This question paper contains 4 printed pages.]

Your Roll No. .....

1396 **A**

B.Sc. (Hons.)/I

ELECTRONIC SCIENCE—Paper 1.5 (V)

(Network Analysis and Linear Active Circuits)

Time : 3 *Hours* *Maximum Marks* : 38

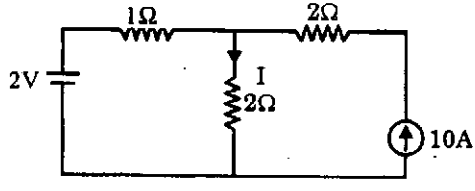
(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt ***five*** *questions in all including Question No.* **1** *which is compulsory.*

Non Programmable Scientific calculator is allowed.

1. Attempt any ***five*** 2 × 5

(a) Determine the current I in the following circuit.



(b) Three equal resistance of 3Ω are connected in star network. What is the resistance in one of the arms in the equivalent delta circuit.

(c) Two identical sections of the π network are connected in parallel. The Y-parameters of the network are : $Y_{11} = 3\,\mho$, $Y_{12} = Y_{21} = -2\,\mho$, $Y_{22} = 3\,\mho$. Determine the overall Y-parameters of resulting network.

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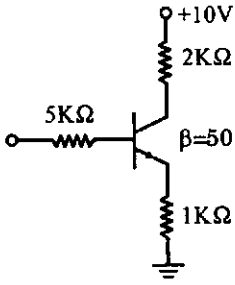
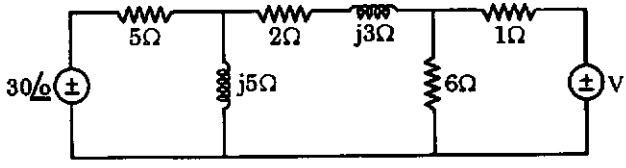
(d) Find the operating point of the following circuit.



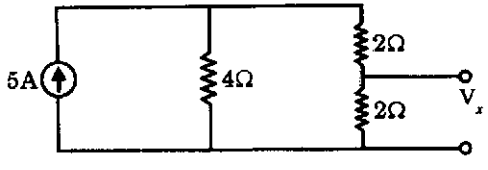
(e) Define Peak Inverse Voltage of a diode. What is the PIV rating of a diode in case of Bridge rectifier in comparison to CT-FWR if turns ratio of the transformer used is same in both rectifiers.

(f) What type of feedback is preferred for designing of a oscillator and why ?

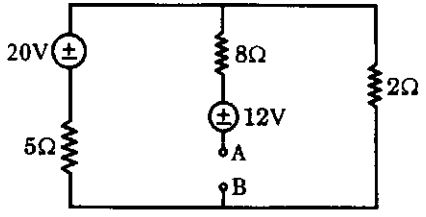
2. (a) In the following network, determine the voltage V which result in zero current through $(2 + j3)\ \Omega$ 4



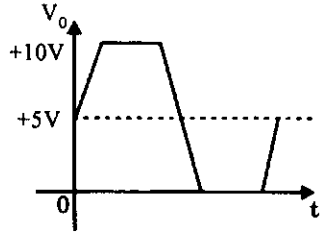
(b) Verify reciprocity theorem by computing V_x. 3



3. (a) Find the Norton's equivalent of the following circuit across AB. 4



(b) Design a circuit to generate an output wave form as shown in figure below for a 20V peak to peak sinusoidal input signal 3



4. (a) Derive the exact expression of ripple factor for a full wave bridge rectifier with capacitor filter. 5

(b) Define Transformer Utility Factor and find its value for a full wave rectifier. 2

5. (a) Define various stability factors. Derive the expression for variation of collector current with respect to β in self bias circuit. 5

(b) Explain for a given spread in the value of β, a high β circuit will be more stable. 2

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6. (a) What is the advantage and disadvantage of using capacitive coupling in a multi-stage amplifier. 1

(b) Draw frequency response curve of a 2-stage RC coupled amplifier and derive the expresssion for its mid-frequency gain. 4

(c) Explain why the gain drops in the low-frequency and high-frequency region. 2

7. (a) For an amplifier with following specifications gain (A) = 100, R_i = 10 kΩ, R_0 = 1kΩ. 3 if a negative feedback of 25% of voltage series type is introduced, what will be the corresponding change in the given specifications.

(b) Draw the circuit diagram of Colpitt oscillator and derive expression for its frequency of oscillation. 4