Registration No. :

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B. Tech

BENG 1102

First Year Special Examination – 2014
BASIC ELECTRICAL ENGINEERING
BRANCH(S) : AEIE, BIOTECH, CSE, EC, EEE, ELECTRICAL, IEE, IT

QUESTION CODE : G 510

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) Write down the equation of a sinusoidal source voltage of 40 Hz frequency having a RMS value of 240 V.

    (b) A 5 Ω resistor is connected across a Potential difference of 30 V. Calculate the power dissipated in the resistor.

    (c) Explain briefly the term MMF.

    (d) What is Form Factor ?

    (e) What do you understand by resonance in AC circuit ?

    (f) Write down the principle of DC Generator.

    (g) A three phase balanced load supplied from 440 V, 50 Hz supply takes a current of 20 A and draws a power of 10 KW. What is the p.f. of the circuit ?

    (h) What do you mean by 'slip' of a three phase induction motor ?

    (i) What is the relation between phase and line current in three phase star connected circuit ?

    (j) What are the conventional ways of electrical power generation ?

P.T.O.

2. (a) Explain the terms 'effective value' and 'average value' for a sinusoidal alternating quantity. 5

   (b) Find the equivalent resistance of the circuit shown below in Fig (1) also. Find out the current flowing in the 3 Ω resistor. 5
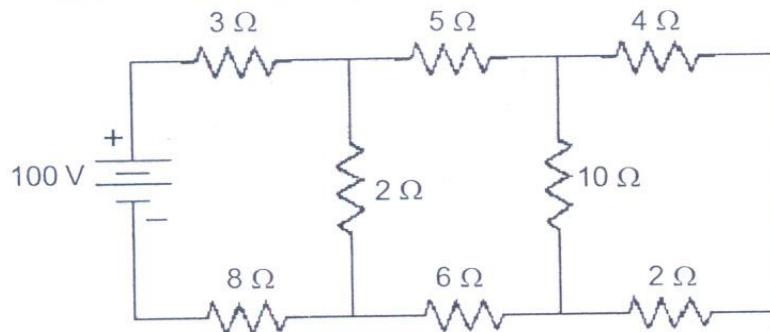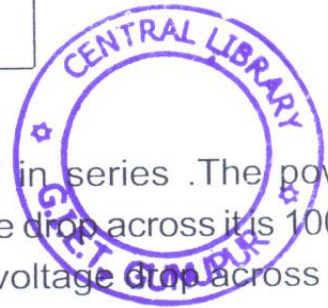

Fig. (1)

3. (a) A circuit consist of pure resistance and a coil in series .The power dissipated in the resistance is 600 W and voltage drop across it is 100 V. The power dissipated in the coil is is 200 W and voltage drop across it is 60 V. Determine the resistance and reactance of the coil and also the supply voltage. 5

   (b) 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 24 πm Wb/m^2, calculate the relative permeability of iron. 5

4. (a) A capacitor with capacitance of 500 μF and a resistance of 100 Ω is suddenly switched across a 30 V DC supply of negligible internal resistance. Determine the initial and final currents, time constant of the circuit and instantaneous value of voltage across the capacitor after 500 ms. 5

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

5. (a) A DC shunt motor rotating at 1500 rpm is fed by 220V DC source. The line current drawn by the motor is 22 A and the shunt field resistance is 100 Ω. Find :
   (i) Back emf
   (ii) Mechanical power
   (iii) Torque developed.
   Assuming that armature resistance is 0.1 Ω. 5

   (b) State the merits and demerits of Moving iron instruments. 5

6. (a) Briefly explain the EMF equation of a single phase transformer. 5

   (b) The Primary of a single phase transformer is connected to a 220 V, 50 Hz supply. If the peak flux in the core is 20 m Wb, what is the no. of turns in the Primary ? How many no of turns are required in the secondary to obtain a voltage of 110 V ? 5

7. (a) Compare between the operation of hydel power plant and nuclear power plant. 5

   (b) Write down various industrial uses of electricity. Also calculate the resistance of the heating element of a heater of rating 1500 W and 250 V. 5

8. Write short notes on any **two** : 5×2

   (a) Complex Power

   (b) Transmission and Distribution of electric energy

   (c) Single Phase Induction Motor.