Total No. of Questions :8]

SEAT No. :

P4026

[Total No. of Pages :3

[5351] - 106

F.E.

BASIC ELECTRICAL ENGINEERING

(2015 Pattern) (Semester - II)

Time : 2 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figure to the right indicates full marks.***
3) ***Assume suitable data wherever necessary.***
4) ***Use of electronic pocket calculator is allowed (non-programmable).***

Q1) a) Describe with necessary graph, the effect of temperature on resistance of following material. **[7]**

a) Metals

b) Insulation.

b) An air cored toroid having 25 cm mean diameter & 6.26 cm^2 circular cross sectional area would uniformly with 1000 turns of wire. Determine **[6]**

i) Inductance of toroid

ii) emf induced in the coil when current is increasing at the rate of 200 A/sec.

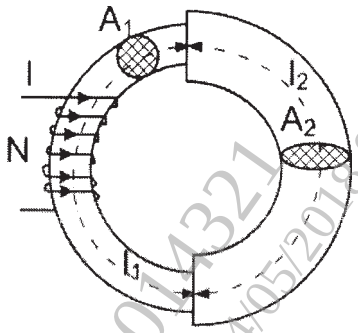
iii) energy stored in its magnetic field when coil carries current of 10 A.

OR

Q2) a) In a hydro electric generating station, the head of water is 425m. If 1250 liters of water are required to generate 1 kWh of electric energy, find the overall efficiency. Assume 1 liter = 1 kg. **[7]**

P.T.O.

b) Derive the formula of total reluctance and total mmf in following circuit if relative permeability are μ_{r1} and μ_{r2} respectively. **[6]**



Q3) a) Give the types of capacitors based on dielectric material used and describe any two types. **[6]**

b) A sinusoidal varying alternating current has r.m.s. value of 40 A and periodic time of 20 milliseconds. If the waveform of this current enters in to positive half cycle at t = 0, find instantaneous values of the current at quarter cycle, t1 = 7 ms and t2 = 14ms. **[6]**

OR

Q4) a) A 50 kVA single phase transformer has a turns ratio of 300/20. The primary winding is connected to a 2200V, 50Hz supply. Calculate. **[6]**

i) The secondary voltage at no load.

ii) The approximate value of Primary current on full load.

iii) The approximate value of secondary current on full load.

b) Explain the concept of lagging, leading and in phase Phasors. Draw the respective waveform and Phasor diagram for the same. **[6]**

Q5) a) Derive the expression for current drawn and power consumed by a circuit consisting of a resistor R and a capacitor C connected in series across $v = V_m \sin(\omega t)$. **[6]**

b) Each phase of star connected load has an impedance (25+j40) connected across 3-phase, 415 V, 50 Hz supply. Determine:

a) Line current

b) Active, Reactive and Apparent Power. **[7]**

OR

Q6) a) Derive the relationship between the line and phase value of voltage and current for balanced three phase star connected resistive load with the help of connection diagram and phasor diagram. Hence obtain the total power consumed. **[6]**

b) Two impedances $Z_1 = 30\angle 45^\circ\ \Omega$ and $Z_2 = 45\angle 30^\circ\ \Omega$ are connected in parallel across a single phases 230 V, 50 Hz supply. Calculate the **[7]**

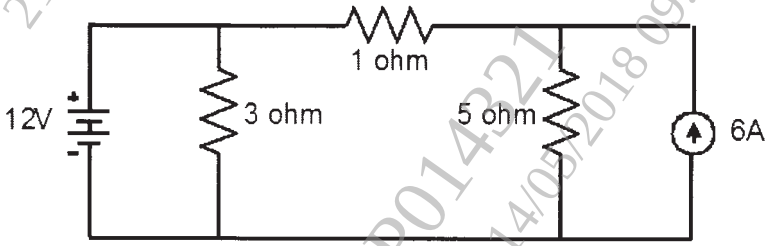
i) current drawn,

ii) power factor and

iii) power consumed by the circuit.

Q7) a) With usual notation, derive step by step formula for converting star elements of the network to delta elements on equivalence basis. **[6]**

b) Calculate the current through all resistance using superposition principle. **[6]**



OR

Q8) a) Elaborate steps to be followed to obtain current through any branch using Superposition theorem. **[6]**

b) Determine effective resistance between A and B. **[6]**