



(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 10×2=20 equal marks.

- 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 $C = 3 \mu F$. 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

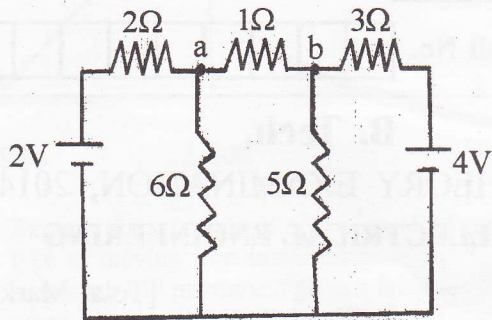


Fig.1

- 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

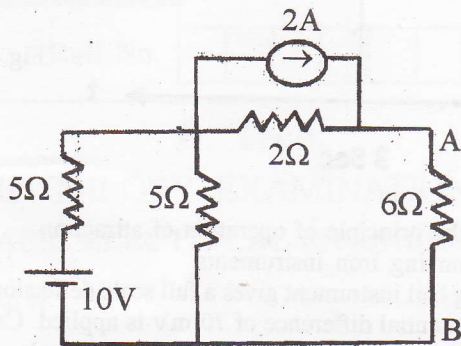


Fig.2

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

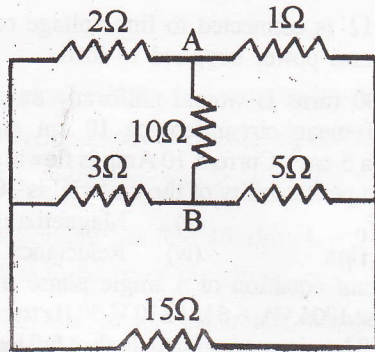


Fig.3

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

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

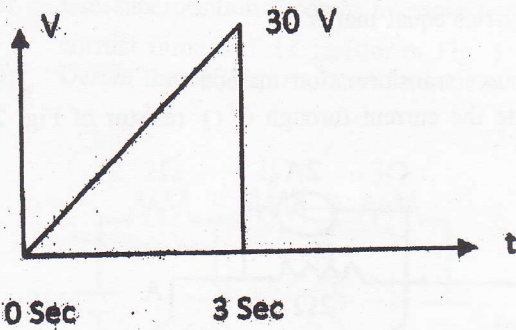


Fig.4

- 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 cm^2 . Current 10 Amp is flowing through coil. Relative permeability of the material is 3000. Find 10
 (i) MMF (ii) Magnetizing force
 (iii) Total flux (iv) Reluctance.
- (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 0.8 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.