Total No. of printed pages = 4

EI-401/EC&N/4th Sem/2014/N

ELECTRICAL CIRCUITS AND NETWORK

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. (a) What do you mean by active and passive component of a circuit ? Give example. 2+2=4

   (b) Why parallel circuit is used in domestic electric installation ? 3

   (c) Find equivalent resistance of a circuit given in Fig. 1 across the terminals A and B. 4+3=7

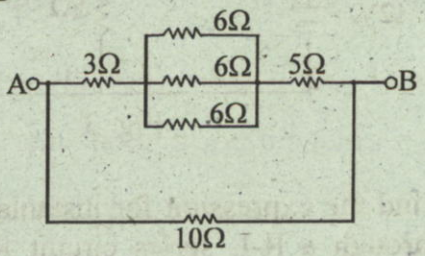

Fig. 1

Find current through the 10Ω resistance if a battery of 20V is connected across A and B.

[Turn over

2. (a) State Kirchhoff's laws and explain with suitable circuit. 7

(b) Find branch currents in the circuit shown in Fig. 2. 7

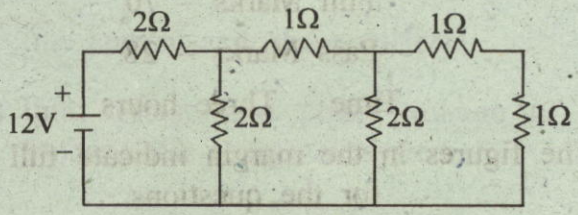

Fig. 2

3. (a) State and explain Superposition theorem. 7

(b) Using Superposition theorem, find current through the 5Ω resistance in the circuit shown in Fig. 3. 7

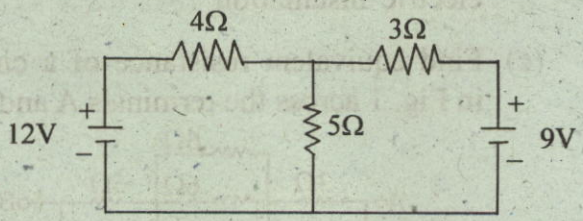

Fig. 3

4. (a) Find the expression for instantaneous current through a R-L series circuit for an applied voltage of $v = V_m \sin wt$, where $w = 2\pi f$. 7

(b) Find : 7

(i) Instantaneous current at t = 0·005 second from the first zero crossing

(ii) R.M.S current

(iii) Power factor of the circuit given in Fig. 4.

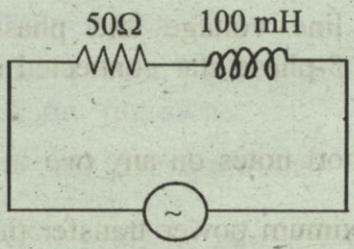

Fig. 4

$v = 315 \sin wt$, $f = 50$ Hz

5. Two impedances $(6+j8)\Omega$ and $(10+j4)\Omega$ are connected in parallel. The whole combination is connected across 230 volt, 50 Hz a.c supply.

Calculate – 14

(i) total impedance

(ii) current through the branches

(iii) over all power factor

(iv) power consumed

Also draw vector diagram.

6. (a) Deduce the relationship between delta connection and star connection of three resistances. 7

(b) Write down the relationship between : 7

(i) line current and phase current

(ii) line voltage and phase voltage of a 3-phase star connected system.

7. Write short notes on any *two* : 2×7=14

(a) Maximum power transfer theorem

(b) Series resonance circuit

(c) Thevenin's theorem.