Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech
BE 2102

First Semester Back Examination – 2014

BASIC ELECTRICAL ENGINEERING

BRANCH(S) : AEIE, AERO, AUTO, BIOTECH, CHEM, CIVIL, CSE, EC, EEE, EIE, ELECTRICAL, ENV, ETC, FASHION, FAT, IEE, IT, MANUFACT, MANUTECH, MECH, MINERAL, MINING, MM, MME, PLASTIC, TEXTILE

QUESTION CODE : L 354

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 a controlled current source.

(b) What is r.m.s value of a AC waveform ?

(c) What do you understand by coercivity ?

(d) Explain the significance of Power Factor.

(e) What is the time constant of a RC circuit having R =10 Ω and C=0.3F ?

(f) Two resistances of 10 Ω , 15 Ω are connected in parallel and this combination is connected across a 210V supply DC source. Find the current flowing in 15 Ω resistor.

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

(h) A 3 phase, 4 pole, 50Hz, 440 V induction motor runs at 1440 rpm. What is the slip speed and slip ?

(i) Discuss the disadvantages of noise signals.

(j) What do you understand by rotating magnetic field ?

P.T.O.

2. (a) A series circuit has R=10Ω , L = 50mH, and C=100μF and is supplied with 200V, 50Hz AC supply Find 5

(a) Impedance of the circuit ?

(b) Total Current and power factor of the circuit ?

(c) Active power consumed ?

(b) Using Super position theorem find the voltage Vx across 4Ω, resistor as shown in Fig (1). 5

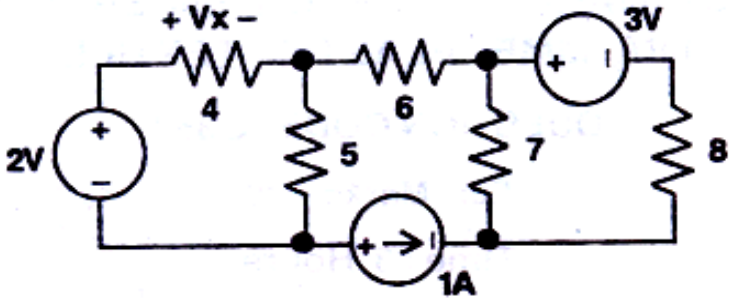

Fig (1)

3. (a) An iron ring with mean length of magnetic path of 30cm and of small cross section has an air gap of 2mm.It is wound uniformly with a coil of 660 turns. A current of 2 amp in the coil produces flux density of 24Π mWb /m^2 Calculate the relative permeability of iron.
(Assume $\mu_0 = 4\Pi \times 10^{-7}$ H/m) 5

(b) Explain the characteristics of Open and Short circuit in electrical network by drawing a circuit diagram. 5

4. (a) Three equal impedances are star connected to a 3 phase, 440 V 50 Hz supply. If the inductive reactance and resistance of each branch are 8Ω and 6Ω respectively Find the 5

(a) Impedance of each phase ?

(b) Line current ?

(c) Active power consumed ?

(b) What is complex power, apparent power, real power and reactive power in a single phase AC circuit ? Explain by drawing power triangle. 5

5. (a) A capacitor is charged from a DC supply of 200V through a resistor in series having a resistance of 100 Ω . If the time constant for the given set up is 15ms , Calculate the value of the capacitance. Also calculate the time requirement for the capacitor to acquire 85% of the steady state charge assuming zero initial charge on the capacitor. 5

(b) A 6 pole DC shunt motor the flux per pole is 8 mWb .There are 96 conductors lap connected. Find out the back emf developed in the motor if the armature rotates at a speed of 25 revolutions / second. 5

6. (a) Derive the e.m.f equation of single phase two winding transformer from first principle. 5

(b) A 50 Hz, 4-pole, 3-phase induction motor has a rotor current of frequency 2 Hz. Determine 5

(a) the slip ?

(b) Speed of the motor ?

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

(b) What is a transducer ? Explain its working by giving a suitable example. 5

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

(a) Maximum Power Transfer theorem

(b) AC power distribution network

(c) Principle of operation of 3 phase induction motor.