

**BTCSVI / BTECVI / BTELVI**

**Term-End Examination**

00211

**December, 2015**

**BIEE-001 : BASICS OF ELECTRICAL ENGINEERING**

*Time : 3 hours*

*Maximum Marks : 70*

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**Note : Answer five questions in all. Question no. 1 is compulsory.**

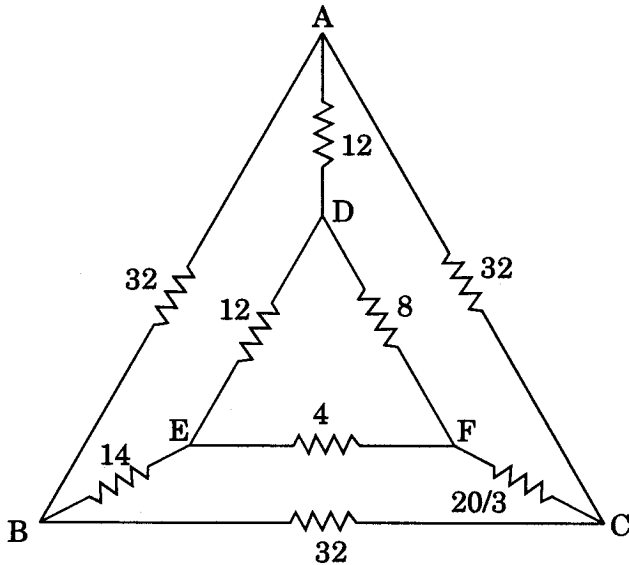
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1. State whether the following statements are *True* or *False* : *10×1=10*
- (a) Non-linear resistors do not obey Ohm's law.
  - (b) Superposition theorem can be applied to those circuits which contain voltage sources only.
  - (c) Relative permeability of a material increases with increase in the flux density established in it.
  - (d) The capacity of a cell is measured in watt hours.
  - (e) Induced e.m.f. can be either mutually induced or statically induced.
  - (f) The magnitude of the e.m.f. induced in a circuit depends on the change of flux linkages.

- (g) For a given current, energy stored in the magnetic field of a coil depends on the square of its turns.
- (h) An R-L-C circuit has maximum impedance under resonant conditions.
- (i) A parallel a.c. circuit draws maximum current when in resonance.
- (j) Two-wattmeter method can be used for measuring reactive power.

2. (a) In the network shown below, determine the resistance between A and B. The numbers represent the respective resistances in ohms.

7



- (b) What do you understand by temperature coefficient of resistance ? Specify its units. Name five materials whose resistance decreases with rise in temperature. 8
3. (a) Explain the constant current and constant voltage method of charging a battery. Which method is employed commercially ? 7
- (b) Explain the care and maintenance of lead acid battery. Also state its applications. 8
4. (a) Explain the terms
- (i) magnetic intensity,
  - (ii) magnetic flux density,
  - (iii) permeability, and
  - (iv) magnetic flux. 7
- (b) Explain hysteresis loss and the importance of hysteresis loop. 8
5. (a) The self-inductance of a coil of 500 turns is 0.25 H. If 60% of the flux is linked with a second coil of 10000 turns, calculate
- (i) the mutual inductance of the two coils, and
  - (ii) the e.m.f. induced in the second coil, when the current in the first coil changes at the rate of 100 A/s. 7
- (b) Define the coefficient of coupling and show that

$$k = \frac{M}{\sqrt{L_1 L_2}} . \quad 8$$

6. (a) Show that the r.m.s. value of a sinusoidal a.c. voltage of amplitude  $V_m$  is  $V_m/\sqrt{2}$ . 7
- (b) A coil of  $18\ \Omega$  resistance and  $0.3\ \text{H}$  inductance is connected in parallel with a variable capacitor across a  $230\ \text{V}$ ,  $50\ \text{Hz}$  supply. Calculate
- (i) the capacitance of the capacitor for resonance condition,
- (ii) the effective impedance of the circuit, and
- (iii) the current supplied from the mains. 8
7. (a) Explain the two-watt method to measure power in a 3-phase unbalanced load. 7
- (b) Three equal impedances each having a resistance of  $8\ \Omega$  and inductive reactance of  $6\ \Omega$  are connected in (i) star, and (ii) delta, across a 3-phase  $440\ \text{V}$  system. Find the (i) phase current, (ii) line current, and (iii) total power consumed. 8
8. Write short notes on any *two* of the following :  $2 \times 7 \frac{1}{2} = 15$
- (a) Kirchhoff's Current and Voltage Law
- (b) Thevenin's Theorem
- (c) Power Factor and its improvement
- (d) Ohm's Law
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