

Total No. of Questions : 8]

SEAT No. :

P4358

[Total No. of Pages : 3

[5458]-107

F.E.

BASIC ELECTRICAL ENGINEERING

(2015 Pattern)

Time : 2 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4 , Q.5 or Q.6, Q.7 or Q.8.*
- 2) *Neat diagrams must be drawn, wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) Define the insulation resistance. Write down the expression for insulation resistance of the single core cable. State the factors on which it depends. **[6]**

b) Two coils, X of 12000 turns and Y of 15000 turns lie in parallel planes such that 60% of the flux produced by coil X links coil Y. A current of 5 A in coil X produces a flux of 0.05 mWb, while the same current in coil Y produces a flux of 0.075 mWb. Find : **[7]**

- i) self-inductance of each coil
- ii) mutual inductance
- iii) coefficient of coupling

OR

Q2) a) What is magnetic circuit? For simple magnetic circuit without air gap, obtain the expression for flux. **[6]**

b) A filament lamp has a normal rating of 240V, 60W. If switched on at the room temperature of 20°C to the 240V supply, it draws an initial current of 2.5A, calculate the temperature of filament in normal hot condition, if the temperature coefficient of resistance at 20°C is 0.0055 per °C. **[7]**

Q3) a) When two capacitance C_1 and C_2 are connected in series, derive the equation for total capacitance. Also draw circuit diagram. **[6]**

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- b) A sinusoidal alternating quantity of 50 Hz frequency is having maximum value of current of 100 Amps. Find the time taken by current to attain [6]
- i) 40A from origin and
 - ii) 70 A after passing through first positive maximum value.

OR

- Q4)** a) Write the equation of instantaneous voltage in terms of : [6]
- i) Maximum voltage and coil angle θ
 - ii) Maximum voltage and angular velocity
 - iii) Maximum voltage and frequency
 - iv) Maximum voltage and Time period.

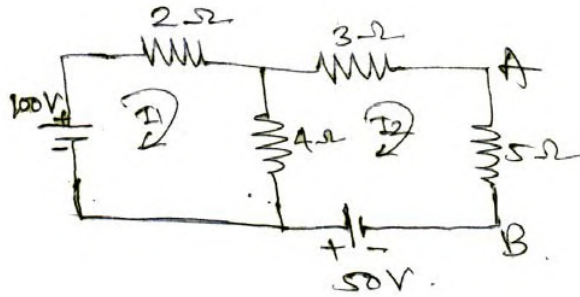
Draw the sinusoidal waveform of voltage vs time and show the maximum value, cycle, frequency and periodic time.

- b) With neat sketches , explain the various types of lamination used for the construction of core of single phase transformer. [6]
- Q5)** a) Derive the relationship between the line values and phase values of voltage and current for balanced three phase **star connected inductive load** with the help of connection diagram and phasor diagram. Hence obtain the total power consumed. Assume phase sequence RYB. [6]
- b) A R-C series circuit is connected across 100 V, 50 Hz supply draws a current of 5 A at a power factor 0.3 leading. Find the value of R and C. Also find power consumed. [7]

OR

- Q6)** a) What is admittance? Obtain its components and their units. Draw admittance triangle for R-L and R-C circuit. [6]
- b) A coil of inductance 15 mH and resistance 25 Ω resistance is connected in series with a capacitor 'C' across 230 V, 50 Hz supply. Find the value of capacitor so that circuit draws maximum current. What will be the power factor and power consumed? [7]

- Q7) a)** Elaborate steps to be followed to obtain current through any branch using Thevenin's equivalent circuit. [6]
- b) Find the current through branch AB using KVL. All resistances are in ohm. [6]



OR

- Q8) a)** With usual notation, derive step by step formulae for converting delta elements of the network to star elements on equivalence basis. [6]
- b) Elaborate steps to be followed to obtain current through any branch using Superposition theorem. [6]
