Total No. of Questions : 8]

SEAT No. :

P4420

[Total No. of Pages : 3

[5251]-1004

First Year Engineering (II Semester)

BASIC ELECTRICAL ENGINEERING

(2015 Pattern)

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

Instructions to the candidates :

1) ***Attempt Q.1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 and Q. 7 or Q. 8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figure to the right indicates full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) Define the terms Resistance, Resistivity, Conductance and Conductivity. Also state their formula and unit of measurement. **[7]**

b) A coil is wound with 300 turns on steel ring of relative permeability of 900. It has mean circumference of 40cm & a cross sectional area of 5 cm^2. If the coil has resistance of 100 Ω & it is connected to 250 V D C supply. Calculate - a) coil mmf b) field strength c) total flux d) reluctance of ring e) permeance of ring. **[6]**

OR

Q2) a) A belt driven pulley of 0.4 m in diameter rotates at a speed of 4 revolutions per second. The tension in the tight side of the belt is 420N and in the slack side 80N. Calculate **[7]**

i) The torque on pulley

ii) The power developed

b) Compare Statically induced emf& Dynamically induced emf **[6]**

Q3) a) Derive the equation of energy stored in a capacitor connected across dc supply. **[6]**

b) A sinusoidal alternating quantity is having form factor of 1.15 and peak factor of 1 .57,if the maximum value of the voltage is 440V calculate the average and RMS values of the voltage. Mention the relations of the factors **[6]**

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OR

Q4) a) A single phase 50Hz transformer has 300 primary turns and 750 secondary turns. The net cross-sectional area of the core is 64cm^2. If the primary induced emf is 400V, find **[6]**

i) Maximum flux in the core

ii) Maximum flux density in the core

iii) emf induced in the secondary

b) A sinusoidal voltage $V = V_m$ Sin ωt applied across pure capacitor circuit. Derive expression for voltage, current and power of the circuit. Also draw the Phasor diagram of the circuit. **[6]**

Q5) a) If $v=V_m$,sin (ωt) is applied across single phase circuit and current flowing through the circuit is $i = I_m$ sin (ωt–ø) .derive the expression for average power consumed in the circuit. Draw the waveforms of voltage, current and power. **[6]**

b) A delta-connected load draws a line current of 15 ampere at a lagging power factor of 0.85 from a 400 V. 50 Hz, 3-phase supply. Find the resistance and inductance of each phase. If the same load is now connected in star, calculate the line current and total power consumed.**[7]**

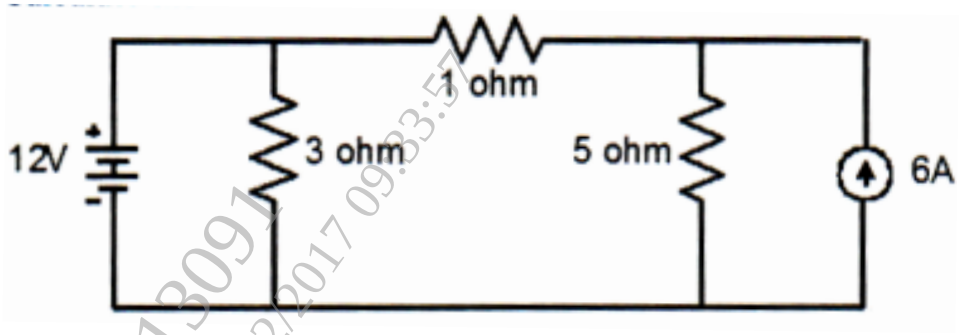
OR

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

b) A coil of 15 mH is connected in series with 25 Ω resistance and a capacitor 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) State and explain Kirchoff's current law and Kirchoff's voltage law with the help of suitable diagram. **[6]**

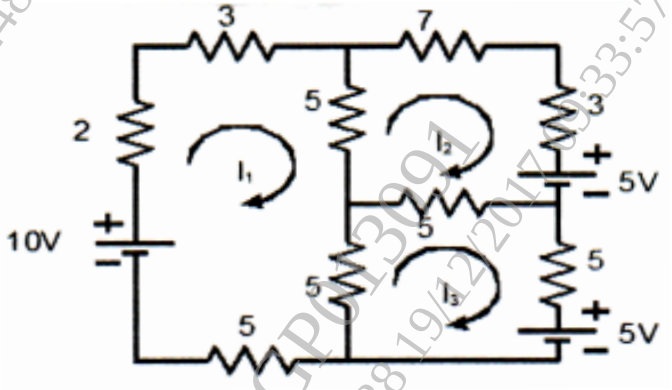
b) Calculate the current through all resistance using superposition principle. **[6]**



OR

Q8) a) With the help of neat diagram state and explain Thevenin's Theorem used for determination of current through any branch of a network. **[6]**

b) Determine all loop currents using KVL. All resistances are in ohm **[6]**



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