Q. P. Code: 24888

Duration: 3hours　　　　　　　　　　　　　　**Maximum Marks: 80**

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

(2)　Solve any **three** questions from the **remaining five.**

(3)　Figures to the right indicate full marks.

(4)　Assume suitable data if necessary and mention the same in answer sheet.

Q1　Attempt any 5 questions　　　　　　　　　　　　　　　　　　　　[20]
　　a)　Write down current equation of diode and explain significance of each parameter.
　　b)　Calculate I_B, I_C and V_{CE} for the common emitter circuit shown in Fig. 1b
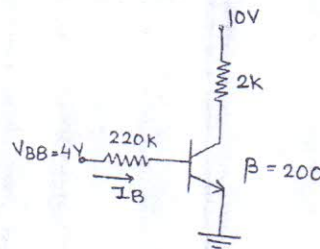

Fig. 1b

　　c)　Explain effect of temperature on JFET and derive equation for zero temperature drift.
　　d)　Compare CE, CB and CC configuration.
　　e)　Draw small signal hybrid pi model of BJT including early effect.
　　f)　Why LC oscillators are preferred for high frequency applications?

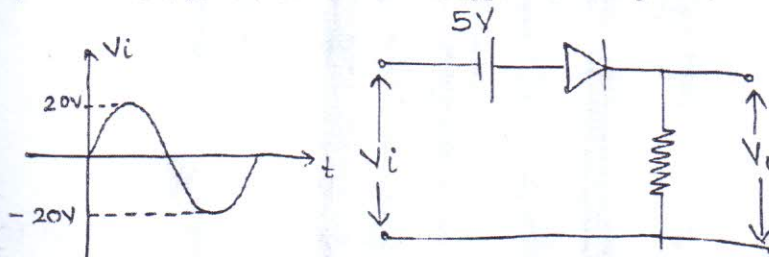Q2　a) Draw the output waveform for the clipper and clamper circuit shown in Fig 2a and 2b.　　[10]
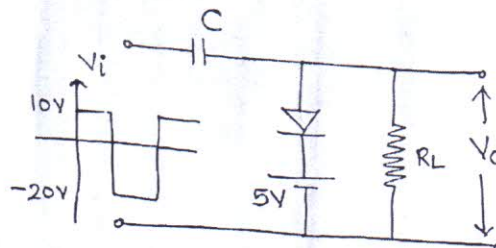

Fig. 2a

Fig. 2b

　　b) Derive the expression for frequency of oscillation for a transistorized (BJT) RC phase shift　[10]
　　　oscillator.

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Q.3   a) Find I_{CQ} and V_{CEQ} for the circuit shown in Fig 3a if $\beta = 100$.   [10]
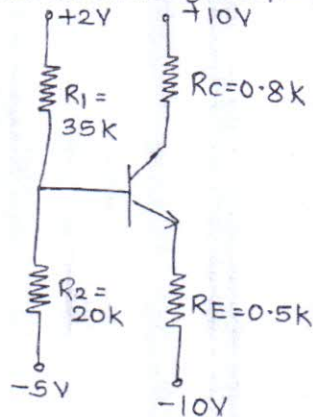

Fig. 3a

b) Explain the construction and characteristics of N-channel Enhancement MOSFET. Draw [10] transfer and drain characteristics.

Q.4   a) For the circuit shown in Fig, 4a, determine V_{GSQ} and V_{DSQ}. Also calculate voltage gain, [10] input impedance and output impedance.
$V_{TN} = 1V$, $K_N = 0.5$ mA/V^2, $\lambda = 0.01V^{-1}$.

Fig.4a

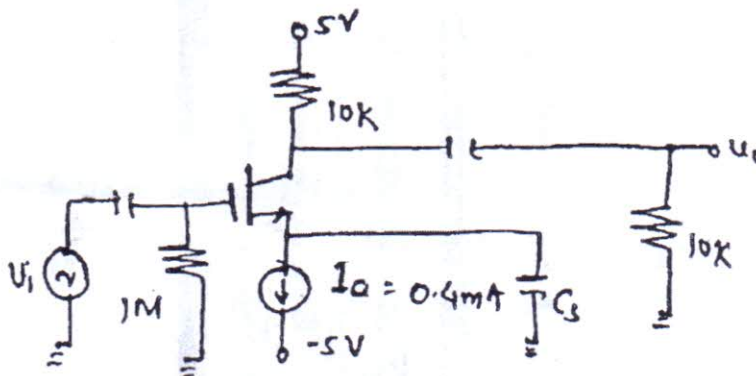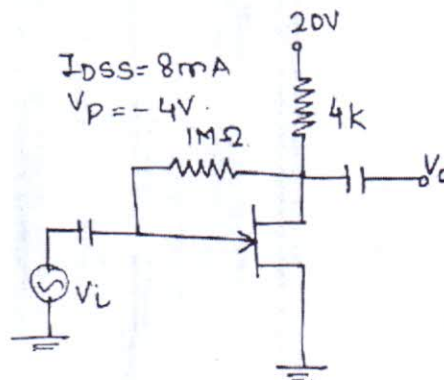b) Find I_{DQ}, V_{GSQ}, V_{DSQ}, V_D and V_S for the circuit shown in Fig 4b.   [10]

Fig. 4b

[Time:3 Hours] [Marks:80]

N.B

1. Question **No.1** is compulsory.
2. Attempt **any three** questions from remaining five questions.
3. Assume **suitable data** if required.
4. Use **Smith chart** for the transmission line problem if asked.

Q.1)(a) Find the Norton's equivalent circuit across the terminal a-b for the circuit shown in
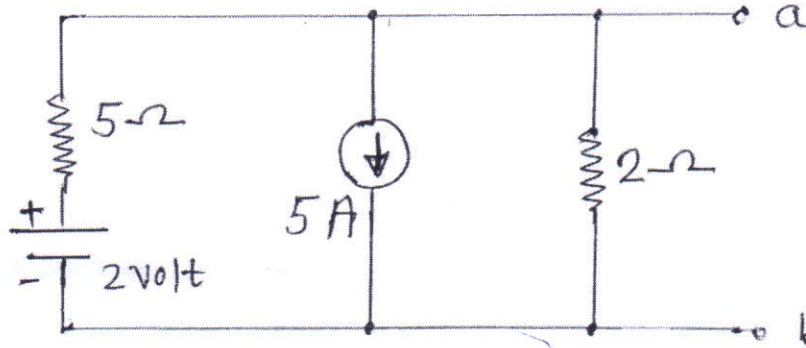
Figure No.1. (5-M)

Figure No.1

(b) Obtain the instantaneous value of currents through R and L and obtain the total current in terms of RMS value for the circuit shown in Figure No.2. This circuit is energized by a sinusoidal a.c. voltage of v = 100sin (1000t+36) volt. (5-M).
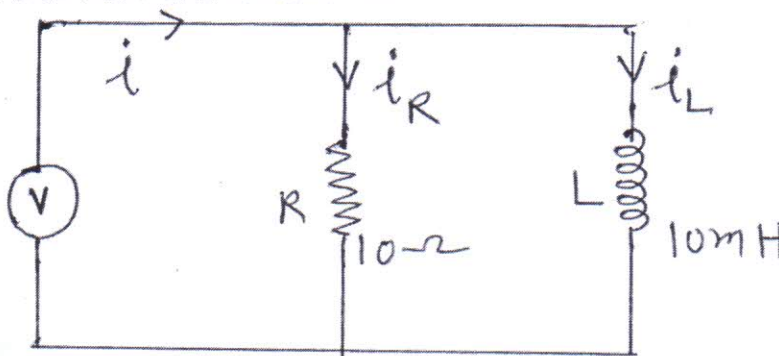

Figure No. 2

(c) Determine the Z- parameters for the circuit shown in Figure No.3.   (5-M)
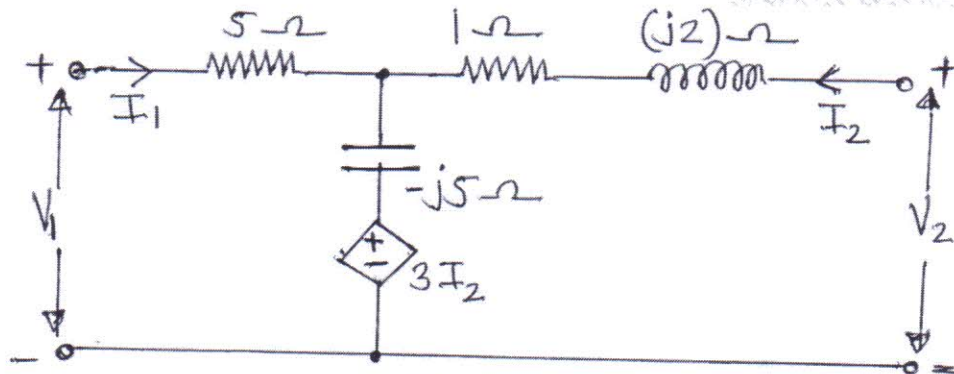
Figure No. 3

(d) Differentiate between lossy transmission line and lossless transmission line with respect to (i) Equivalent circuit (ii) Propagation constant (iii) Attenuation constant (iv) Characteristics impedance (v) Input impedance.   (5-M)

Q.2) (a) Find the transmission parameters for the circuit shown in Figure No.4 (10-M)

Figure No. 4

(b) For network shown in Figure No.5, the switch is opened at t = 0, find v(t) for t > 0. (10-M)

Figure No. 5

Q.3) (a) Find the Thevenin's equivalent circuit for the network shown in Figure No.6 at the right
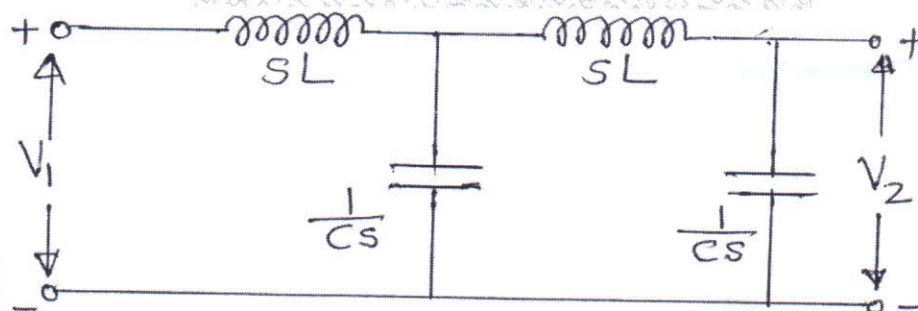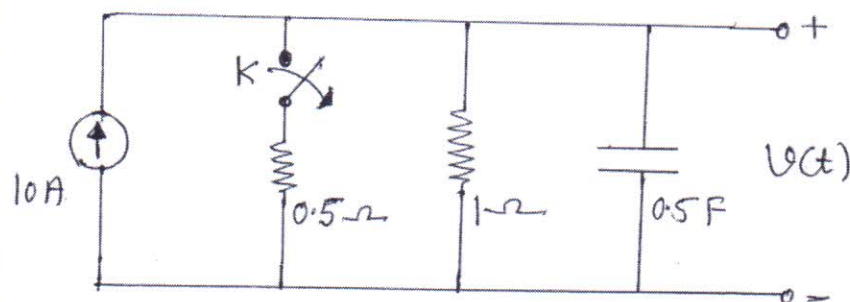of the terminal a-b. (10-M)
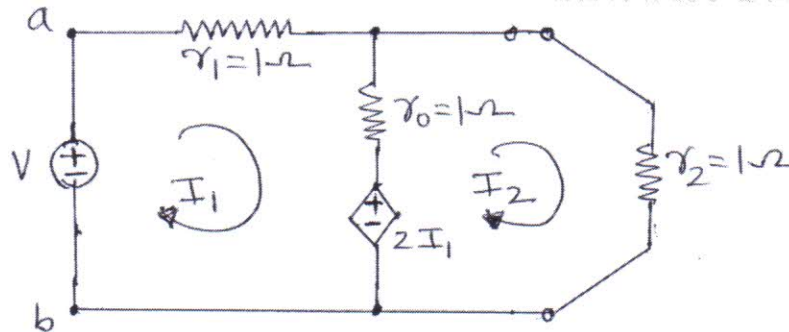
Figure No. 6

(b) A series RC combination, having an impedance of $Z_L = (450-j600)\ \Omega$ at 100 MHz, is connected
to a 300 Ω transmission line. Calculate in meters the position and length of short circuited shunt
stub designed to match this load to the line. Give any one solution and solve using **Smith chart**
only. (10-M)

Q.4) (a) A driving point impedance is given by $Z_{LC}(s) = \dfrac{s\,(s^2+4)\,(s^2+6)}{(s^2+1)\,(s^2+5)}$. Obtain the first form
of Cauer network. (10-M)

(b) Find the voltage drop across the capacitor and the resistor for the circuit shown in Figure
No.7. (10-M)

Figure No. 7

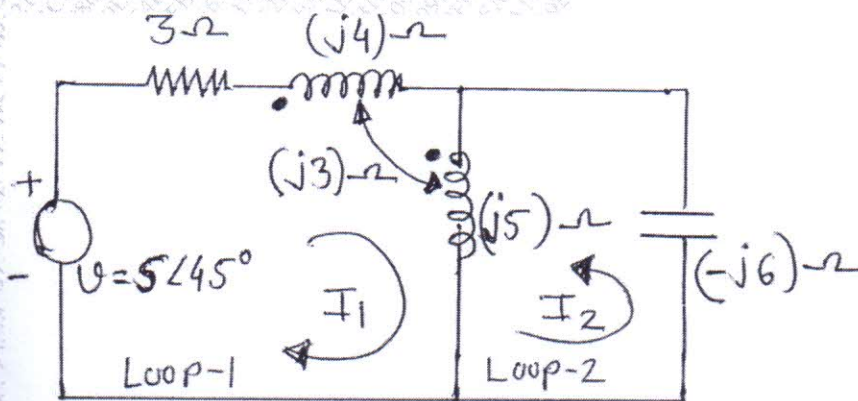Q.5) (a) Find the Z parameters for the network shown in Figure No.8   (10-M)
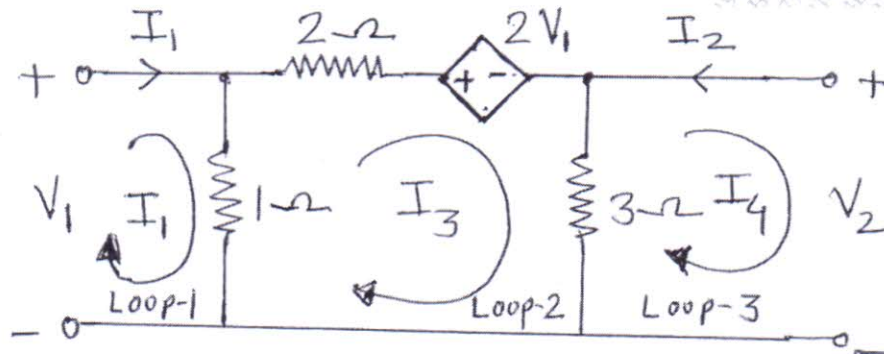
Figure No. 8

(b) (I) State properties of the positive real function (PRF).   (5-M)

(II) Check positive realness of the function $Y(s) = \dfrac{s^2+2S+20}{S+10}$ with proper reason. (5-M)

Q.6) (a) Find $V_C(t)$ and $I_L(t)$ in the circuit shown in Figure No.9 assuming zero initial conditions.

(10-M)
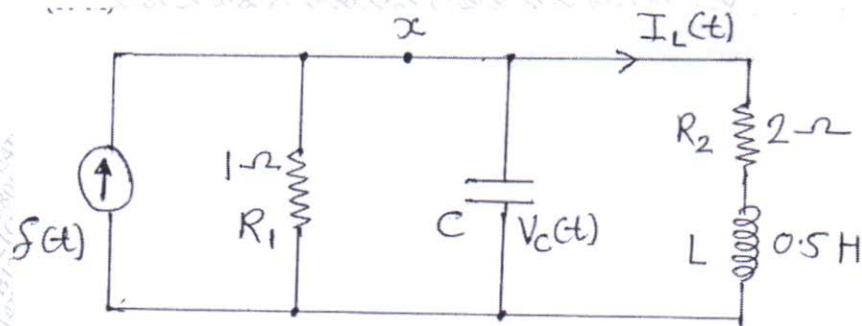
Figure No. 9

(b) A load impedance of $Z_L = (40+j70)\ \Omega$ terminates $100\ \Omega$ transmission line of length 0.3λ long. Use formulas and determine following parameters.   (10-M)

(i) Find load admittance at the load end of transmission line.   (2-M)
(ii) Find input impedance at the input port of transmission line.   (4-M)
(iii) Find reflection coefficient at the load end of transmission line.   (2-M)
(iv) Find voltage wave standing ratio (VSWR) along the transmission line.   (2-M)

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Time : 3 Hours   Total Marks: 80

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

1. (a) Compare SRAM and DRAM   [5]
    (b) Compare Mealy and Moore machine   [5]
    (c) Compare TTL and CMOS Logic   [5]
    (d) Compare PLA with PAL   [5]

2. (a) Prove that NAND and NOR Gates are universal Gates   [10]
    (b) Design a full subtractor and implement using logic Gates   [10]

3. (a) Design a 4 bit Binary to Grey code converter   [10]
    (b) Implement the given function using 8:1 Multiplexer   [10]
         $F(A, B, C, D) = \sum m(0, 1, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13)$

4. (a) Explain 4-bit asynchronous up counter with proper timing diagram   [10]
    (b) Write a VHDL program to design a 4:1 Mux   [10]

5. (a) Minimize the following expression using Quine McClusky Technique   [10]
         $F(A,B,C,D) = \sum m(0, 1, 2, 3, 5, 7, 9, 11,15)$
    (b) Convert JK FF to T FF and SR FF to D FF   [10]

6. (a) Design synchronous mod 5 counter using T FF   [10]
    (b) Write a note on CPLDs   [10]

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Q. P. Code: 26311

(3Hours)

Total Marks: 80

Instructions – i) Questions 1 is Compulsory
ii) Out of remaining questions attempt any three questions
iii) Figures in the bracket to the right hand side indicate full marks.

Q.1	a) Explain alternate and chopped mode in dual trace CRO.	(05)
	b) Define precision, accuracy and sensitivity with suitable example.	(05)
	c) Explain selection criteria for transducers.	(05)
	d) Write a note on piezoelectric transducer.	(05)
Q.2	a) Explain working of strain gauge and derive expression for gauge factor.	(10)
Q.2	b) Explain Kelvins'double bridge and its application in low resistance measurement.	(10)
Q.3	a) Write a note on applications of Q meter.	(10)
Q.3	b) Define power and energy and explain working of a single phase energy meter.	(10)
Q.4	a) Explain heterodyne type wave analyser and its application.	(10)
Q.4	b) Draw and explain Schering bridge and drive expression for measurement of capacitance.	(10)
Q.5	a) Draw and explain R_2Rladder network DAC for 3 bit input taking suitable example.	(10)
Q.5	b) Discuss DSO with the help of block diagram along with various modes of operation also explain its applications.	(10)
Q.6	a) Draw and explain capacitive transducer for level measurement	(10)
Q.6	b) Explain SAR type ADC with neat block diagram and comment on its speed.	(10)

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