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

PAPER ID : 2302 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. II) THEORY EXAMINATION 2010-11

ELECTRICAL ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note :– ALL sections are compulsory.

SECTION—A

1. All parts are compulsory. All questions carry equal marks :— **10×2=20**

(a) The power consumed in an inductive circuit will be :

(i) vi cos θ (ii) vi sin θ

(iii) vi (iv) none of these

(b) An ideal voltage source should have :

(i) large e.m.f. (ii) small e.m.f.

(iii) zero resistance (iv) none of these

(c) Superposition theorem is applicable for :

(i) Linear circuits only

(ii) Non-linear circuits only

(iii) Linear and non-linear circuits both

(iv) None of these

(d) The current through a series RLC circuit under resonance condition will be

(i) V/R (ii) V/X_C

(iii) V/X_L (iv) None of these

(e) For a 3-phase load balanced condition, each phase has the same value of ..... .

(i) impedance (ii) resistance

(iii) power factor (iv) all of these

(f) The ..... is an integrating type instrument.

(i) Moving iron ammeter

(ii) Moving coil voltmeter

(iii) Dynamometer wattmeter

(iv) Induction type energy meter

(g) When voltage is transferred from primary to secondary then it is ..... .

(i) multiplied by K^2 (ii) multiplied by K

(iii) divided by K^2 (iv) divided by K

(h) Stray losses are sum of :

(i) Iron and mechanical losses

(ii) Copper and iron losses

(iii) Copper and mechanical losses

(iv) None of these

(i) If N_s is the synchronous speed, N is the rotor speed and S is the slip then the relation is :

(i) $N_s = (1 - S)N$ (ii) $N = S \cdot N_s$

(iii) $N = (S - 1)N_s$ (iv) None of these

(j) An electrical installation is earthed for :

(i) safety to personnel

(ii) fire protection

(iii) protection against electric shock

(iv) all of these

SECTION—B

2. Attempt any **THREE** parts of the following. All questions carry equal marks :— **10×3=30**

(a) Write the statement of Norton's theorem and discuss it with help of example.

A network has the configuration shown in Fig. 1. All resistance values are expressed in ohms.

(i) Find the current through R_L when it takes on values of 10, 50, and 200 Ω using Thevenin's theorem.

(ii) Determine the value of R_L corresponding to which there a maximum power is transferred to the load resistor. Compute this maximum power.

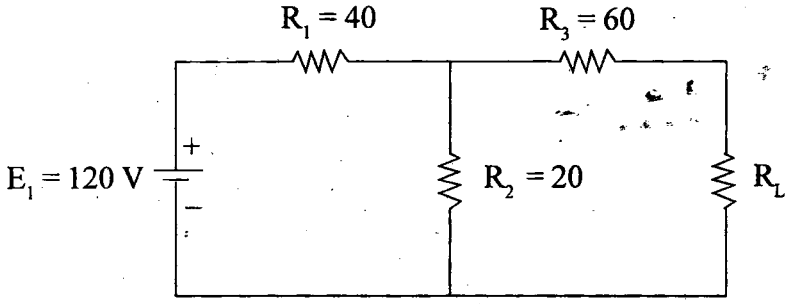

Fig. 1

(b) How are settling time and time constant related in a first-order linear circuit ? Also derive the step response of (i) R_L series circuit (ii) R_C series circuit.

(c) Explain the working of a transformer with the derivation of the e.m.f. equation for a transformer. Also discuss the losses in the transformer.

(d) Derive the expression of torque for D.C. Motor. Also discuss the characteristics of D.C. shunt motor.

A 6 pole lap wound D.C. generator has 720 conductors; a flux of 80 m weber/pole is driven at 1000 rpm. Find the generated e.m.f.

SECTION—C

Note :—All questions are compulsory. All questions carry equal marks. 10×5=15

3. Attempt any **TWO** parts of the following. All questions carry equal marks :—

(a) Derive the expression for Q-factor in the R-L-C- parallel circuit.

(b) Define power factor. Also discuss the reasons for low power factor and ways to improve it.

(c) In Fig. 2 compute the voltage required between terminal a–b so that a voltage drop of 45 V occurs across 15 ohm resistor.

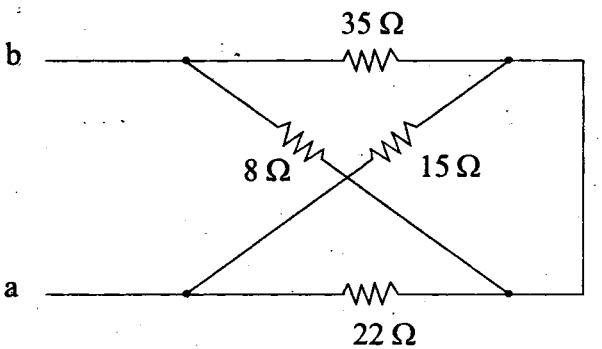

Fig. 2

4. Attempt any **TWO** parts of the following. All questions carry equal marks :—

(a) Discuss the construction and working principle of PMMC type measuring instruments.

(b) Explain the two wattmeter method to determine the power in three phase system.

(c) For the given circuit find the (1) Line currents (2) Phase currents and (3) Power consumed.

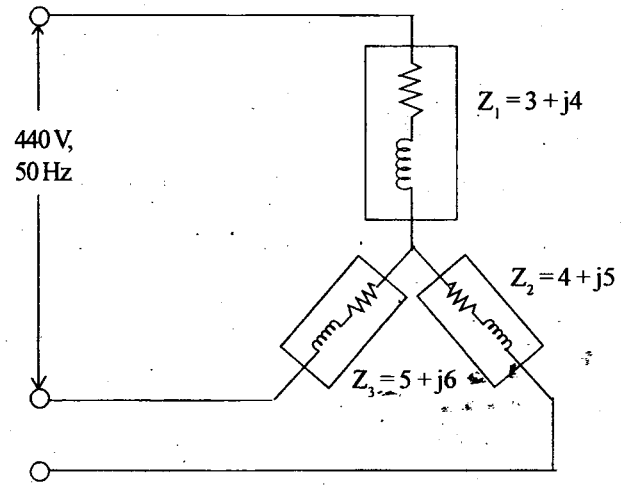

Fig. 3

5. Attempt any **TWO** parts of the following. All questions carry equal marks.

(a) Derive the expression for efficiency of transformer. Also find out the condition of maximum efficiency.

(b) Explain the slip-torque characteristics of three phase induction motor.

(c) Discuss the principle of operation of a single phase induction motor. Also write its applications.

6. Attempt any **TWO** parts of the following. All questions carry equal marks :—

(a) Describe the working principle of d.c. series motor and draw its various characteristics.

(b) Discuss the working principle of a three-phase synchronous machine. Also differentiate synchronous motor from induction motor.

(c) Explain the squirrel cage rotor and phase wound rotor in induction motor.

7. Attempt any **TWO** parts of the following. All questions carry equal marks.

(a) Explain the analogy between electric and magnetic circuit with AC excitation. Also determine the power factor for the given circuit in Fig. 4.

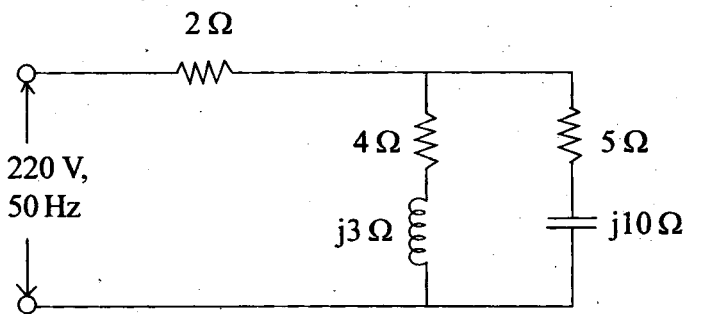

Fig. 4

(b) Discuss the following :—

(i) Form factor, peak factor, permeability, flux density.

(ii) Use of shunt and multipliers in measuring instruments.

(c) Describe the basic fundamentals of standard transmission and distribution of voltages. Also briefly discuss the concept of grid.