RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIRST SEMESTER EXAMINATION, DECEMBER 2017

FIRST YEAR [BATCH 2017-20]

Date : 15/12/2017

ELECTRONICS [General]

Time : 11 am – 1 pm

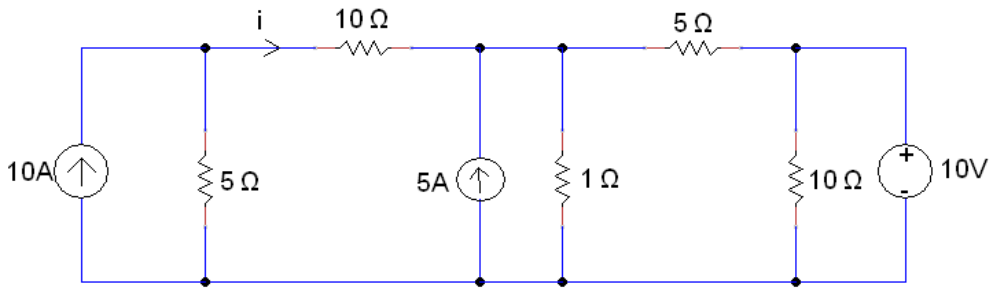
Paper : I

Full Marks : 50

Answer **any five** questions: 5 X 10

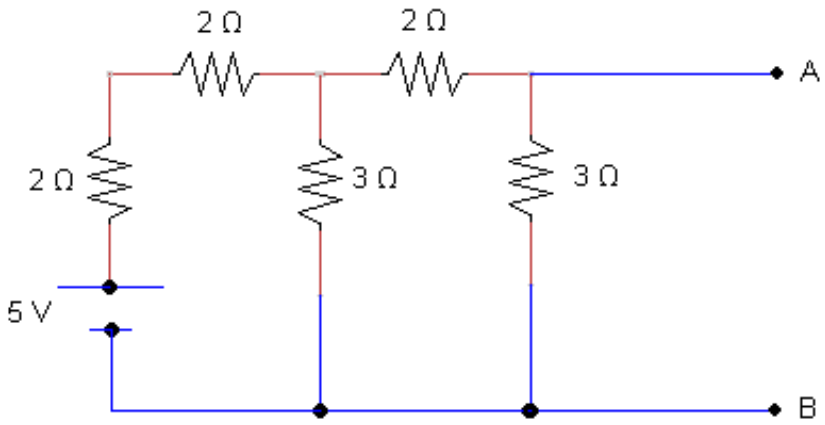
1. a) State Kirchhoff's current and voltage laws. Explain how they are equivalent to the principle of conservation of charge and conservation of energy respectively. 2+3

   b) Obtain the value of current 'i' in the following circuit: 5

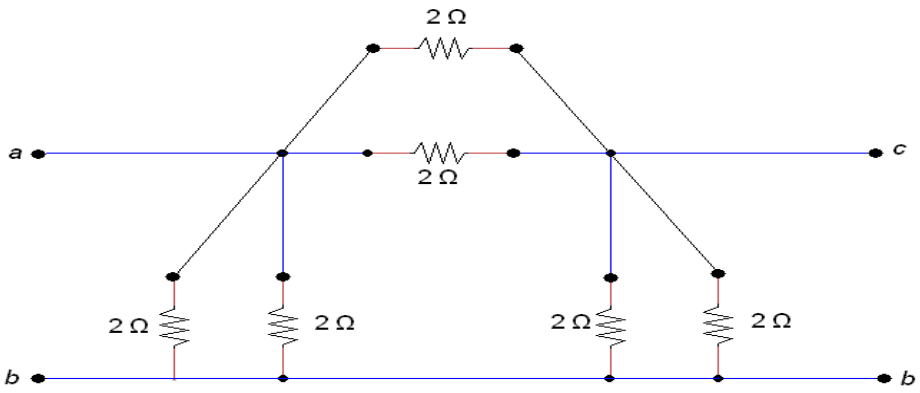


2. a) State and explain Thevenin's Theorem. 3

   b) Obtain Thevenin's equivalent network for the following circuit across the point AB. 3



   c) Obtain the equivalent T (or Y) network of the given circuit. 4



3. a) What do you mean by doping? 2
   b) Define donor level and acceptor level for *n*-type and *p*-type semiconductor respectively. 2+2
   c) What do you mean by rectifier? 1
   d) Calculate ripple factor for centre tapped fullwave rectifier. 3

4. a) Define depletion region and barrier field. 3
   b) What do you mean by biasing? 2
   c) Differentiate between energy band diagrams of a forward bias and reverse bias PN junction diode. 5

5. a) Explain how voltage regulation can be achieved by using zener diode. 3
   b) Find the dynamic (forward) resistance of a silicon diode when the diode voltage is 0.12 V while diode current changes below and above I = 2.5 mA by 5 mA. 3
   c) A halfwave rectifier uses a junction diode of forward resistance 2Ω, a transformer of secondary winding resistance of 4Ω and a load resistance of 100Ω. If the transformer primary to secondary turns ratio is 20:1 and 220 V, 50 Hz ac is applied to the primary, find
      (i) the dc load current
      (ii) the ripple factor
      (iii) the rectification efficiency. 4

6. a) Explain current components of n-p-n transistor in CB mode. 3
   b) Draw and explain the output characteristics in CE mode of the transistor. 4
   c) Define transistor parameters α and β. 3

7. a) Draw a schematic diagram of NMOS. State its principle of operation. 5
   b) Differentiate between depletion and enhancement type MOS. 3
   c) State some advantages of MOS over BJT. 2

8. Write short notes on **<u>any two</u>** of the following: 2 X 5
   a) Bridge rectifier.
   b) Charging of a capacitor in in series C–R circuit.
   c) h-parameters
   d) JFET
   e) Maximum power transfer theorem

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