EX/EE/T/112/2017(S)

B. ELE. ENGG. 1ST YEAR 1ST SEM. SUPPLEMENTARY EXAMINATION 2017

PRINCIPLES OF ELECTRICAL ENGINEERING-I

Time: Three hours Full Marks: 100

(50 marks for each part)

Use separate answer script for each part.

PART I

Answer **any three** questions.

Figures in the margin indicate full marks

Two marks allotted for neat and to the point answer

1. State and explain Ampere's circuital law. (16)

   Derive the magnetic field intensity produced at any arbitrary point near a very long current carrying conductor.

2. What is meant by normal magnetization curve? How is it drawn? Explain the significance of the different sections of magnetization curve. (16)

   Derive the expression for inductance of a solenoid and energy stored in an inductor.

3. State and explain Gauss's theorem. Can you derive the Coulomb's law starting from the Gauss theorem ? (16)

   Establish a relationship between electric potential and electric field intensity.

   What do you understand by leakage of flux?

4. State Coulomb's law. Define electric field intensity from Coulomb's law. (16)

   Derive an expression for the capacitance per unit length between two co-axial cylinders with the space between them filled with two layers of different dielectrics.

5. What do you understand by hysteresis and eddy current loss? (16)

   Compare between electric circuit and magnetic circuit.

Ex/EE/T/112/2017(S)

BACHELOR OF ENGINEERING IN

ELECTRICAL ENGINEERINGEXAMINATION, 2017

(1st Year, 1st Semester, Supplementary)

PRINCIPLES OF ELECTRICAL ENGINEERING - I

Time: Three Hours | Full Marks: 100

(50 marks for each part)

Use a separate Answer-script for each Part

PART-II

Answer ***any three*** questions

Two marks are reserved for neatness and well organized answer script

1.a) Derive the relationship between the voltage and current for a purely inductive circuit. Also show that the average power consumed by the inductive circuit is zero. Draw the appropriate phasor diagram showing voltage and current relationship. 6

b) Calculate the rms and average values of current i represented by Fig.1

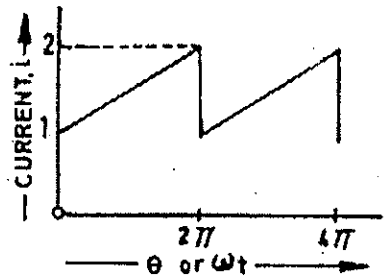

Fig.1

6

c)Explain the term apparent power, active power, reactive power and power factor. 4

2. a) A load consumes 6.5KW at a lagging power factor of 0.5 when connected to a 230V, 50Hz power line. Find the value of capacitor to raise the power factor to 0.9. Show associated phasor diagram. 8

b) A voltage of 125 V at 50 Hz is applied across a non-inductive resistor connected in series with a capacitor. The current in the circuit is 2.2 A. The power loss in the resistor is 96.8 W. Assume that power loss in the capacitor is negligible. Calculate the resistance and capacitance. 8

3. a) From dimensional analysis, show that

i) CR has the unit of time

ii) $R^2\sqrt{\frac{C}{L}}$ has the unit of ohm. 8

b) Find the value of total resistance between the terminals A and D of the circuit given in Fig. 2.

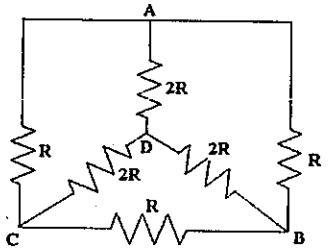

Fig. 2

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4. a) Find the current through 12 ohm resistor using mesh analysisof the circuit given in Fig. 3 .

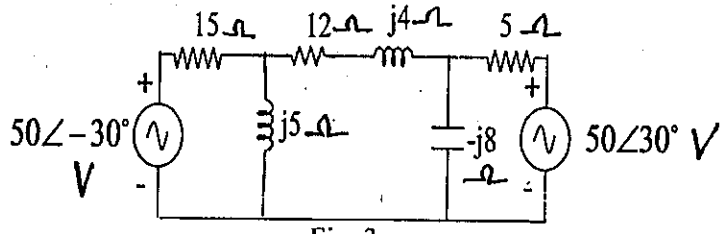

Fig. 3

8

and prove

b)State maximum power transfer theorem considering a circuit with ac source with fixed source impedance delivering power to a load consisting of variable complex impedance. 8

5. Write short notes on any *two*:

a) Resonance in series R-L-C circuit.

b) Star-delta conversion of impedances.

c) Thevenin's and Norton's theorem and their relation.

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