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

Seat No.	

[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 :

(*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. [8]

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 takes 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]

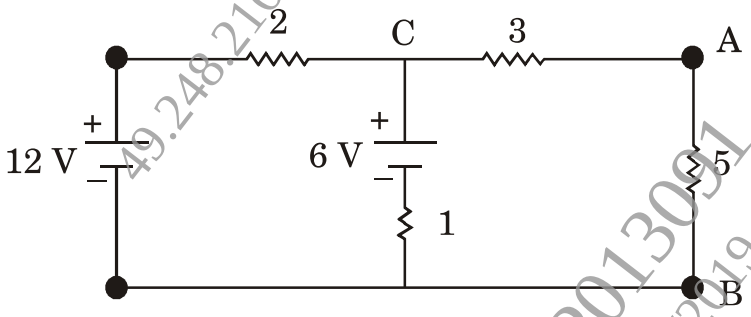

Fig. 5(*b*)

(*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 3 Ω 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]