RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. THIRD SEMESTER EXAMINATION, MARCH 2021

SECOND YEAR [BATCH 2019-22]

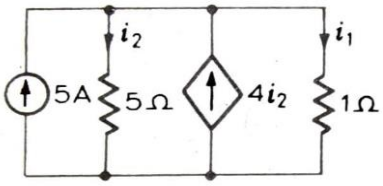
Date : 20/03/2021 **ELECTRONICS [GENERAL]**

Time : 11.00 am – 1.00 pm **Paper : III** Full Marks : 50

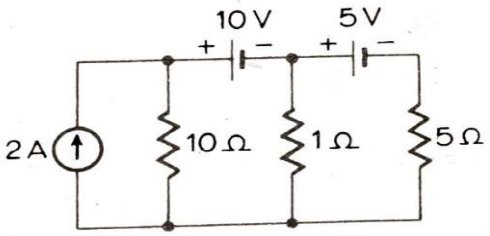
Answer **any five** questions from the following : [5×10]

1. a) KCL and KVL are alternate statements for conservation of charge and conservation of energy respectively. Explain it.

   b) Find the currents i_1 and i_2 in the following circuit:

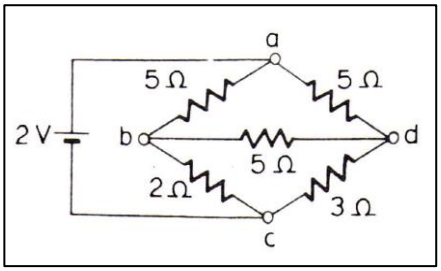


   c) Calculate the current and power drop in the resistance 5Ω of the following circuit:



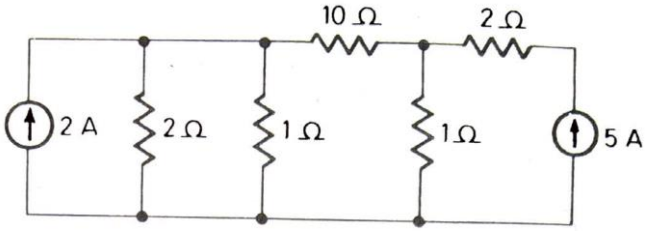
[(1.5+1.5)+3+4]

2. a) Find the current passing through the 2V source in the following circuit:



   b) State and explain Superposition theory.

   c) Use Thevenin's theorem to determine the power loss across the 10Ω resistance in the following circuit:



[3+(1+2)+4]

3. a) Mention two applications for negative and positive feedback respectively.

   b) State and explain Barkhausen criteria for sustained oscillation.

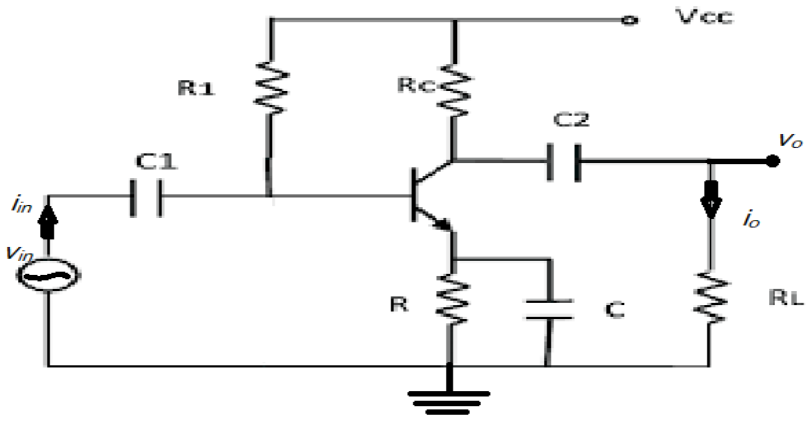
   c) Draw a Wien-Bridge oscillator circuit. Obtain expression for frequency of oscillation of that circuit. For a Wien-Bridge oscillator if the frequency determining resistance and capacitance values are R = 1 KΩ and C = 0.1 μF, then calculate the frequency of oscillation. [2+2+(1+3+2)]

4. a) Compare JFET and MOSFET. Draw the cross-sectional diagram of a JFET at pinch-off and beyond pinch-off respectively.

   b) Explain how a Depletion type MOS can be used as an Enhancement type MOS. Draw a CMOS device and mention all the layers in the diagram.

   c) For a FET device the *trans-conductance* is 10 mA/V and *channel resistance* is 0.1 MΩ. Find the value of *amplification factor* of the device. [(2+2)+(2+2)+2]

5. All the hydride parameters are standard of the following circuit. Find (a) input impedance (b) output impedance (c) current gain and (d) voltage gain



[2+2+3+3]

6. a) Find the relation between α and β of a transistor.

   b) Using the KVL, and KCL explain the CE configuration of an NPN transistor.

   c) How many classes of the amplifier are there? Explain any two. [2+4+4]

7. a) Design a 6 V full-wave circuit with a shunt C-filter.

   b) Draw circuits for CB and CC configuration using NPN transistor. [6+4]

8. Write short notes on **any four** of the following: [4×2.5]

   a) Reciprocity theorem

   c) Uni-Junction Transistor

   d) Pinch-off in FET

   e) Avalanche Breakdown

   f) Load line

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