BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - I Electrical & Computer Engineering : WINTER- 2022
SUBJECT : ELECTROMAGNETICS & ITS APPLICATIONS

Day : Friday | Time : 10:00 AM-01:00 PM

Date : 13-01-2023 | **W-25145-2022** | Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Assume suitable data **WHEREVER** necessary.
4) Draw neat labeled diagrams **WHEREVER** necessary.

Q.1 **a)** Explain the concept of Active and Passive elements. **(05)**

b) Explain the concept of Voltage and current sources. **(05)**

OR

Q.1 **a)** Describe with diagram super node and super mesh analysis. **(05)**

b) Write short note on network reduction using series parallel and star delta transformations. **(05)**

Q.2 **a)** Explain the concept of flux, flux density, field strength. **(05)**

b) Compare electric and magnetic circuits. **(05)**

OR

Q.2 **a)** Describe Faradays law of electromagnetic induction. **(05)**

b) State the concept of statically and dynamically induced emf. **(05)**

Q.3 **a)** Explain the following : sinusoidal, square and triangular wave form. **(05)**

b) Write short note on analysis of series circuits. **(05)**

OR

Q.3 **a)** Three circuits in parallel take the following currents : **(05)**

$i_1 = 20 \sin 314\,t$, $i_2 = 30 \sin (314\,t - \frac{\pi}{4})$, $i_3 = 40 \cos (314\,t + \frac{\pi}{6})$.

Find

i) the expression for the resultant current and

ii) its rms value and frequency.

If the circuit has a resistance of 2 Ω , what is the energy loss in 10 hours?

b) A 230 v, 50 Hz AC supply is applied to a coil of 0.06 H inductance and 2.5 Ω resistances connected in series with a 6.8 μF capacitor. Draw the circuit diagram for above values. Calculate i) impedance ii) current iii) phase angle between current and voltage iv) power factor & v) power consumed. **(05)**

Q.4 **a)** Explain the necessity of three phase system. **(05)**

b) Explain the meaning of phase sequence. **(05)**

OR

Q.4 **a)** Phase voltage and current of a star-connected inductive load is 150V and 25 A. Power factor of load is 0.707 (lag). Assuming that the system is 3-wire and power is measured using two watt meters, find the reading of watt meters. **(05)**

b) Write short note on balanced supply and balanced load. **(05)**

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Q.5 a) Explain the construction and principle of operation of single phase transformer. (05)

b) Describe the equivalent circuit and phasor diagram of single phase transformer. (05)

OR

Q.5 a) The maximum flux density in the core of a 250/3000 volts, 50 Hz single phase transformer is 1.2 Wb/m^2. If the emf per turn is 8 volt, determine i) primary and secondary turns & ii) area of the core. (05)

b) Describe losses in transformer. (05)

Q.6 a) Write short note on transformer on no-load and on load. (05)

b) Write short note on efficiency of transformer, condition of maximum efficiency, all day efficiency. (05)

OR

Q.6 a) In a no-load test of single phase transformer, the following test data were obtained : (05)

Primary voltage : 220V
Secondary voltage : 110V
Primary current : 0.5A
Power input : 30W

Find the following : i) the turn ratio ii) the magnetizing component of no-load current, iii) its working (or loss) component & iv) the iron loss. The resistance of the primary winding = 0.6 Ω .

b) Write short note on regulation of a transformer. (05)

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