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OIEE-001

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00923

Term-End Examination

December, 2016

OIEE-001 : BASICS OF ELECTRICAL ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. Question no. 1 is **compulsory**.*

State whether the following statements are True or False : *7×2=14*

1. (a) The resistance of a conductor increases, if its area of cross-section increases. [T/F]

(b) Three resistances of R Ω each are connected in delta. Its equivalent star will comprise resistance of value R/3 each. [T/F]

(c) The superposition theorem is applicable to only linear circuits. [T/F]

(d) Magnetic flux density (B) is the ratio of cross-sectional area (A) to the magnetic flux (ϕ). [T/F]

(e) The power factor of a purely resistive circuit is unity. [T/F]

(f) In case of 3-phase Δ connected circuit, the total power is given by $\sqrt{3}\, V_L\, I_L \cos\phi$. [T/F]

(g) The unit of electrical energy is kW. [T/F]

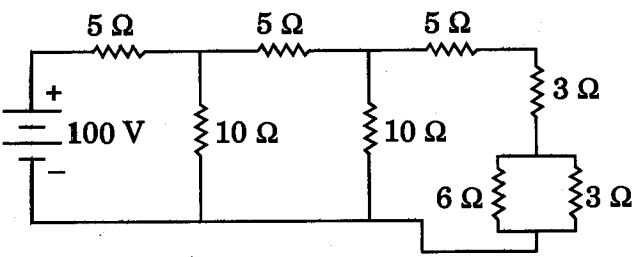
2. (a) Define power factor. Explain the concept of power triangle with the help of power factor. 7

(b) Calculate the value of form factor of a half wave rectified waveform. 7

3. (a) Derive an expression for the half cycle average value for sinusoidal current $i(t)\ I_m \sin \omega t$. 7

(b) In the circuit shown, determine :

(i) the current supplied by the 100 V source, and (ii) the voltage across the 6 Ω resistor. 7



4. (a) State and explain Kirchhoff's voltage and current laws. 7

(b) Compare primary and secondary cells. 7

5. (a) Derive the relations for conversion from delta to star connection for three-phase impedance. 7

(b) State and explain superposition theorem with the help of a suitable example. 7

6. (a) A coil with 250 turns carries a current of 2 A, and produces a flux of 0·3 mWb. When this current is reduced to zero in 2 ms, the voltage induced in a nearby coil is 60 volts. Calculate (i) the self-inductance of each coil, and (ii) mutual inductance of coils. Assume coefficient of coupling = 0·7. *8*

(b) Give the comparison between electric and magnetic circuits. *6*

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Advantages of 3-ϕ over 1-ϕ system

(b) Reluctance

(c) Lenz's Law

(d) Hysteresis Loop

(e) Fleming's Right-Hand Rule

(f) Series Resonance
