Registration No. :

Total number of printed pages – 3

First Semester Regular Examination – 2014
BASIC ELECTRICAL ENGINEERING
BRANCH : B. TECH
QUESTION CODE : H 456

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any five from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions :   2 ×10

    (a) Define an ideal Voltage source ?

    (b) How controlled current source is different from other independent source ?

    (c) Explain briefly residual magnetism and its reason.

    (d) For a single phase AC voltage write down the relationship among Peak value, r.m.s value and the average value.

    (e) What is the time constant of a RC circuit having $R=10\,\Omega$ and $C=10\,\mu F$?

    (f) In a circuit the voltage and current equations are given by $V=15\sin(wt+30°)$ and $I = 15\sin(wt-30°)$. Find the power consumed in the circuit.

    (g) Describe various losses occurring in a DC machine.

    (h) Find the probable number of poles of an induction motor having no load speed of 1750 rpm when supplied from a three phase 60Hz supply.

    (i) What is noise and write various sources of noise ?

    (j) What is a transducer ?

2. (a) In an AC single phase circuit three impedances of value $5 < 30°\,\Omega$, $3+j6\,\Omega$ and $4-j8\,\Omega$ are connected in series with a 230 V, 50 Hz supply.   5

    (i) Find the total combined impedance in Polar form.

    (ii) Magnitude of the current flowing in the circuit.

P.T.O.

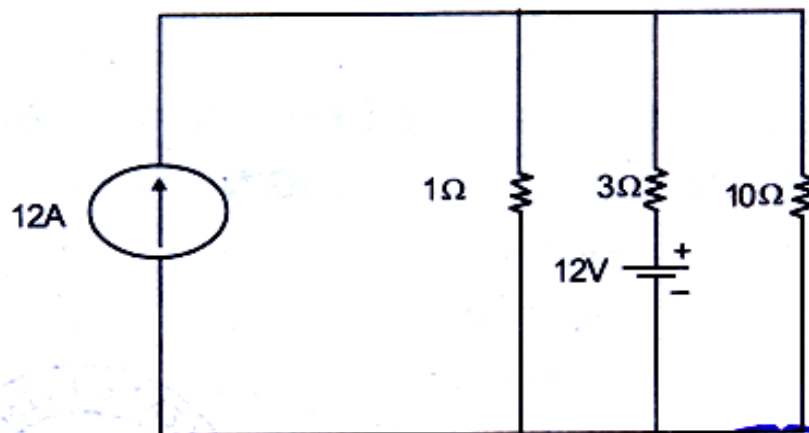(b) Using Super position theorem. Find the voltage across 10Ω , resistor as shown in Fig (1). 5

Fig (1)

3. (a) An Iron rod of 2 cm diameter is bent to form a ring of mean diameter of 25 cm and wound with 300 turns of wire .A gap of 1mm exist in between the end faces. The relative permeability of iron is 1200. Find the current required to produce a flux of 0.6 mWb in the coil. 5

(Assume $\mu_0 = 4\Pi \times 10^{-7}$ H/m)

(b) Explain the laws of magnetic circuits. 5

4. (a) A series circuit has R=100 Ω , L= 0.5 H, and an capacitance C of unknown value .When this circuit is supplied by 250 < 0° V,50Hz AC supply the current in the circuit is found to be equal to 2.5 < 0° A (in phase with supply voltage) Find 5

(i) The value of the capacitance

(ii) Voltage across the inductor

(iii) Power factor of the circuit

(b) State and Explain Thevenin's Theorem by giving a suitable example. 5

5. (a) A resistance of 100 Ω and a inductor of 10 mH connected in series is suddenly switched across a 150 V DC Supply having negligible internal resistance, 5

(i) Time constant of the coil ?

(ii) Initial and steady state value of the current ?

(iii) Time taken for the to reach 50% of the final value ?

(b) A DC shunt motor is supplied from a DC supply of 220 V. If it takes a load current of 10 A ,calculate the armature current ,field current and back e.m.f, Given that armature Resistance (R_a) =1 Ω and Field Resistance (R_f) =100 Ω . 5

6. (a) The primary winding of a single phase transformer is connected to a 230 V, 60 Hz supply. The secondary winding has 2000 turns .If the maximum value of the flux in the core is 0.03 Wb, Determine the 5

    (i) The number of turns in the secondary ?

    (ii) E.M.F induced in the secondary winding ?

(b) A balanced three phase delta load has load impedance of 75 – j50 ohm per phase and is supplied from a balanced three phase 440V, 50 Hz supply . Determine the values of 5

    (i) Line Voltages and phase voltages ?

    (ii) The Phase current and the line current ?

    (iii) Total power consumed ?

7. (a) What is a thermocouple ? How the temperature measurement can be done by it ? 5

(b) Explain in brief the Principle of operation of three phase induction motor ? 5

8. Answer any two of the following : 5 × 2

    (a) Back e.m.f of DC Motor.

    (b) Complex power and Power triangle.

    (c) AC Power distribution network.