



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

**PAPER ID : 199227**

Roll No.

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## B. Tech.

### (SEM. II) THEORY EXAMINATION, 2014-15 BASIC ELECTRICAL ENGINEERING

Time : 3 Hours]

[Total Marks : 100

#### SECTION – A

Attempt all parts of this question. Each part carries equal marks.

10×2=20

- 1 (a) Define ideal voltage and current source.
- (b) State maximum power transfer theorem.
- (c) Define Form Factor and Peak Factor.
- (d) A series circuit has  $R = 10 \text{ ohm}$ ,  $L = 0.02 \text{ H}$  and  $C = 3 \mu\text{F}$ . Calculate Q-factor of the circuit.
- (e) What is the major difference between PMMC type and dynamometer type of instruments ?
- (f) Draw connection diagram for power measurement in three phase delta circuit using two wattmeter methods.
- (g) Define MMF and write its unit.
- (h) Draw equivalent circuit diagram of single phase transformer.
- (i) Draw speed – torque characteristic of DC series motor.
- (j) Write applications of single phase induction motor.

SECTION - B

Attempt any three questions from 2, 3, 4, 5 & 6. 3×10=30

- 2 (a) Use superposition theorem to compute the current through  $1\ \Omega$  resistor of Fig. 1 5  
 (b) Derive the delta to star transformation. 5

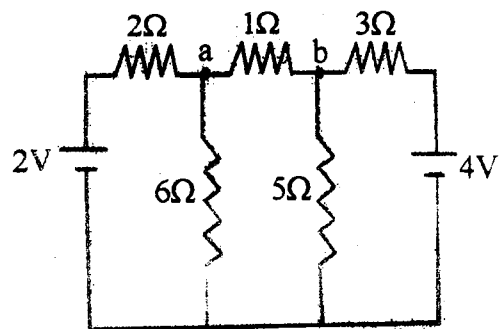


Fig.1

- 3 (a) Derive resonance conditions in series circuit. Also derive the expression for Bandwidth. 5  
 (b) A coil having a resistance of  $30\ \Omega$  and inductance of  $0.05\ \text{H}$  is connected in series with a capacitor of  $100\ \mu\text{F}$ . The whole circuit has been connected to a single phase  $230\ \text{V}$ ,  $50\ \text{Hz}$  supply. Calculate impedance, current, power factor, power and apparent power of the circuit. 5
- 4 (a) In the two wattmeter method of power measurement in a three phase circuit, the readings of the wattmeter's are  $2000\ \text{W}$  and  $500\ \text{W}$ . What is the total power and power factor of the load? 5  
 (b) Explain with neat diagram, working principle of PMMC type electrical measuring instruments. 5
- 5 (a) Derive and explain the equivalent circuit of a transformer. 5  
 (b) Define efficiency of transformer. Find condition for maximum efficiency of transformer. 5
- 6 (a) Why single phase induction motor is not self-starting machine? Explain it. 5  
 (b) Classify DC motors and write current and voltage equation for each type. 5

SECTION - C

Attempt any one part from each question of this section. Each part carries equal marks. 5×10=50

- 7 (a) Use source transformation method to compute the current through  $6\ \Omega$  resistor of Fig. 2. 10

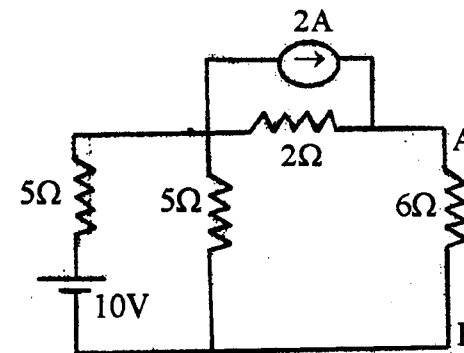


Fig.2

- (b) Determine the effective resistance between terminals A-B in the network of Fig. 3. 10

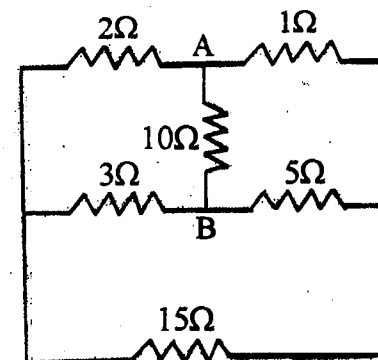


Fig.3

- 8 (a) Explain Parallel Resonance. A circuit of a resistance of  $20\ \Omega$ , and inductance of  $0.3\ \text{H}$  and a variable capacitance in series across a  $220\ \text{V}$ ,  $50\ \text{Hz}$  supply. Calculate:  
 (i) The value of capacitance to produce resonance  
 (ii) The voltage across the capacitance and inductance  
 (iii) The Q-factor of the circuit. 10

- (b) Find form factor and peak factor for given waveform. 10

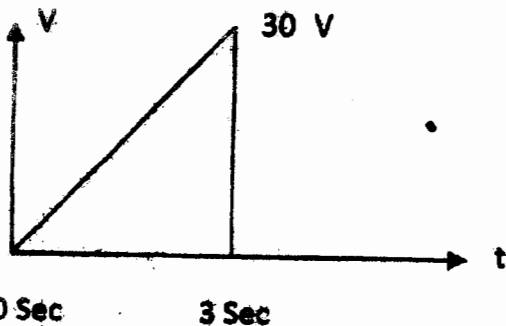


Fig.4

- 9 (a) Explain the principle of operation of attraction type of moving iron instruments. 10  
A moving coil instrument gives a full scale deflection of 30 mA when a potential difference of 70 mV is applied. Calculate the series resistance to measure 750 V on full scale.
- (b) Derive the relation between line and phase voltage and current for a delta connected 3 phase balanced system. A balanced delta-connected load of impedance,  $Z=30 \angle 60^\circ \Omega$  is connected to line voltage of 440 V. Obtain the current and power supplied to load. 10
- 10 (a) A coil of 200 turns is wound uniformly on an iron ring of mean circumference 10 cm and across sectional area  $5 \text{ cm}^2$ . Current 10 Amp is flowing through coil. Relative permeability of the material is 3000. Find  
(i) MMF (ii) Magnetizing force  
(iii) Total flux (iv) Reluctance. 10
- (b) Derive the emf equation of a single phase transformer. 10  
A single phase 100 kVA, 6.6 kV/230 V, 50 Hz transformer has 90% efficiency at .8 lagging power factor both at full load and also at half load. Determine iron and copper loss at full load for transformer.
- 11 (a) (i) Draw and explain the torque-slip characteristics of a three phase induction motor. 10  
(ii) Explain working principle of synchronous motor and two applications.
- (b) (i) Find Torque equation of a dc Motor. 10  
(ii) Explain the principle of operation of an Alternator.