

Total No. of Questions : 8]

P4358

SEAT No. :

[Total No. of Pages : 3

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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

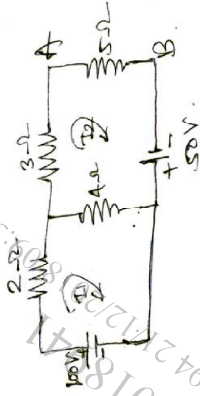
Q6) a) What is admittance? Obtain its components and their units. Draw admittance triangle for R-L and R-C circuit. [6]

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]

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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]

