Registration No. :

Total number of printed pages – 4

B.Tech

BE 2102

Second Semester Examination – 2012

BASIC ELECTRICAL ENGINEERING

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) Three resistances 15Ω, 20Ω, 30Ω are connected in parallel across 240 V, DC Source. Compute the power dissipated in each resistor and total power drawn from the source.

   (b) What is the rms value of the following periodic current ?

   $$\cos 450t + 2\cos 450t$$

   (c) An AC current is given by $i = 100\sin 100\pi t$. After how many seconds it will achieve a value of 50 A ?

   (d) Two admittances of $0.25 < 30°$ and $0.015 < 45°$ are connected in parallel. Find out the resultant impedances in rectangular form.

   (e) A DC voltage V is switched on to a Series R-L Circuit. Write the differential equation for the circuit and also find the expression for instantaneous current.

   (f) Define Coercivity and retentivity with reference to Magnetism.

P.T.O.

(g) What is the Back emf in a DC motor ? Write the expression for it and also explain each term.

(h) Why commutator is employed in a DC machine ?

(i) What do you mean by 'Synchronous speed' ? Also define 'Slip' of a three phase induction motor.

(j) Draw a block diagram of different sections of power system by which the electric power reaches your home from generating station.

2. (a) State and explain Kirchoff's voltage law by drawing suitable diagram. 4

   (b) In the circuit given below in Fig. 1. Find the Value of R and Vs if current flowing across 4Ω resistor is 0.75 A and Voltage drop across 6Ω resistor is 6 V as shown. Find the power output of the Source Vs. 6
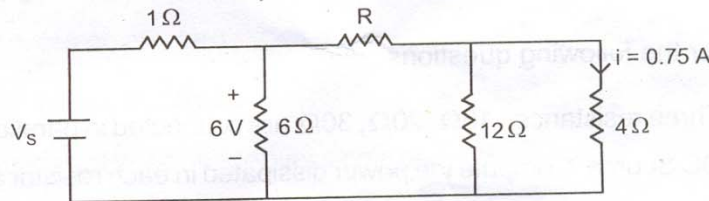

Fig. 1

3. (a) Explain the Principle of Maximum Power transfer in a electrical network by drawing suitable diagram. 4

   (b) Find the current through 8Ω resistor in the given circuit below Fig. 2. 6
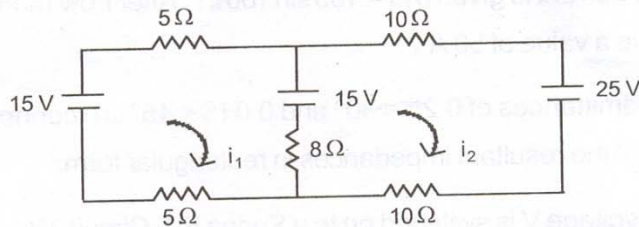

Fig. 2

4. (a) What is the significance of B-H curve ? Explain by drawing suitable diagram. 4

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(b) An Iron ring has a mean diameter of 60 cm and a cross sectional area of 9 cm^2, It is wound with a coil of 2000 turns. An airgap of 2 mm width is cut in the ring. If the current flowing in the coil is measured to be equal to 4 amp, then determine the flux produced in the air gap, if the relative permeability of iron under these conditions is 1000. Neglect leakage and fringing. Given $\mu_0 = 4\pi \times 10^{-7}$ H/m.   6

5. (a) A resistance of 1000 Ω and a capacitor of 100 μF are connected in series to 100 V DC supply. Find the value of –   4

   (i)   Initial current

   (ii) Final current

   (iii) Current after 0.2 second.

   (b) A balanced star connected load has impedance $8 + j6$ Ω in each phase. If the supply is 3 phase, 440 V, 50 Hz. Find the –   6

   (i)   Line Current

   (ii) Power Factor

   (iii) Apparent power, active power.& reactive power.

6. (a) Describe the principle of operation of a single phase transformer. Also explain how a practical transformer is different from an ideal transformer ?   4

   (b) A choke coil is connected in series with a non inductive resistor. The combination is connected across 250 V, 50 Hz supply and draws a current of 5A from the line. The voltage across the choke coil and non inductive resistor are respectively 125 V and 200 V respectively. Calculate for this circuit –   6

   (i)   Resistance and reactance of the choke coil.

    (ii)   Power absorbed by the coil.

    (iii) Total Power.

7. (a) Describe various methods of excitation of a DC machine. Show the connection diagram in each case.   3

    (b) A 4 pole DC shunt generator supplies a load of 20 A at 220 V. The field current of the generator under this condition is 2 A . The armature resistance of the generator is 0.5 ohm. Calculate the generated emf under no load. Neglect the brush contact drops as well as the armature reaction and field saturation.   4

    (c) A 3-phase induction motor is wound for 4 pole and supplied with 50 Hz frequency, calculate the rotor speed when slip is 3%.   3

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

    (a) Laws of Magnetic Circuit

    (b) Advantages of three phase over single phase System

    (c) Complex Power

    (d) Measurement System.