

Total No. of Questions—8]

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[5667]-1007

F.E. (All Branches) (I Sem.) EXAMINATION, 2019
BASIC ELECTRICAL ENGINEERING
(2019 PATTERN)

Time : 2½ Hours

Maximum Marks : 70

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

(ii) Neat diagram must be drawn wherever necessary.

(iii) Figures to the right indicate full marks.

(iv) Use of Non-Programmable Scientific Calculators is allowed.

(v) Assume suitable data, if necessary.

1. (a) Define active, reactive and apparent power. State their units. Also draw the power triangle for R-L circuit. [4]
- (b) What is series resonance ? Derive the expression for resonant frequency. [6]
- (c) The R-L circuit when supplied by 180V, 50 Hz ac voltage, the voltage drop across the inductance is 150 V. The current drawn by the circuit is 5 A. Calculate : [8]
- (i) inductive reactance
- (ii) inductance
- (iii) resistance
- (iv) V_R
- (v) P.F.
- (vi) Phasor diagram.

P.T.O.

Or

2. (a) Obtain the expression for current, when voltage $v = V_m \sin \omega t$ is applied across purely inductive circuit. [4]
- (b) Derive the expression for power, when voltage $v = V_m \sin \omega t$ is applied across R-L series circuit. Draw the phasor diagram. [6]
- (c) The ac voltage given by $v = 141.4 \sin (100 \pi t + \pi/3)$ Volt, when applied to certain circuit, resultant current is $i = 7.07 \sin (100 \pi t + \pi/6)$ Amp. Draw the phasor diagram and Find : [8]
- (i) impedance
 - (ii) circuit elements
 - (iii) active, reactive and apparent power.
3. (a) Define : [3]
- (i) phase sequence
 - (ii) balanced and unbalanced load.
- (b) Derive the emf equation of 1-phase transformer. [6]
- (c) Three identical impedances each of $8 + j6 \Omega$ are connected in star across 3-ph, 415 V, 50 Hz ac supply. Calculate : [8]
- (i) line voltage, phase voltage
 - (ii) phase current, line current
 - (iii) active power
 - (iv) When same impedances are connected in delta across the same supply voltage, find active power.

Or

4. (a) Why are steel laminations used for construction of transformer core ? Sketch different types of laminations used for core. [3]
- (b) What are losses taking place in the transformer ? State the parts in which they take place. How to minimize these losses ? [6]
- (c) Obtain the relation between phase values and line values of voltage and current in case of balanced star connected 3-ph inductive load. Assume phase sequence RYB. Draw the necessary phasor diagram. [8]
5. (a) Define the ideal and practical voltage sources. Draw their V-I characteristics. [4]
- (b) Find current flowing through AB using Kirchhoff's loop analysis for the circuit shown in Fig. 5(b). All resistances are in Ω . [6]

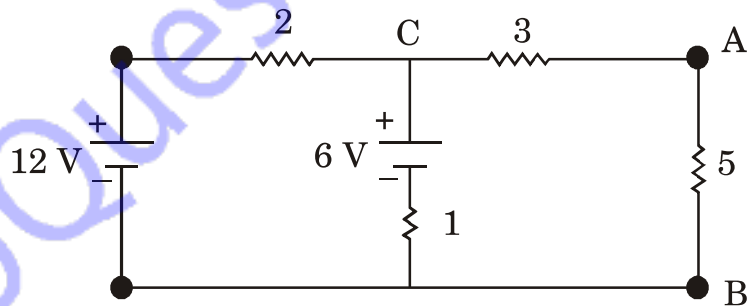


Fig. 5(b)

- (c) Derive the equations to convert Delta connected resistive circuit into equivalent star circuit. [8]

Or

6. (a) State and explain KCL & KVL. [4]
(b) Define :
(i) active & passive network
(ii) linear & nonlinear network.
(iii) unilateral & bilateral network. [6]
(c) Find current flowing through 3Ω using Superposition theorem for the circuit shown in Q 5(b) Fig. 5(b). [8]
7. (a) Define temperature coefficient of resistance. State the factors on which it depends. [3]
(b) Compare lead acid battery and lithium ion battery. (6 points only). [6]
(c) The electrical load of a bungalow is as follows. Find :
(i) daily energy consumption in kWh.
(ii) monthly electricity bill for the month of 30 days at the rate of Rs 6/unit.
(I) Tubes 40 W ---- 06 nos ---- 6 hrs/day
(II) Fans 60 W ---- 04 nos ---- 10 hrs/day
(III) Washing machine 2 kW ---- 01 no ---- 01 hr/day
(IV) Geyser 2 kW ---- 01 no ---- 02 hrs/day
(V) TV 100 W ---- 01 no ---- 06 hrs/day [8]

Or

8. (a) State the applications of lead acid battery. [3]
(b) Prove that $\alpha_2 = \alpha_1/1 + \alpha_1 (t_2 - t_1)$, all the symbols have their appropriate meaning. [6]
(c) Explain the operation of Lithium ion battery with construction & chemical reactions during charging and discharging. Also state its applications. [8]