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**[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 °C. Find the temperature coefficient of resistance at [i] 50 °C and [ii] 70 °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 = 0.8 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  $10 \Omega$ . [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 in case 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  $5 \Omega$  and capacitance  $150 \mu\text{F}$  is connected to 1-phase, 200 V, 50 Hz AC supply. Calculate - [06]
- [i] capacitive reactance  $X_c$  [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]

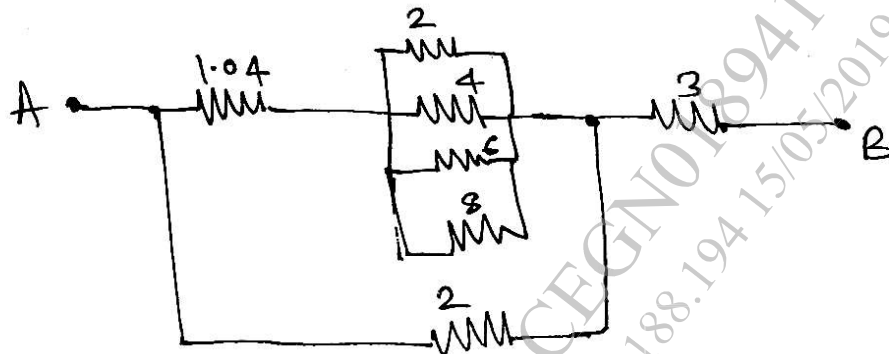


Fig. 7 (b)

OR

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

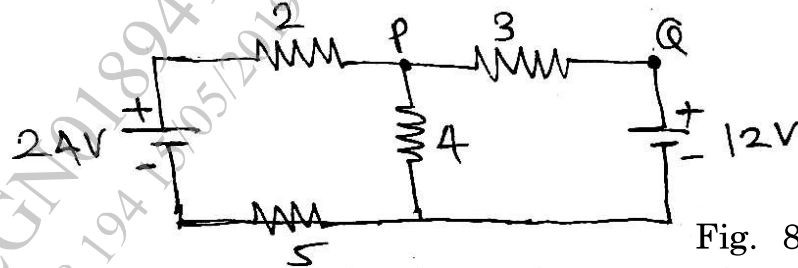


Fig. 8 (a)

- 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)