*3838*

# Elements of Electrical Engineering
## (Old) (1120)

P. Pages : 3

Time : Two Hours                                                        Max. Marks : 50

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Use of non programmable calculator is allowed.
5. Figures to the right indicate full marks.
6. Neat diagrams must be drawn wherever necessary.
7. Assume suitable data if necessary.

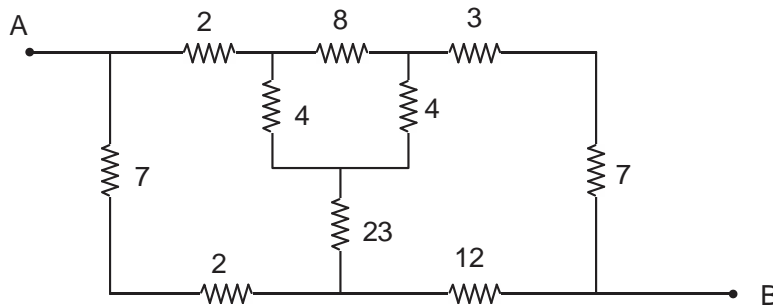1       Attempt **any two** of the following.                           10

a)   A conductor has a Resistance of 1.5 Ω. What is the Resistance of a conductor of the same material which has half the diameter and three times it's length ?

b)   Define RTC, with usual notations obtain an expression

$$\alpha_2 = \frac{\alpha_1}{1 + \alpha_1\,(t_2 - t_1)}$$

c)   For the network shown find the net resistance between the terminal A & B.



(All resistors are in Ω)

**2.** Attempt **any two** from the following      **10**

a) A steel ring of 180 cm. mean diameter has cross - sectional area of 250 mm$^2$. Flux developed in the ring is 500 $\mu$wb when a 4000 turns coil carries certain current. Find
   i) mmf required
   ii) Reluctance of the magnetic circuit.
   iii) Current in the coil, Given '$\mu r$' of the steel is 1075.

b) Derive an expression for the force acting on current carrying conductor placed in a magnetic field ? Also state Flemings Left Hand Rule and Right Hand Rule.

c) State and explain the following terms
   i) Permeability and it's unit

   ii) Laws of magnetism

   iii) Reluctance

   iv) Field strength

   v) MMF

**3.** Attempt **any two** from the following.      **10**

a) If $V = 200 \sin (377\,t + \pi/6)$ find
   i) Form factor             ii) Peak factor

   iii) Angular velocity        iv) Time period

   v) Value of voltage at $t = 2$ msec.

b) Find out the resultant voltage obtained by adding the following voltage
   $V_1 = 100 \sin(wt)$, $V_2 = 50 \sin(wt - \pi/6)$,
   $V_3 = 100 \sin(wt + \pi/4)$. Also obtain r . m. s. value of resultant voltage. Draw the vector diagram.

c) Derive the equation of $1 - \phi$ Alternating emf with neat sketch - also state different forms of $1 - \phi$ emf's.

**4.** Attempt **any two** from the following.      **10**

a) A coil draws 5 amp. When connected to 100 volt, 50Hz A. C. supply the Resistance of the coil is $5\,\Omega$, determine.
   i) Impedance of the coil

ii) Inductance of the coil

iii) P. F of the coil and it's nature

iv) Active power

v) Draw the vector diagram.

b) If $Z_1 = (3 - j4)$ and $Z_2 = (8 + j6)$, find $Y_1$, $Y_2$, $Y_{eq}$, $Z_{eq}$ if $Z_1$ and $Z_2$ are connected in parallel.

c) If $V = V_m \sin(wt)$, obtain the equation for instantaneous value of current for purely capacitive circuit. Draw wave forms and phasor diagram. Show that the average power for the circuit is zero.

**5.** Attempt **any two** form the following        **10**
  a) What is Fuse ? What are it's types ? Explain the construction and operation of HRC fuse. State it's Advantages.

  b) What are different types of Electric. Discharge Lamps ? Draw the Fluorescent Tube Circuit and Explain the operation of each part.

  c) What is Earthing ? State any ten General Safety precautions while working with Electricity.

**********