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Total number of printed pages – 3

B. Tech
BE 2102 (New)

Second Semester (Back) Examination – 2013

BASIC ELECTRICAL ENGINEERING

BRANCH : ALL

QUESTION CODE : B476

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 R.M.S value of an alternating quantity ?
 - (b) What do you understand by controlled voltage source ?
 - (c) A Voltmeter V of 23 k ohm resistance in series with a resistor R across a 230 V supply reads 92 volts. Calculate the value of resistor R.
 - (d) Mention the limitations of Ohm's law ?
 - (e) Explain the term 'm.m.f' & 'reluctance' with reference to magnetic circuit ?
 - (f) What is back emf in a DC motor ? Explain.
 - (g) What is the difference between self excited and separately excited DC generator ?
 - (h) A resistor of 20 ohm in series with 0.5 H inductor is connected across a supply of 250 V, 60 Hz. Find the current through the inductor.
 - (i) What is an alternator ?
 - (j) Why laminated core is used in a transformer ?
2. (a) An alternating voltage $V = 160 + j120$ volts is applied to a circuit and the current flows $I = -6 + j15$ amp. Find using j method 5
- (i) The impedance of the circuit.
 - (ii) The power consumed in the circuit.

P.T.O.

- (b) Using Super position theorem, find V in the circuit shown in Fig. 1. 5

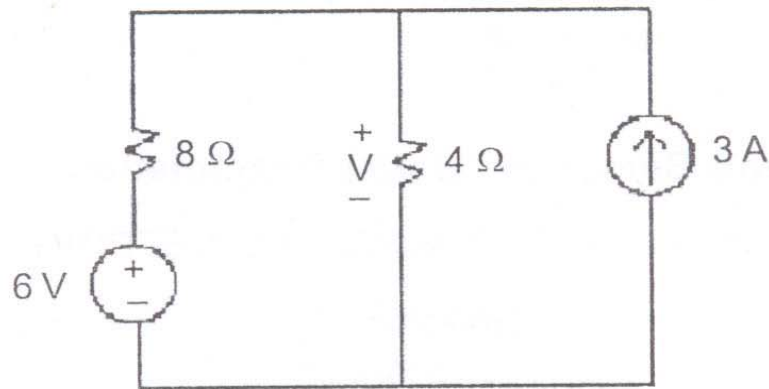


Figure 1

3. (a) State explain Maximum Power transfer theorem with a suitable example. 5
 (b) Determine the current through the 5 ohm resistor of the network shown in Fig. 2 using Thevenin's Theorem. 5

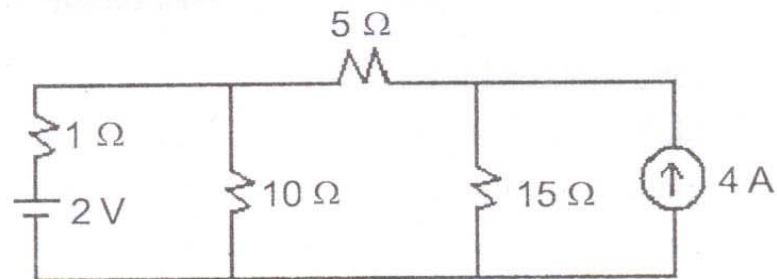


Figure 2

4. (a) Compare between a magnetic circuit with electric circuit by drawing suitable diagrams. 5
 (b) An iron ring of 50 cm mean circumference has a cross sectional area of 20 sq cm and has a winding of 800 turns on it. The ring has an air gap of 2 mm. It is observed that a current of 4 A in the winding produces a flux density of 2 weber/m² in the air gap.

Calculate :

5

- (i) The relative permeability of iron.
 (ii) Inductance of the coil.

5. (a) Explain the Principle of operation of DC generator and also write emf equation explaining each term associated with it. 5

- (b) In a single phase series circuit the supply voltage is 220 V. If the circuit draws a current of 5 A with a power factor of 0.8 lagging. Calculate : 5
- (i) Impedance of the circuit
 - (ii) Real Power and
 - (iii) Reactive power consumed by the circuit.
6. (a) Three impedances of each $(8 + j6)$ ohm are connected in star and to a 400 V, 50 Hz supply. What is the total power consumed in the circuit ? 5
- (b) Derive the mathematical expression for growth and decay of current in a R-C circuit subjected to DC voltage. 5
7. (a) A 220 V DC shunt motor takes 32 A at full load. Find the back e.m.f on full load if the resistance of the motor armature and shunt field windings are 0.5 ohm and 100 ohm respectively. 5
- (b) Explain how an analog voltage signal gets converted to its digital form using an analog to digital converter (ADC) ? 5
8. Write notes on any **two** : 5×2
- (a) Transient Analysis in R-L circuit with DC excitation
 - (b) Complex Power in AC circuit
 - (c) Signal conditioning.

