Code : 100101

B.Tech 1st Semester Exam., 2019
(New Course)

BASIC ELECTRICAL ENGINEERING

Time : 3 hours   Full Marks : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

(ii) There are **EIGHT** questions in this paper.

(iii) Attempt **FIVE** questions in all.

(iv) Question No. **1** is compulsory.

1. Answer the following short answer-type
   questions (any *seven*) :   2×7=14

   (a) Define active and passive element.

   (b) State and explain Norton theorem.

   (c) A half-cycle average voltage of 12 V is
       equal to what r.m.s. voltage?

   (d) What are the phase voltage and phase
       current of three-phase delta-connected
       system?

   (e) Draw equivalent circuit of a DC motor.

   (f) What is resonance?

(**2**)

   (g) Relate   flux,   reluctance   and
       permeability.

   (h) Define power factor.

   (i) Write the application of Ohm's law.

   (j) Describe important characteristic of an
       inductor. http://www.akubihar.com

2. (a) Define Q-factor. What is the Q (quality
       factor) of a series circuit that resonates
       at 6 kHz, has equal reactance of
       4 kilo-ohms each and a resistor value of
       50 ohms?   6

   (b) A series R-L-C circuit containing a
       resistance of 10 Ω, an inductance of
       0·45 H and a capacitor of 400 µF is
       connected in series across a 120 V,
       50 Hz supply. Calculate the total circuit
       impedance, the circuit current, power
       factor and draw the voltage phasor
       diagram.   8

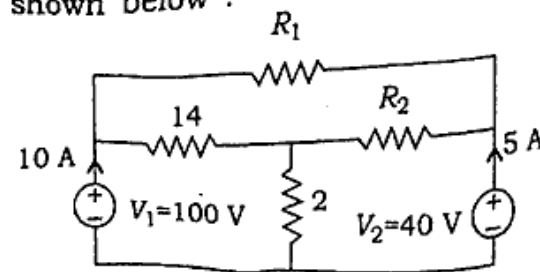3. (a) Find the resistor value R_1 in the Fig. 1
       shown below :   6

Fig. 1

(b) In a balance 3-phase 400 V circuit, $I_1 = 115 \cdot 4$ A. When power is measured by two-wattmeter method, one meter reads 40 kW and other zero. What is the power factor of load? If unity power factor and line current are same, what would be the reading of each wattmeter? 8

4. (a) What are the two general types of transformer? Why is the low-voltage winding placed near the core? What will be the output of transformer if it is operated on DC supply? 6

(b) Describe the operation of a single-phase transformer, explaining clearly the function of different parts. Why are the cores laminated? 8

5. Draw and explain the B-H curves for air and a magnetic material. What are different types of magnetic losses? How can they be minimized? 14

6. What is circuit? What is the difference between fuse and circuit breaker? Explain the objective of earthing. 14

7. Write Thevenin theorem statement. Determine the equivalent Thevenin's circuit between terminals a and b in the circuit shown in Fig. 2 below. Resistances are in ohms : 14
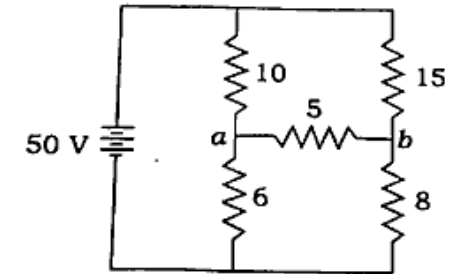

Fig. 2

8. Describe with neat sketches the construction of a 3-phase induction motor. Explain the principle of operation of a 3-phase induction motor. What is meant by slip in an induction motor? 14

★ ★ ★