Total No. of Questions—8] [Total No. of Printed Pages—4+1

Seat No.	

[4756]-205

F.E. (First and Second Semester) EXAMINATION, 2015

BASIC ELECTRICAL ENGINEERING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Attempt Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Use of non-programmable pocket size scientific calculators is permitted.

(*v*) Assume suitable data, if necessary.

1. (*a*) If a coil of 150 turns is linked with a flux of 0.01 Wb when carrying a current of 10 A, then calculate the induced emf : [6]

(*i*) if this current is uniformly reversed in 0.1 second.

(*ii*) if this current is interrupted in 0.05 second.

(*b*) Define insulation resistance and obtain an expression for insulation resistance of a single core cable. [6]

P.T.O.

Or

2. (*a*) Explain what do you mean by statically induced EMF and dynamically induced EMF. [6]

(*b*) A coil of insulated copper wire has a resistance of 150 Ω at 20°C. When the coil is connected across a 240 V supply, the current after several hours is 1.25 A. Calculate the temperature of the coil, assuming the temp. co-efficient of resistance of copper at 20°C to be 0.0039 per °C. [6]

3. (*a*) Derive an EMF equation of 1-ph transformer. [6]

(*b*) Derive an expression for instantaneous current and power consumed when voltage of $V = V_m \sin(\omega t)$ is applied to pure inductance alone. Also draw the phasor diagram. [6]

Or

4. (*a*) A single phase 4 kVA transformer has 400 turns on its primary and 1000 secondary turns. The net cross-sectional area of the core is 60 cm^2. When the primary winding is connected to 500 V, 50 Hz supply, calculate : [6]

(*i*) the max. value of flux density in the core

(*ii*) the voltage induced in the secondary winding and

(*iii*) the secondary full load current.

(*b*) The expression of the alternating current is given by $i = 5.48 \sin \omega t$: [6]

Calculate :

(*i*) the average value

(*ii*) rms value of the current

(*iii*) power consumed if the current is passed through a resistance of 10 Ω.

5. (*a*) What is admittance of an AC circuit ? What are its *two* components ? State units of these quantities. How the admittance is expressed in rectangular and polar form ? [6]

(*b*) An impedance $Z_1 = (100 + j0)$ Ω is connected in series with another impedance $Z_2 = (50 + j80)$ Ω. The circuit is connected to a single phase 230 V, 50 Hz supply. Calculate : [7]

(*i*) current drawn by the circuit

(*ii*) power consumed by whole circuit

(*iii*) circuit power factor.

Or

6. (*a*) Draw and explain phasor diagram of an RLC series circuit, when : [7]

(1) $X_C > X_L$

(2) $X_C < X_L$

(3) $X_C = X_L$

(*b*) A delta connected balanced load across a 400 V 3-phase supply consist of three identical impedances, each equal to (15 + j12) Ω. Find the line current, active power and reactive power. [6]

7. (*a*) State and explain superposition theorem. [6]

(*b*) Using Kirchhoff's Law, determine the current flowing through 6 Ω resistance. [7]

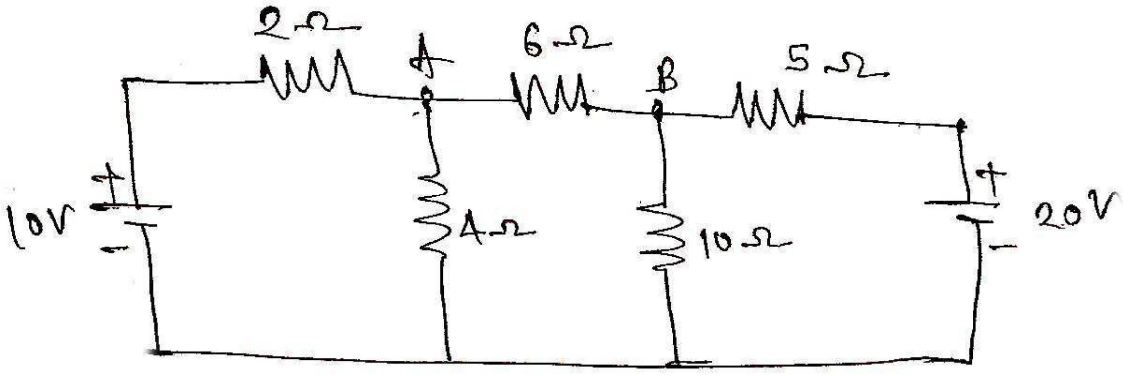

Fig. 1

Or

8. (*a*) Derive the expressions to convert delta connected resistances into equivalent star circuit. [6]

(*b*) Using Thevenin's Theorem, determine the value of current flowing through 6 Ω resistance. [7]

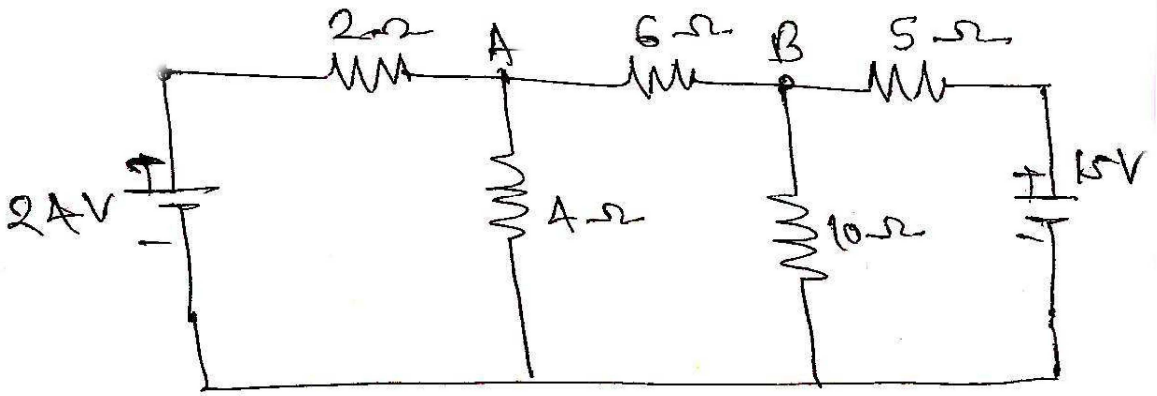

Fig. 2