

Total No. of Questions—8]

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[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 150Ω 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 $^\circ\text{C}$. [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

$$i = 5.48 \sin \omega t : \quad [6]$$

Calculate :

(i) the average value

(ii) rms value of the current

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

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 $Z_1 = (100 + j0) \Omega$ is connected in series with another impedance $Z_2 = (50 + j80) \Omega$. 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 $(15 + j12) \Omega$. 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 6Ω resistance. [7]

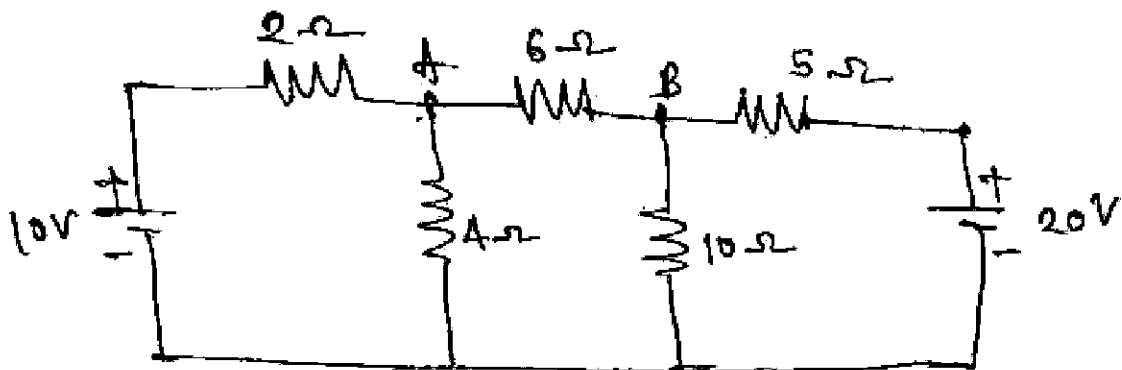


Fig. 1

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 $6\ \Omega$ resistance. [7]

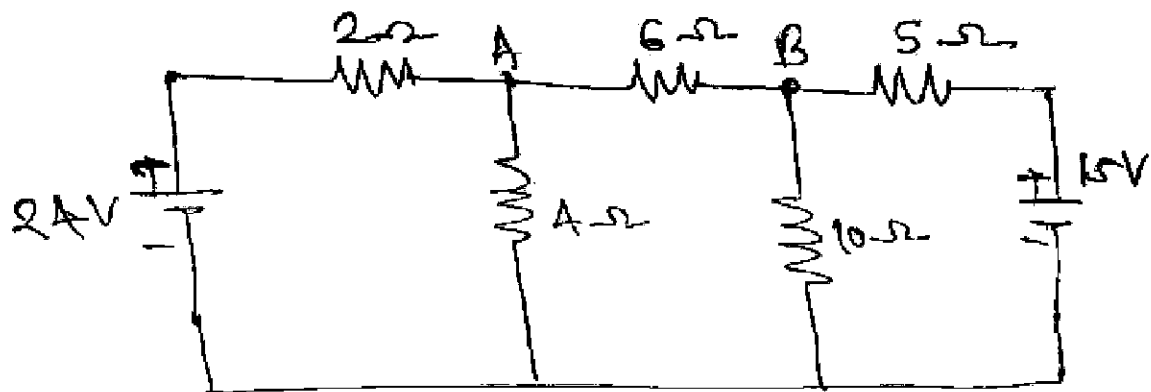


Fig. 2