Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5558]-105

F.E. EXAMINATION, 2019

BASIC ELECTRICAL ENGINEERING

(2015 PATTERN)

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

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 diagrams must be drawn wherever necessary.

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

(*iv*) Use of Non-programmable scientific calculator is allowed.

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

Q.1 **a)** Define resistance and state its unit. What is the effect of temperature on resistance of the [i] metallic conductor [ii] alloys and [iii] insulator **[06]**

b) Find the induced emf in the coil having inductance of 0.15 H when [i] current of 10 A in the coil is switched off in 0.01 sec. [ii] same current is uniformly reversed in 0.01 sec. **[06]**

OR

Q. 2 **a)** Obtain the expression for coefficient of coupling between two magnetically coupled coils. **[06]**

b) If the temperature coefficient of resistance for copper wire is 0.00393 per degree Celsius at 20 ^{0}C. Find the temperature coefficient of resistance at [i] 50 ^{0}C and [ii] 70 ^{O}C **[06]**

Q.3 **a)** Obtain the emf equation of 1-phase transformer. **[06]**

b) Obtain the expression for RMS value of alternating current in terms of its peak value. **[07]**

P.T.O.

OR

Q.4 **a)** A 80 kVA, 1000/250 V, 1-ph 50 Hz transformer has iron loss of 800 W and full load copper loss 1200 W. Find [i] efficiency at full load and power factor = 08 lag. [ii] efficiency at half load and power factor = 1 lag. **[06]**

b) The alternating current expression is given by $i = 14.14 \sin (100 \pi t)$ Amp. Determine: [i] maximum value of current [ii] RMS value of current [iii] average value of current [iv] form factor [v] peak factor [vi] power consumed when it flows through resistance of 10 Ω. **[07]**

Q.5 **a)** Obtain the expression for power, when voltage $v = V_m \sin \omega t$ is applied across R-L series circuit. Draw the circuit diagram and phasor diagram. **[06]**

b) State the relation between [i] phase voltage and line voltage [ii] phase current and line current incase of balanced delta connected 3-ph load. Using above relations, obtain the expressions for 3 –ph active power and 3-ph reactive power. **[06]**

OR

Q.6 **a)** What is series resonance?. Obtain the expression for resonant frequency. **[06]**

b) The series circuit having resistance 5 Ω and capacitance 150 μF is connected to 1-phase, 200 V, 50 Hz AC supply. Calculate - **[06]**

[i] capacitive reactance Xc [ii] impedance [iii] current drawn by the circuit [iv] power factor [v] Active power and [vi] reactive power.

Q.7 **a)** Derive the equations to convert Delta connected resistive circuit into equivalent star circuit. **[06]**

b) Find equivalent resistance between AB for the circuit shown in fig. 7.b **[07]**

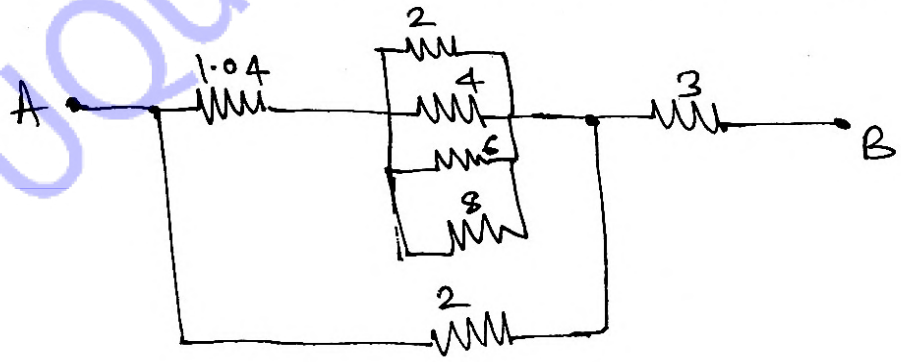

Fig. 7 (*b*)

OR

Q.8 **a)** For the circuit shown in fig. 8.a find the current flowing through PQ using Kirchhoff's laws. **[06]**

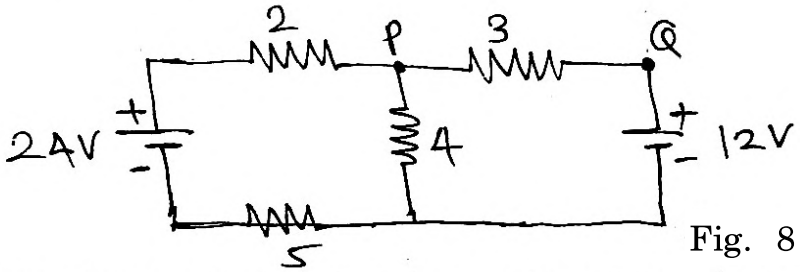

Fig. 8 (*a*)

b) Write down the steps to find current through load resistance R_L using Thevenin theorem for the circuit shown in fig. 8.b. **[07]**

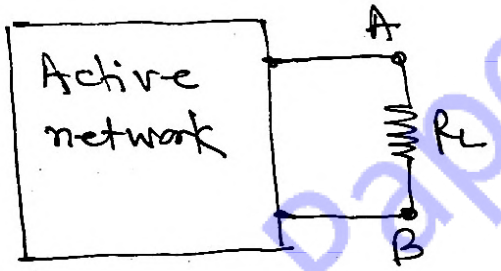

Fig. 8 (*b*)