



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 199115**

Roll No. 

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## B. Tech.

### (SEM. I) (ODD SEM.) THEORY EXAMINATION, 2014-15 ELECTRICAL ENGINEERING

Time : 3 Hours]

[Total Marks : 100

**Note:** Attempt all Questions. All question carry equal marks.

1. Attempt any two parts : 10x2=20
- (a) Derive the relationship to convert delta connected resistance to equivalent star. Also determine the equivalent resistance between the terminal A-B shown in fig. 1.

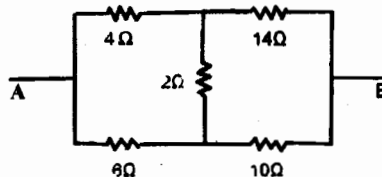


Fig.1

- (b) State superposition theorem. Why superposition theorem is not applicable in calculation of power? Also determine the current in 100 Ω resistance in the circuit shown in fig. 2.

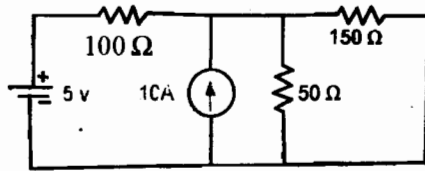


Fig.2

- (c) State prove maximum power transfer theorem. Find the magnitude of R for maximum power transfer in the circuit show in fig. 3. Also find out the maximum power.

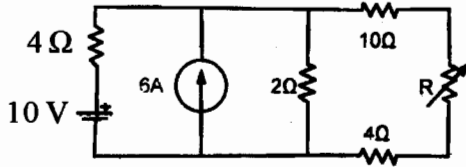


Fig.3

2. Attempt any **two** parts : **10x2=20**

- (a) Define the following for ac waveform terms :  
 (i) Instantaneous value (ii) Root mean square (RMS) value (iii) phase angle (iv) Average Value  
 Also find the resultant voltage  $V(t)$  in form  $V(t) = V_m \sin(314t + \phi)$  of two ac voltages are represented by  $V_1(t) = 30 \sin(314t + 45^\circ)$ ,  $V_2(t) = 60 \sin(314t + 60^\circ)$ .
- (b) Show that in purely inductive circuit current lags the voltage by  $90^\circ$ . Also show that the average power consumed across by it is always zero.
- (c) Define the term resonance for a ac circuit consisting resistance, inductance and capacitance. Derive the condition of resonance in series RLC circuit.  
 Also determine (i) resonant frequency (ii) Q-factor of the circuit at resonance (iii) The half power frequencies (iv) Bandwidth (v) current at resonance in a series R-L-C circuit having  $R=10 \text{ ohm}$ ,  $L=0.1\text{H}$ , and  $C=8 \text{ microfarad}$ .

3. Attempt any **two** parts : **10x2=20**

- (a) A balanced 3-phase load consists of three coils, each of resistance  $6 \Omega$  and inductive reactance of  $8 \Omega$ , is connected to a  $415\text{V}$ ,  $50\text{Hz}$  supply. Determine the line current and power absorbed when the coils are (a) Star connected (b) Delta connected.
- (b) Explain with a neat diagram, the construction and operation of single phase induction type Energy meter.
- (c) What are the various advantages of three-phase system over a single phase system ? Explain the method of power measurement in star connected 3-phase circuit by two wattmeter method ?

4. Attempt any **two** parts : **10x2=20**

- (a) The core of magnetic circuit is of mean length  $40 \text{ cm}$  and uniform cross section area  $4\text{cm}^2$ . The relative permeability of the core material is  $1000$ . An air gap of  $1 \text{ mm}$  is cut in the core and  $1000$  turns carrying a current  $2\text{A}$  wound on the core. Determine (i) total mmf (ii) total reluctance (iii) flux (iv) magnetic field intensity if fringing is negligible.
- (b) Describe hysteresis loop of a magnetic material and explain residual magnetism and coercive force.
- (c) Draw the no load phasor diagram of practical transformer. Express the magnetizing current and core loss current in terms of no load current and power factor. And also determine the core loss current, magnetizing current and iron loss in a distribution transformer of  $11\text{kV}/400\text{V}$  which takes no load current of  $1\text{A}$  at pf  $0.24$  lagging.

5. Attempt any four parts :

5x4=20

- (a) Discuss the important features of squirrel cage and phase wound rotor constructions in an induction motor.
  - (b) Explain principle of operation of electromechanical energy conversion.
  - (c) Explain the principle of operation of three phase induction motor.
  - (d) Why is the synchronous motor not self starting ? What methods are generally used to start the synchronous motor ?
  - (e) Describe the construction and principal of working of a capacitor start capacitor run single phase motors.
  - (f) A 4 pole generator with wave wound armature has 51 slots, each having 24 conductors. The flux per pole is 0.01 Wb. At what speed must the armature rotate to give an induced emf of 220V ? What will be the voltage developed if the winding is lap connected and the armature rotate at the same speed ?
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