S.E-Sem 3 (CBGS) (EXTC).
CTL

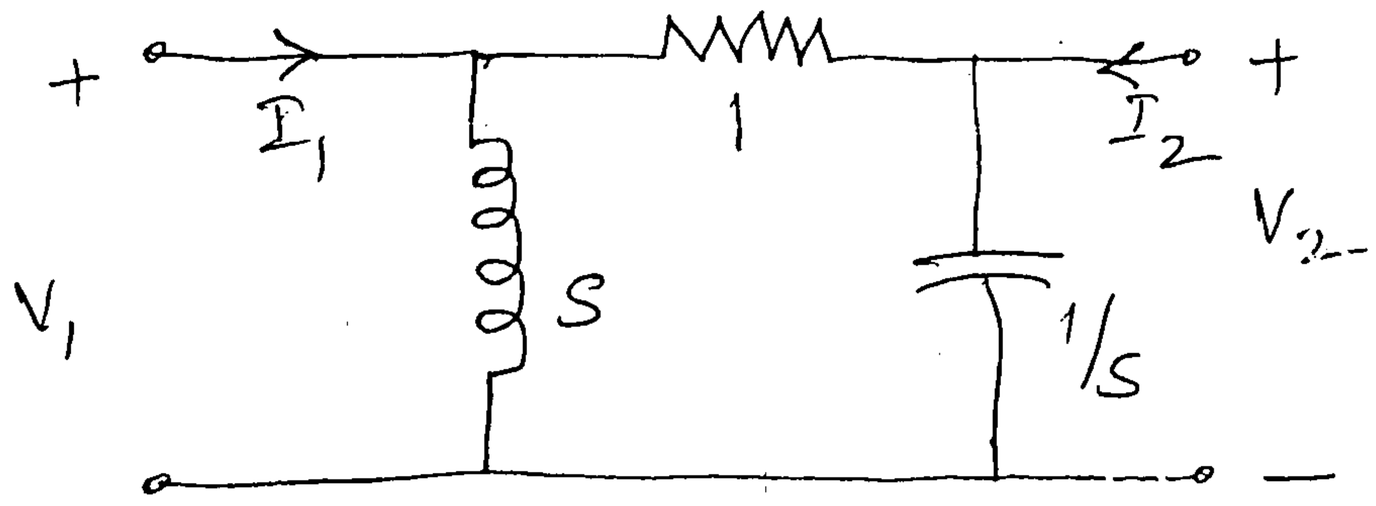
5/6/15.

QP Code : 4898

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

N.B. : (1) Question no. **1** is **compulsory**.
(2) Attempt **any three** questions from **remaining** questions.
(3) Figures to the right indicate full marks.
(4) Assume **suitable data** if **required**.

1. (a) Determine y-parameters for the network. **5**

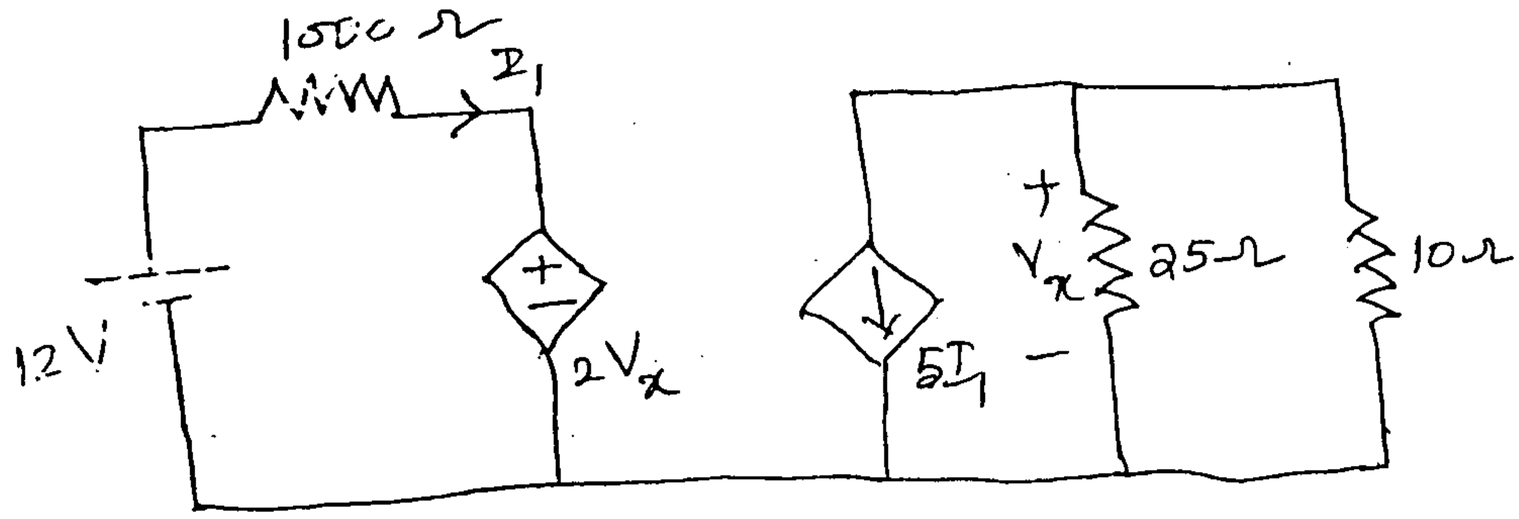


(b) The constants of a transmission line are R = 6 Ω/km, L = 2.2 mH/Km, G = 0.25×10^{-6} ℧/km, C = 0.005×10^{-6} F/km
Determine the characteristic impedeance, propagation constant and attenuation constant at 1 KHZ. **5**

(c) Test if $F(S) = 2S^6 + 4S^5 + 6S^4 + 8S^3 + 6S^2 + 4S + 2$ is a Hurwitz polynomial. **5**

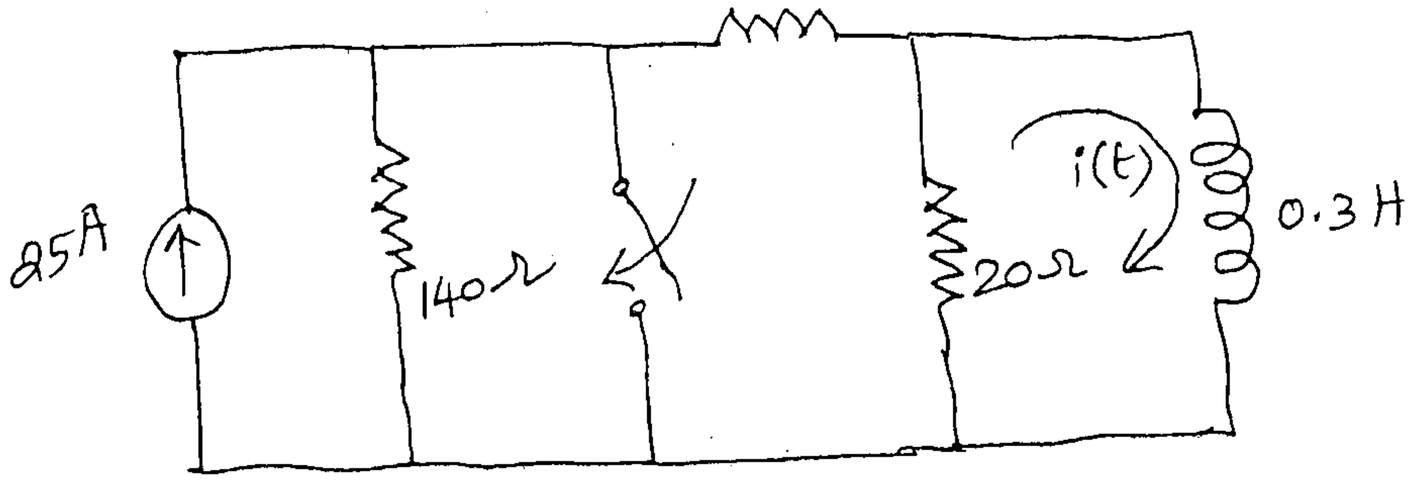
(d) The current I(S) in a network is given by $I(S) = \frac{2(S)}{(S+1)(S+2)}$. Plot the pole-zero pattern in the S-plane and hence obtain i(t). **5**

2. (a) Find the current through 10Ω resistor using Norton's theorem. **10**



[TURN OVER

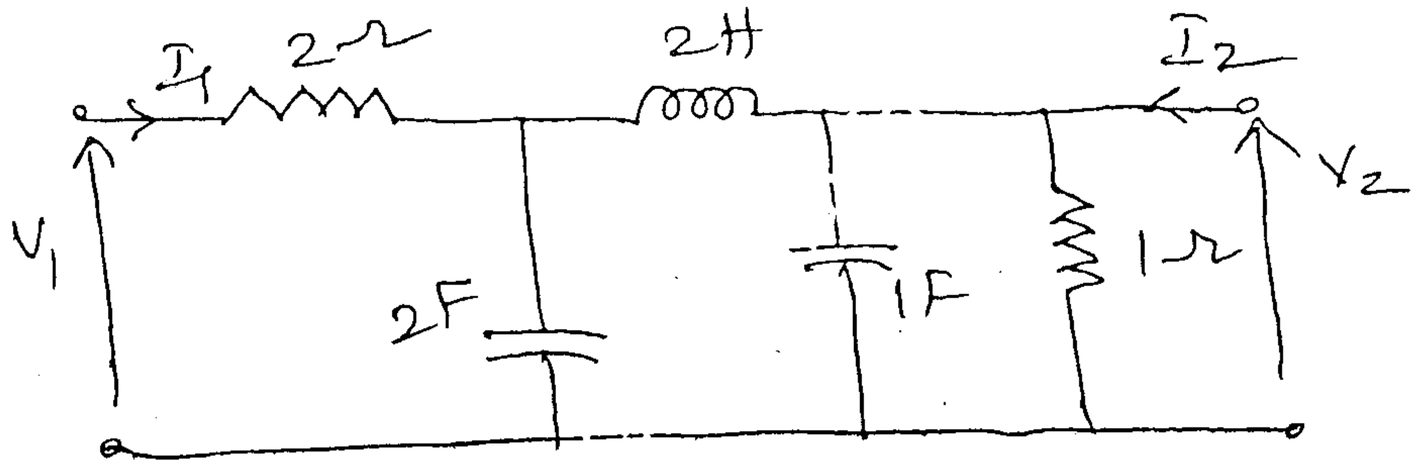
(b) Find the current i(t) for t > 0. 10



3. (a) Find Foster I and Foster II forms of the driving point function :- 10

$$F(S) = \frac{S^3 + 9S^2 + 23S + 15}{S(S^3 + 12S^2 + 44S + 48)}$$

(b) Determine ABCD parameters of the network shown :- 10



4. (a) A transmission line has a characteristic impedance of 50 Ω and terminated in a load $Z_L = 75 - j100\Omega$. Using switch chart, find 10

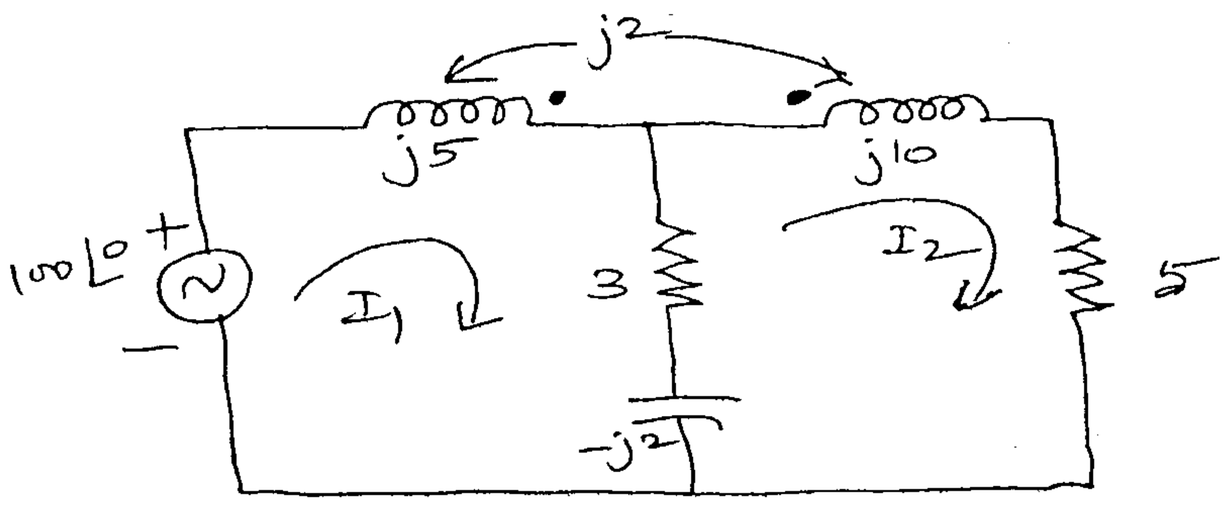
(i) VSWR

(ii) Reflection coefficient

(iii) input impedance at a distance 0.1λ from the load

(iv) location of first voltage maximum and first voltage minimum from the load.

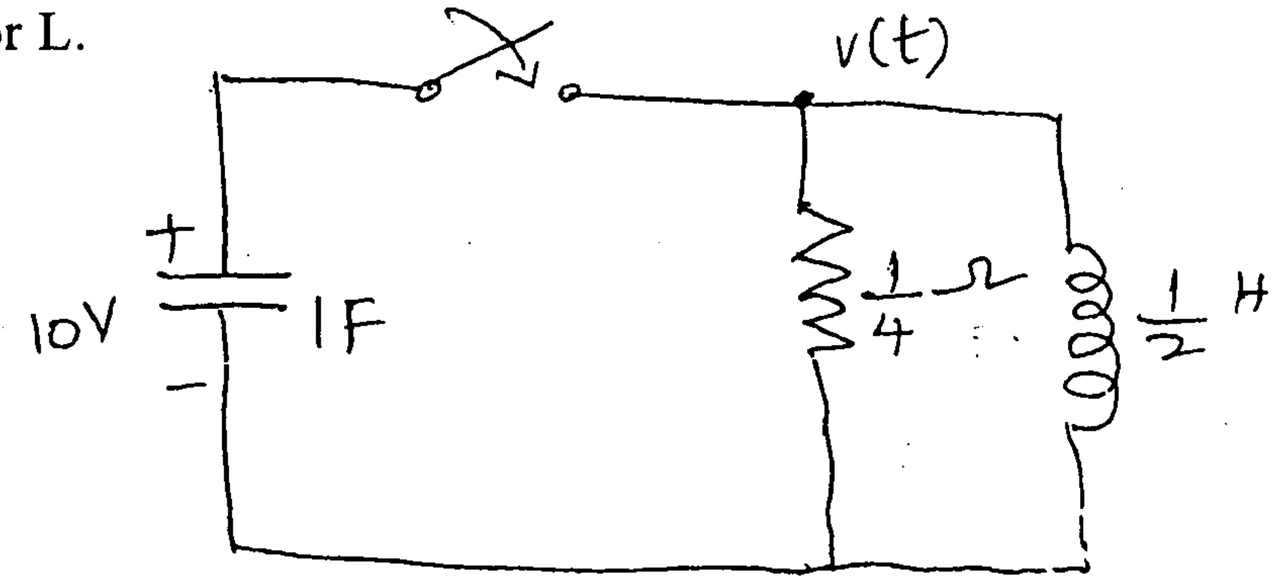
(b) Find I_2 using mesh analysis. 10



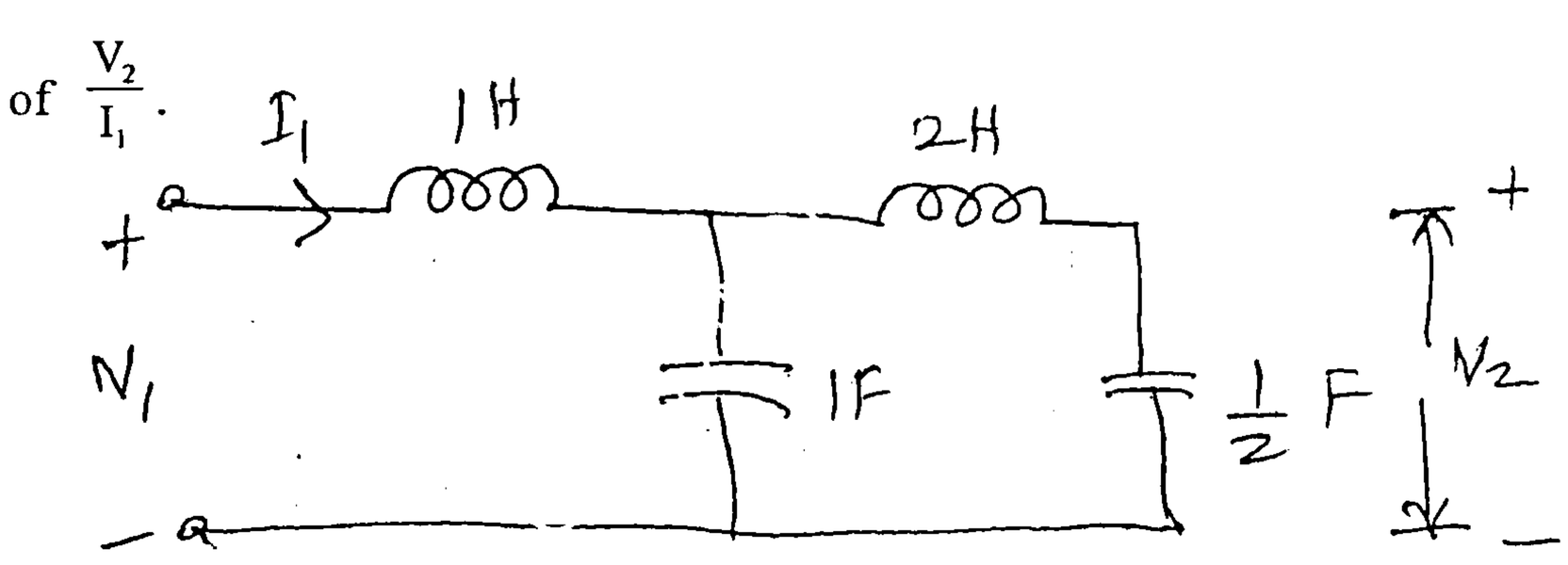
[TURN OVER

10

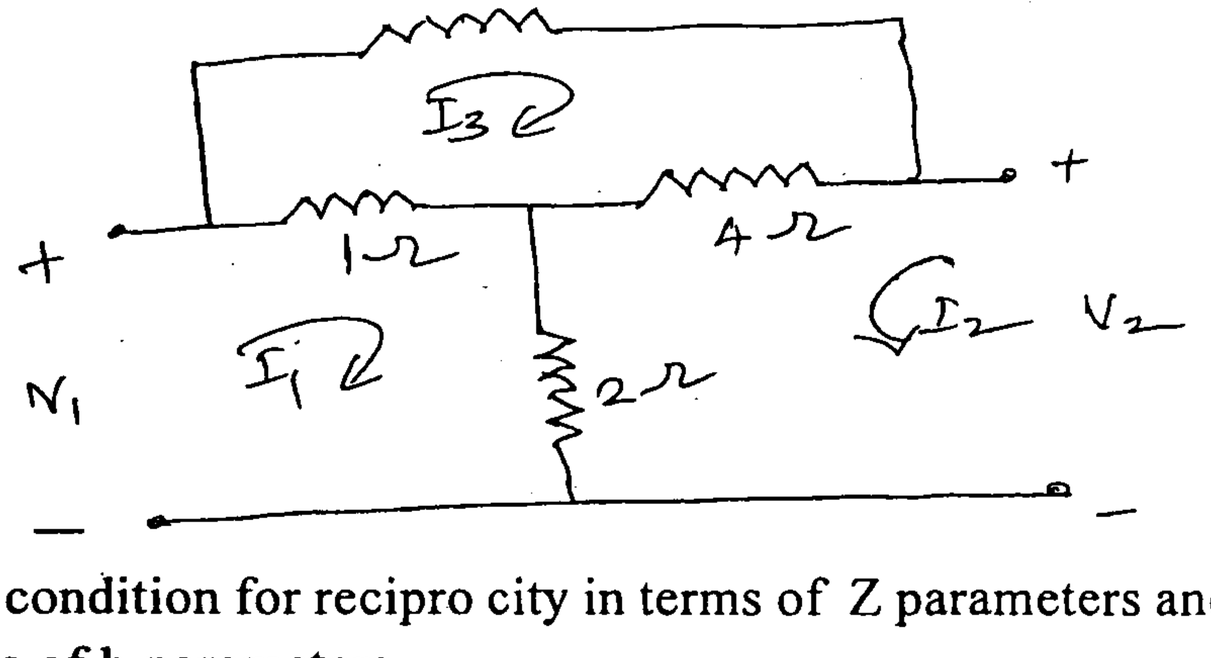
5. (a) For the network shown, capacitor C has an initial voltage $V_C(-0)$ of 10V and at the same instant, current in the inductor L is zero. The switch is closed at time t = 0. Obtain the expression for voltage V(t) across the inductor L. **10**



(b) For the network shown, determine $\frac{V_1}{I_1}$ *and* $\frac{V_2}{I_1}$. Plot the poles and zeros of $\frac{V_2}{I_1}$. **10**



6. (a) For the network shown, find the equivalent T - network. **10**



(b) Derive condition for recipro city in terms of Z parameters and symmetry in terms of h parameters. **10**

S.E. EXTC Sem(3)(CBGS)
EIM

1/6/15

Q.P. Code : 4896

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

Note: 1. Attempt four questions, question no 1 is compulsory.
2. Assume suitable data where ever required.
3. Answers to the questions should be grouped together.
4. Figure to the right of question indicates full marks.

Q1) Attempt five: (20)

a) Significance of three and half digit display
b) Define accuracy, precision and sensitivity with suitable example
c) Explain working of strain gauge and its application in load measurement
d) List various sensors for pressure and temperature along with their ranges
e) Define types of error and methods of minimization

Q2 a) Draw and explain working of capacitive transducer for level measurement. (10)
b) Draw neat block diagram of CRO and explain its functioning, comment on role of sweep in CRO. (10)

Q3 a) Draw and explain R-2R ladder network DAC for 3 bits input taking suitable example. (10)
b) Explain Kelvin's double bridge and its application in very low resistance measurement. (10)

Q4 a) Explain SAR OR Flash type ADC with the help of block diagram and comment on its speed. (10)
b) Explain LVDT and define its application in displacement measurement. (10)

Q5 a) Explain Hetrodyne type waves analyser and its applications. (10)
b) Discuss DSO with the help of block diagram along with various modes of operation also explain its applications. (10)

Q6 a) Draw and discuss Hey Bridge and its application for measurement of inductance. (10)
b) Define power and energy and explain working of an energy meter. (10)

SE - SEM III [CBSGS] EXTC 26 May 2015
Digital Electronics

QP Code :4893

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

N.B. (1) Question no **1** is **compulsory**
(2) Out of **remaining** questions, attempt any **three** questions
(3) **Assume** suitable **data** if required
(4) Figures to the right indicate **full marks**

1.	(a)	Compare combinational logic circuits with sequential circuits	**5**
	(b)	Compare PLA and PAL	**5**
	(c)	Explain static RAM	**5**
	(d)	Explain Master-Slave JK Flipflop	**5**
2.	(a)	State and prove laws of Boolean Algebra	**10**
	(b)	Using Quine McClusky method, minimize the following $F(A, B, C, D) = \sum m(0,2,5,7,8,10,12,15)$	**10**
3.	(a)	Implement Full adder using 8:1 multiplexers	**10**
	(b)	Write VHDL code for 3-bit up counter	**10**
4.	(a)	Design a two bit digital comparator and implement using basic logic gates	**10**
	(b)	Draw a neat circuit of BCD adder using IC 7483	**10**
5.	(a)	What is universal shift register? Explain any two modes of shift register	**10**
	(b)	i) Covert a D FF to T FF	**5**
		ii) Convert a JK FF to T FF	**5**
6.	(a)	Design a Synchronous counter using T FF for the sequence given below: 1-2-3-4-5-6-7-1	**10**
	(b)	Define the following terms for logic families	**10**
		i) Propagation Delay	
		ii) Fan out	
		iii) Power Dissipation	
		iv) Noise Margin	
		v) Fan in	

JP-Con.: 10636-15.

S-E-Sem III (CBGS). 14/5/15

EXTC

Analog Electronics II

QP Code : 4887

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

N.B (1) Question Nos. 1 is compulsory.

(2) Attempt any three questions from the remaining five questions.

(3) Figure to the right indicates full marks.

(4) Assume suitable data whenever necessary but justify the same.

1 (a) Compare clipper and clamper circuit. [5]

(b) Explain Barkhausen criteria for sustained oscillations. [5]

(c) Compare Depletion and Enhancement type MOSFET. [5]

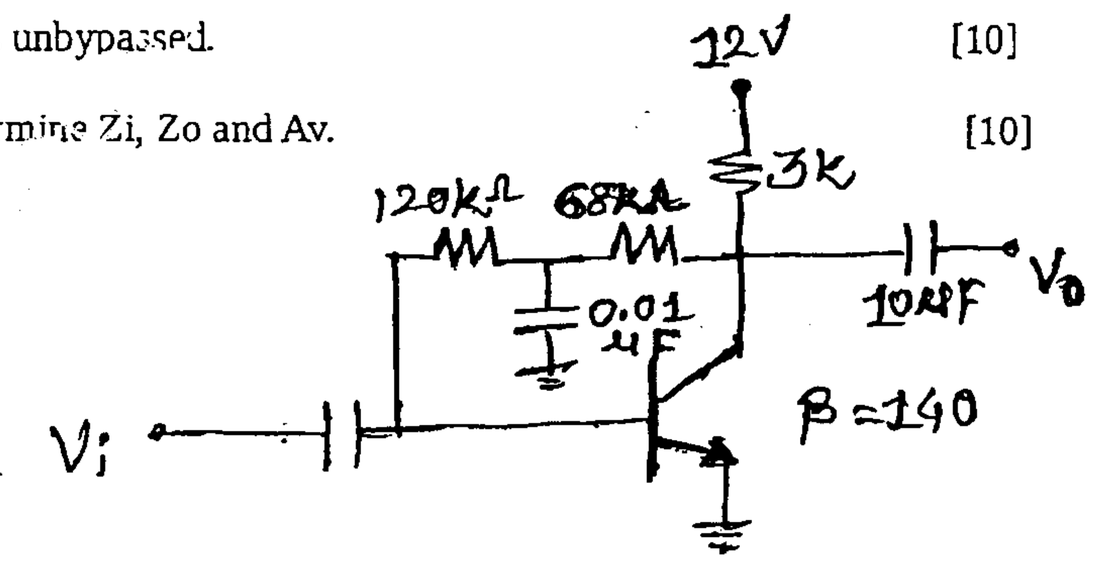
(d) Transistor is a current controlled device while FET is a voltage controlled device. Justify. [5]

Q2 (a) Define Stability factor. Derive the equation for Stability factor. State which biasing technique is more stable. Justify your answer. [10]

(b) For a NPN transistor in CE mode voltage divider bias configuration determine V_C and V_B. Given V_{CC} = +20V, V_{EE}= -20V, R_1 =8.2KΩ, R_2 = 2.2KΩ, Rc = 2.7KΩ, R_E = 1.8 KΩ, C_1=C_2= 10μF and β = 120. [10]

Q3 (a) Derive the equations for Av, Ai, Ri and Ro for a NPN transistor in CE mode voltage divider bias configuration with RE unbypassed. [10]

(b) For the network given below determine Zi, Zo and Av. [10]



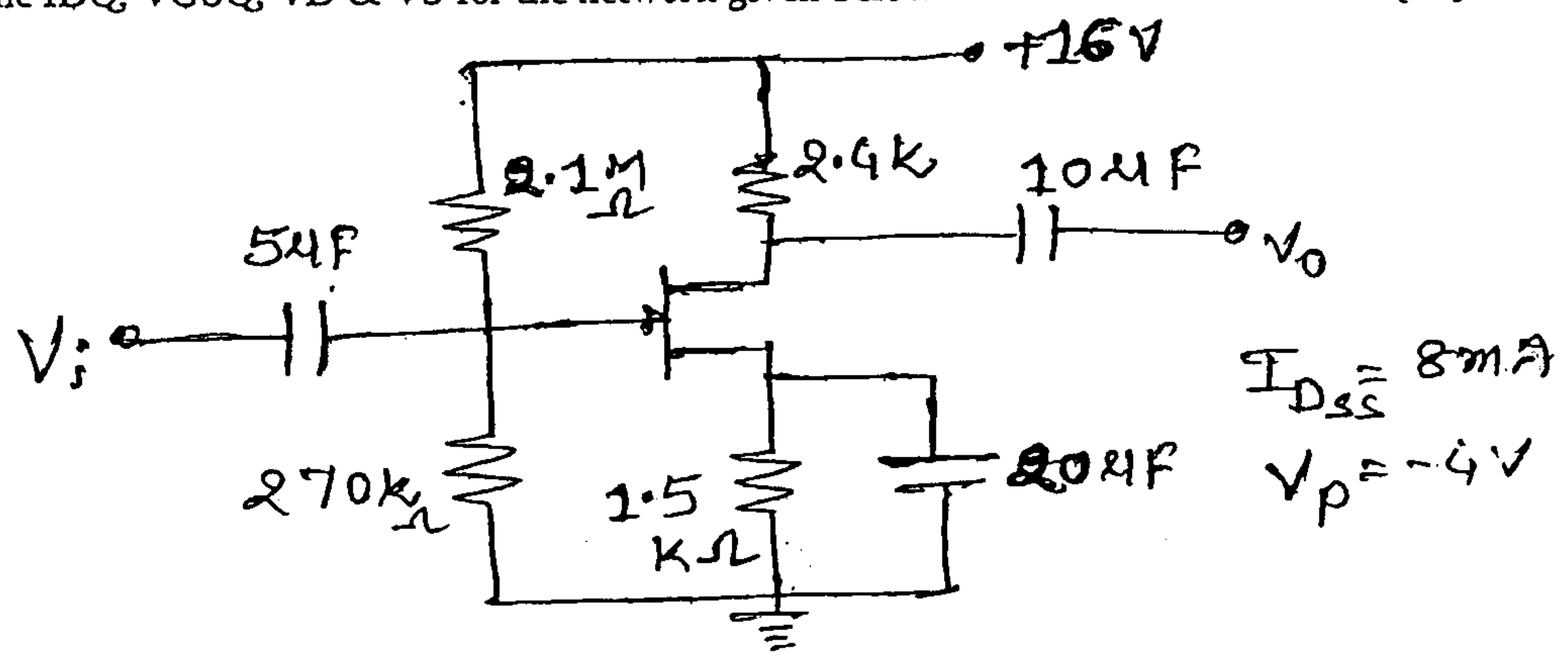
Q4 (a) Explain the basic operation and characteristics of n-channel enhancement type MOSFET. [10]

(b) Draw a neat circuit diagram of Wien bridge oscillator and derive an expression for its output frequency. [10]

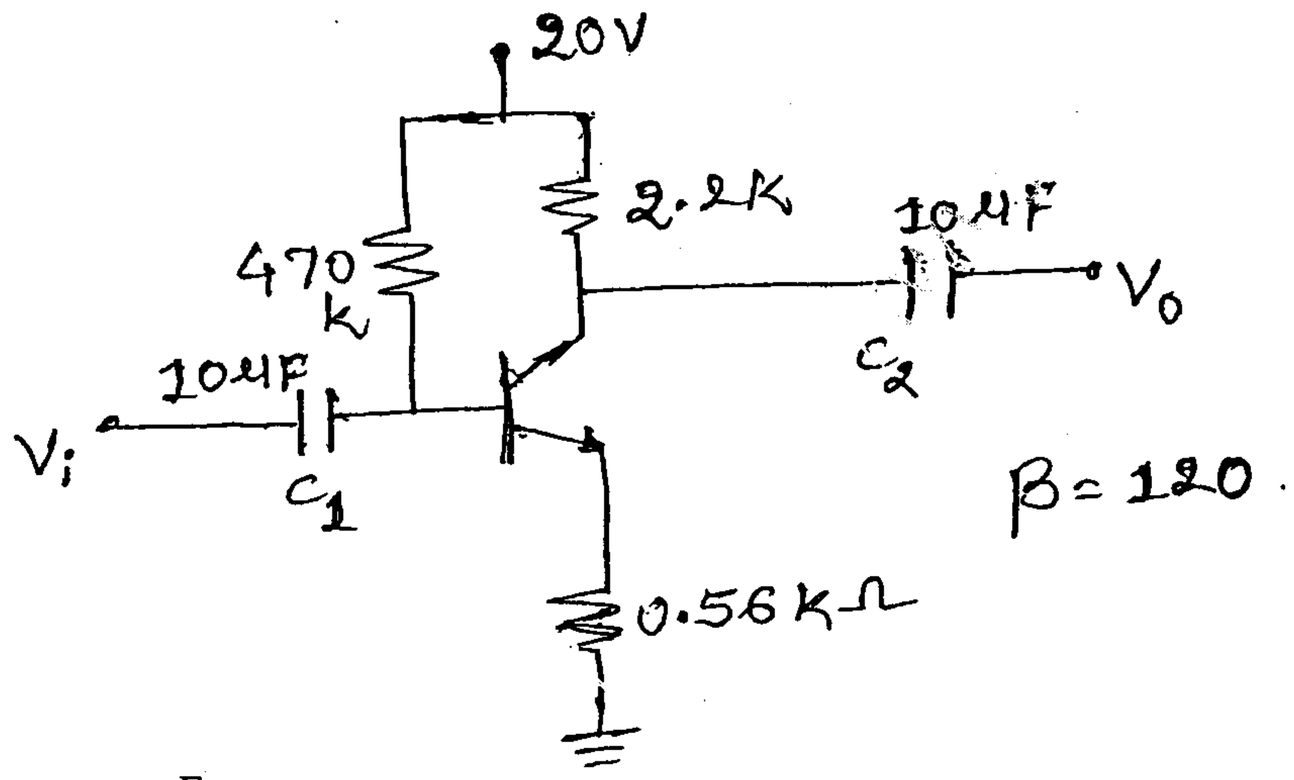
JP-Con. 8919-15.

PT-O

Q5.) a) Determine IDQ, VGSQ, VD & VS for the network given below: [10]



b) Determine Zi, Zo & Av for the circuit given below. [10]



Q6. Write short note on any Four:- [20]

i) Biasing of JFET for Zero temperature drift.

ii) Energy band diagram of MOS capacitor.

iii) Small signal equivalent circuit of CC amplifier.

iv) Crystal oscillator

v) DC load line & significance of Q point.

S.E. Sem III (CBGS) (ETRx & EXTC). 20/5/15

Applied Maths—III

QP Code : **4787**

(3 Hours) [Total Marks : 80

[Revised Course]

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

2) Attempt any three from the remaining questions.

3) Assume suitable data if necessary.

1. (a) Determine the constants a,b,c,d if $f(z) = x^2 + 2axy + by^2 + i(dx^2 + 2cxy + y^2)$ is analytic. 5

(b) Find a cosine series of period 2π to represent $\sin x$ in $0 \le x \le \pi$ 5

(c) Evaluate by using Laplace Transformation $\int_0^\infty e^{-3x}\, t \cos t\, dt$. 5

(d) A vector field is given by $\bar{F} = (x^2+xy^2)\,i + (y^2 + x^2 y)\,j$. Show that $\bar{F}$ is irrotational and find its scalar potential. Such that $\bar{F} = \nabla\emptyset$. 5

2. (a) Solve by using Laplace Transform 6

$(D^2 + 2D + 5)\, y = e^{-t} \sin t$, when $y(0) = 0$, $y'(0) = 1$.

(b) Find the total work done in moving a particle in the force field 6

$\bar{F} = 3xy\,i - 5z\,j + 10x\,k$ along $x = t^2 + 1$, $y = 2t^2$, $z = t^3$ from $t=1$ and $t=2$.

(c) Find the Fourier series of the function $f(x) = e^{-x}$, $0 < x < 2\pi$ and $f(x + 2\pi) = f(x)$. Hence deduce that the value of $\sum_{n=2}^{\infty} \frac{(-1)^n}{n^2+1}$. 8

3 (a) Prove that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \cdot \sin x$ 6

(b) Verify Green's theorem in the plane for $\oint (x^2 - y)\, dx + (2y^2 + x)\, dy$ 6

Around the boundary of region defined by $y = x^2$ and $y = 4$.

(c) Find the Laplace transforms of the following. 8

i) $e^{-t} \int_0^t \frac{\sin u}{u}\, du$ ii) $t\sqrt{1 + \sin t}$

[TURN OVER

4 (a) If $f(x) = C_1Q_1(x) + C_2Q_2(x) + C_3Q_3(x)$, where C_1, C_2, C_3 constants and Q_1, Q_2, Q_3 are orthonormal sets on (a,b), show that 6

$\int_a^b [f(x)]^2 dx = c_1^2 + c_2^2 + c_3^2$.

(b) If $v = e^x \sin y$, prove that v is a Harmonic function. Also find the corresponding harmonic conjugate function and analytic function. 6

(c) Find inverse Laplace transforms of the following. 8

i) $\frac{s^2}{(s^2+a^2)(s^2+b^2)}$ ii) $\frac{s+2}{s^2-4s+13}$

5 (a) Find the Fourier series if $f(x) = |x|$, $-k < x < k$ 6

Hence deduce that $\sum \frac{1}{(2n-1)^4} = \frac{\pi^4}{96}$.

(b) Define solenoidal vector. Hence prove that $\bar{F} = \frac{\bar{a} \times \bar{r}}{r^n}$ is a solenoidal vector 6

(c) Find the bilinear transformation under which 1, i, -1 from the z-plane are mapped onto 0, 1, ∞ of w-plane .Further show that under this transformation the unit circle in w-plane is mapped onto a straight line in the z-plane .Write the name of this line. 8

6 (a) Using Gauss's Divergence Theorem evaluate $\iint_s \bar{F} \cdot d\bar{s}$ where $\bar{F} = 2x^2yi - y^2 j + 4xz^2 k$ and s is the region bounded by $y^2 + z^2 = 9$ and $x = 2$ in the first octant . 6

(b) Define bilinear transformation. And prove that in a general, a bilinear transformation maps a circle into a circle. 6

(c) Prove that $\int x J_{2/3}(x^{3/2})\, dx = -\frac{2}{3} x^{-1/2} J_{-1/3}(x^{3/2})$. 8
