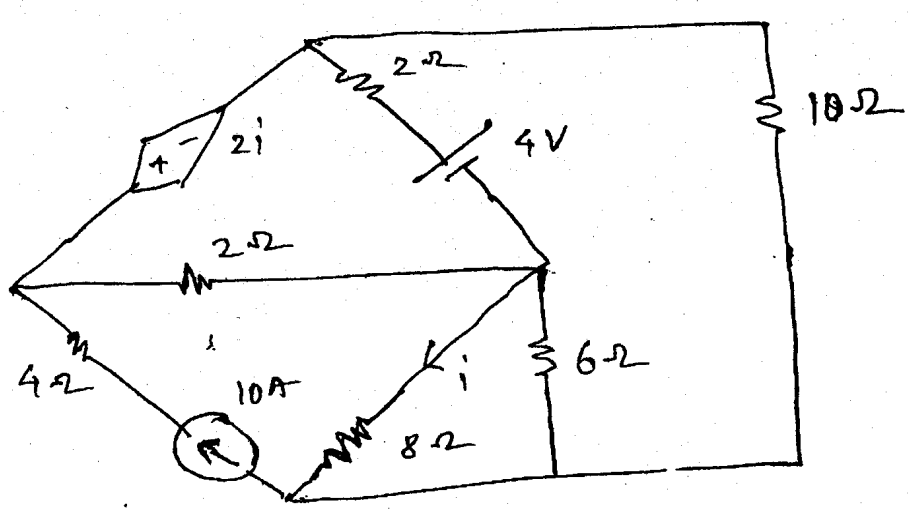
7. (a) (i) Determine current through 10Ω resistance for the network shown below. 10



(ii) For the network shown switch 's' is closed at t = 0 with initial condition shown. Determine V_R (t).



(b) Using superposition theorem determine current through 10Ω resistance. 10



16/12/2011 SE EXTC Sem III (Rev) EI

VT-Sept.-11- 165

Con. 6573–11. **MP–4153**

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from Q. Nos. **2** to **7**.
(3) Assume **suitable** Data if **neccessary**.

1. Attempt any **four** :– **20**
   (a) Explain various sources of errors in measurement system.
   (b) Piezoelectric effect and its applications.
   (c) Applications of network analyzers.
   (d) An 8 bit ADC outputs all 1's when $V_i = 5{\cdot}1$ volts find its (i) Resolution and (ii) Digital output when $V_i = 1{\cdot}28$ volts.
   (e) Give constructional details of Lumped parameter delay line.
   (f) What are the objectives of Data Acquisition System ?

2. (a) Explain Phase Shift Keying (PSK) with block diagram, state its advantages and disadvantages. **10**
   (b) With the help of block diagram explain DC power supply. Also explain constant voltage mode and constant current mode. **10**

3. (a) Differentiate Sensors and Transducers. Give five examples of Sensors and Transducers each. **10**
   (b) Explain frequency selective wave analyzer. State applications of wave analyzer. **10**

4. (a) Explain R/2R ladder type Digital to Analog Converter. What are its advantages. **10**
   (b) Explain digital storage oscilloscope with suitable block diagram. **10**

5. (a) Explain any one photoelectric transducer. State its applications. **10**
   (b) What are different types of Telemetry Systems ? Explain any one Telemetry System. **10**

6. (a) What do you mean by Universal Counter ? Explain and state advantages of Universal Counter. **10**
   (b) Find the bandwidth of a CRO if a signal having 17 microseconds rise time is displaced with 21 microseconds rise time on the CRO. **10**

7. Write short notes (any **four**) :– **20**
   (a) Q meter
   (b) Significance of 3½ and 4½ Digit
   (c) Typical Automatic Test System
   (d) Specifications of Spectrum Analyzer
   (e) Automation in Digital Instruments.

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L 12/12/11 SE Sem-III EXTC (CR)
Digital Logic Design

Con. 6383-11. MP–4144

(3 Hours) [Total Marks : 100

NOTE:- **1) Question no 1 is compulsory.**

2) Out of remaining six questions solve any four.

3) Each question carries 20 marks. Equal marks for the sub-questions.

4) Assume suitable data if required.

Que (1) (A) Perform the following operations:

(I) $101{\cdot}11 \times 100{\cdot}11$

(II) $(4C)_H \times (5A)_H$

(III) Convert $(77)_8$ into Decimal number system.

(IV) Find $(10-33)_{10}$ using 2's complement number system.

(V) Convert $(1001100001110110)_2$ into Hexa-decimal number system.

(B) Draw state diagram of sequence detector to detect a non-overlapping sequence 01100. Write its state table. Find the equivalent states if they are present.

Que (2) (A) Design lockout free Mod 12 up synchronous counter using JKMS flip flops.

(B) Do the following conversions of flip flops;
(I) JKMS to SR (II) D to T.

Que (3) (A) Draw standard TTL 2 input NAND gate circuit, discuss its operation and draw its transfer characteristic.

(B) For the following function implement the SOP and POS circuit.

$$F(A,B,C,D) = \sum m(2,3,5,7,12) + \sum d(6,13,14,15)$$

Que (4) (A) For the following function find the reduced Boolean equation using Quine McClusky method;

$$F(A,B,C,D) = \sum m(1,3,4,6,9,11,12,14) + \sum d(2,5,8,15)$$

(B) Draw logic diagram of 4:1 multiplexer and explain its operation.

Que (5) (A) Design full adder using decoder with active low outputs.

(B) Explain following characteristics of logic families;
(I) Propagation delay (II) Noise margin (III) Current parameters
(IV) Figure of merit (V) Fan out.

Que (6) (A) Design a ROM which will convert BCD numbers into 2421 code.

(B) Use 5 Input, 3 Product, 4 Output PAL to realize following 3 functions.

$F1(A,B,C,D) = \sum m(0,1,5,6,9,12,14)$

$F2(A,B,C,D) = \sum m(0,1,5,9,10,14,15)$

$F3(A,B,C,D) = \sum m(0,1,2,5,6,9,10)$.

Que (7) Write short notes on any four of the following:

(I) CMOS logic family, (II) FPGA, (III) PLA

(IV) Weighted and non-weighted codes, (V) Multiplexer tree.

1/12/2011 SE sem-III (EXTC) maths-III

38 : 2nd half.11-AM(d)

Con. 6038-11. **MP-4156**

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions out of remaining **six** questions.
(3) **Figures** to **right** indicate **full** marks.

1. (a) Find L. T. of $f(t) = \begin{cases} 1 & 0 < t < a \\ -1 & a < t < a + 2a. \end{cases}$ 5

and $f(t) = f(t + 2a)$.

(b) Find Fourier series of $f(x) = \cos \mu x$ in $(-\pi, \pi)$. Where μ is not an integer. 5

(c) Find the value of P for which the following matrix A will be of rank one, rank two, rank three, where 5

$$A = \begin{bmatrix} 3 & P & P \\ P & 3 & P \\ P & P & 3 \end{bmatrix}$$

(d) Find z-transform of $\{k^2 - 2k + 3\}_{k \geq 0}$ 5

2. (a) Solve by using L. T. 8

$$\frac{dy}{dt} + 2y + \int_0^t y\, dt = \sin t \text{ when } y(0) = 1.$$

(b) Find Fourier series for $f(x) = x + n^2$ in $(-\pi, \pi)$ hence deduce that 6

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \ldots = \frac{\pi^2}{8}.$$

(c) Show that the vectors X_1, X_2, X_3 are linearly independant and Vector X_4 depends upon them where 6

$X_1 = (1, 2, 4)$; $X_2 = (2, -1, 3)$; $X_3 = (0, 1, 2)$ and $X_4 = (-3, 7, 2)$.

3. (a) Find Fourier integral representation of the function 8

$$f(x) = \begin{cases} 1 - x^2 & \text{when } |x| \leq 1 \\ 0 & \text{when } |x| > 1 \end{cases}$$

and hence evaluate $\int_0^\infty \left[\frac{x \cos x - \sin x}{x^3}\right] \cos\left(\frac{x}{2}\right) dx$

(b) Find matrix A if adj $A = \begin{bmatrix} -2 & 1 & 3 \\ -2 & -3 & 11 \\ 2 & 1 & -5 \end{bmatrix}$ 6

(c) Find $L\left\{\frac{1-\cos t}{t^2}\right\}$ 6

4. (a) (i) Find $L^{-1}\{\tan^{-1}(s+2)^2\}$ 6

(ii) Find $L\{t^2 H(t-2) - \cos h\, t\, \delta(t-4)\}$ 2

(b) Find inverse Z-transform of 6

$$\frac{z(z+1)}{(z-1)\left(z^2+z+1\right)}.$$

(c) Find nm singular matrices P and Q such that PAQ is in the normal form and hence find rank of A and rank of (PAQ) where 6

$$A = \begin{bmatrix} 3 & 2 & -1 & 5 \\ 5 & 1 & 4 & -2 \\ 1 & -4 & 11 & 19 \end{bmatrix}$$

5. (a) Find half range cosine series for 8

$$f(x) = \begin{cases} x & ; 0 < x < \pi/2 \\ \pi - x & ; \pi/2 < x < \pi \end{cases}$$

hence find the sum $\sum_{n=1}^{\infty} \frac{1}{n^4}$.

(b) Discuss the consistancy of the following system of equations and if consistant solve them 6

$3x + 3y + 2z = 1$
$x + 2y = 4$
$10y + 3z = -2$
$2x - 3y - z = 5.$

(c) Evaluate by using L. T. 6

$$\int_0^{\infty} t^3 e^{-t} \sin t \, dt.$$

6. (a) (i) Find complex form of Fourier series for 4
$f(x) = \cos h\, 3x + \sin h\, 3x$ in $(-\pi, \pi)$.

(ii) Show that the functions $\{\sin(2n-1)\}_{n=0}^{\infty}$ are orthogonal on $\left[0, \pi/2\right]$ hence 4
construct an orthonormal set of functions from this.

(b) Apply Gauss - Seidal itterative method to solve the equations upto three itteratism 6

$3x + 20y - z = -18$
$2x - 3y + 20z = 25$
$20x + y - 2z = 17$

(c) Find Z-transform of $\{k^2 a^{k-1} \cup (k-1)\}$ 6

7. (a) (i) By using convolution theorem find **5**

$$L^{-1}\left\{\frac{1}{(s-4)^4(s+3)}\right\}$$

(ii) Find :— **3**

$L\{\sin 2t \cos t \cos h\, 2t\}$.

(b) Find inverse Z-transform of **6**

$$\frac{2z^2-10z+13}{(z-3)^2(z-2)} \text{ if R. O. C. is } 2<|z|<3.$$

(c) Find Fourier sine integral of f(x) where **6**

$$f(x)=\begin{cases} x & ; \ 0<x<1 \\ 2-x & ; \ 1<x<2 \\ 0 & ; \ x>2 \end{cases}$$

7/12/2011 SE EXTC Sem-III (R.)
Electronic Devices & Circuits-I

205 : 2ndHf11C.mk

Con. 6193-11. **MP-4150**

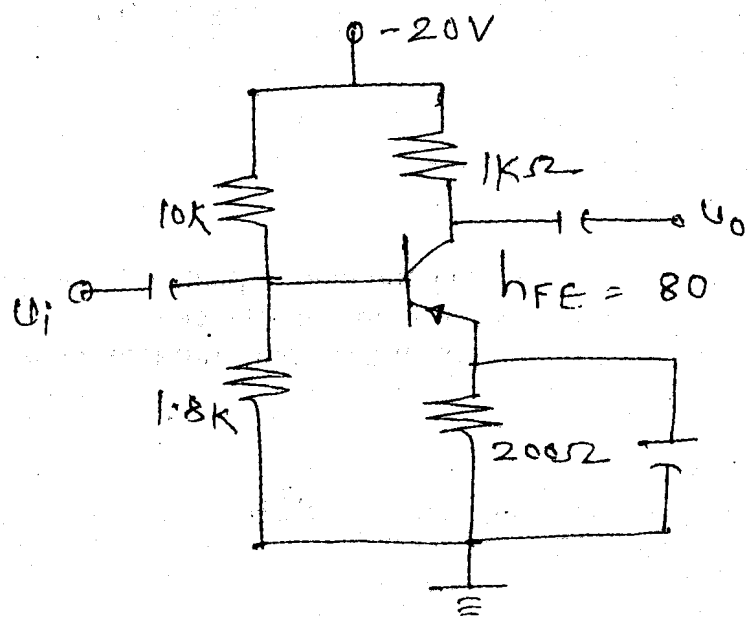
(3 Hours) **[Total Marks : 100**

N.B. (1) Question Nos. **1** and **2** are **compulsory**.
(2) Attempt any **three** questions from the remaining **five** questions.
(3) **Figures** to the **right** indicates **full** marks.
(4) Assume **suitable** data whenever **necessary** but justify the same.

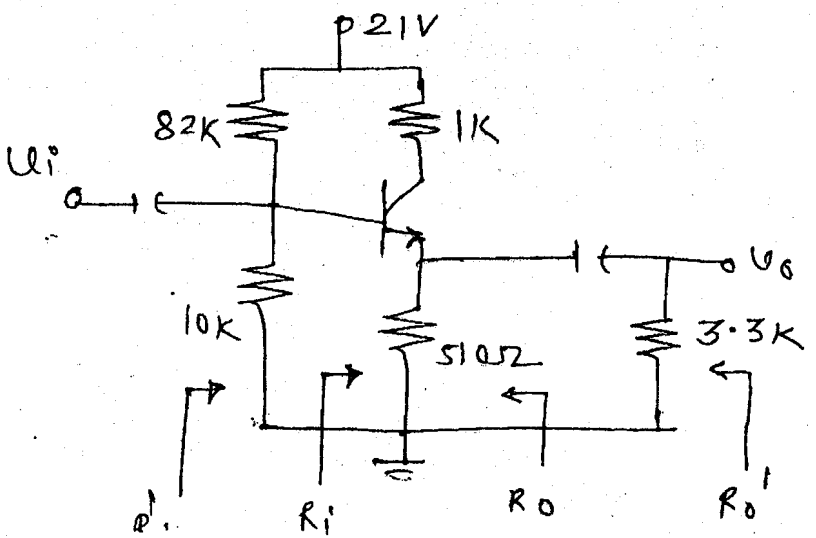
1. (a) Using transistor BC 147A, design single stage CE amplifier to get $A_V \geq 110$ and output voltage $V_0 = 3$ V, $f_L \leq 15$ Hz and $S \leq 10$. **15**
   (b) For the designed amplifier, calculate A_V, R_i and maximum possible undistorted output voltage. **5**

2. (a) Using mid-point biasing method, design single stage CS amplifier for $A_V \approx 11$ and $V_0 = 4{\cdot}5$ V. Use BFW 11 **10**
   (b) Design capacitor filter with full wave rectifier using two diodes with ripple factor less than 5%. The output voltage of 24 V delivered to 200 mA to the load. Input line voltage of 230 V/50 Hz is available. **10**

3. (a) How will you provide temperature compensation for the variation of V_{BE} and stabilization of the operating point. **10**
   (b) For the given circuit determine I_{CQ}, I_{BQ}, V_{CEQ} and stability factor. **10**



4. (a) Calculate current gain A_i, voltage gain A_v, Input resistance R_i, R'_i, output resistances R_0, R'_0 for the following circuit. **10**



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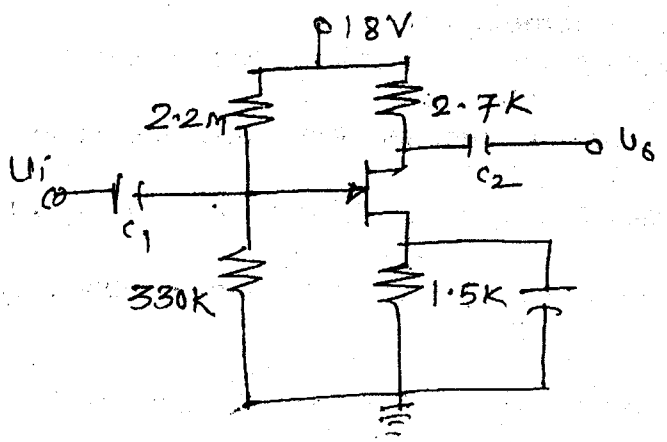
(b) For the given FET amplifier Find I_{DQ} and V_{DSQ}. Sketch the transfer charateristics and show 'Q' circuit on it. **10**

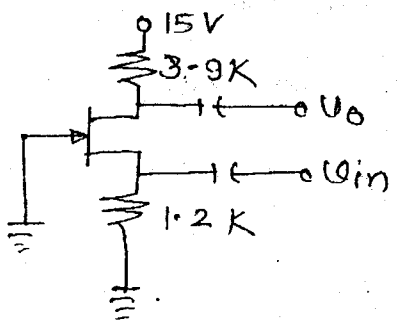


$I_{DSS} = 9mA$

$|V_p| = 4V$

5. (a) Derive the expression for gain of the amplifier, input and output resistance for Common Source amplifier with Rs unbypassed. **10**

(b) Find A_v, R_i and R_0 for the circuit. Shown



$I_{DSS} = 10mA$

$|V_p| = 4V$

6. (a) Derive the expression for the regulation and load regulation for series pass regulator using one transistor, one zener and resistances. **10**

(b) Determine 'h' parameters using input and output characteristics of CE transistor. **10**

10

7. Explain the following (any **four**) :–
   (a) Latching current and Holding current in SCR
   (b) Critical Inductance in Filter **20**
   (c) POWER MOSFET
   (d) Opto-Coupters
   (e) Silicon Controlled Switch-Characteristics, rating and applications.