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TEE–101

B. Tech. (First Semester)
End Semester EXAMINATION, 2017
(All Branches)
BASIC ELECTRICAL ENGINEERING

Time : Three Hours] [*Maximum Marks : 100*

Note : (i) This question paper contains *five* questions.

(ii) All questions are compulsory.

(iii) Instructions on how to attempt a question are mention against it.

(iv) Total marks assigned to each question are **twenty**.

1. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

   (a) Define the statement of Norton's theorem and Thevenin's theorem with its equivalent circuit.

   (b) What is analogy between electrical and magnetic circuit ? Draw series and parallel magnetic circuit with mathematical expression for m.m.f., flux and magnetic field intensity.

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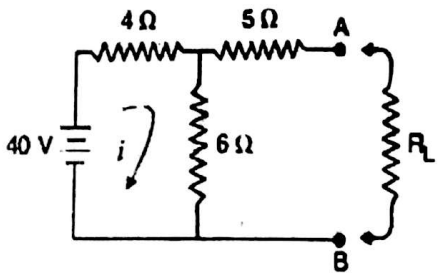
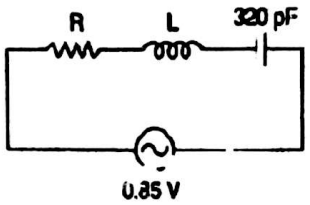
(c) In the below given circuit determine current across resistance R_L for R_L = 1, 2 and 3 ohm using Thevenin's theorem.



2. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) In three-phase can we obtain three-phase power in star or delta circuit by two wattmeter method ? If yes, then derive the expression for active power.

(b) For the circuit shown determine the value of inductance for resonance if Q = 50 and f_o = 175 kHz. Also find the circuit current the voltage across the capacitor and the bandwidth of the circuit.



(c) Derive the condition obtained in case of resonance in series RLC circuit and also derive expression for quality factor in series RLC circuit.

3. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) (i) What is the principle of Faraday law of electromagnetic induction for static e.m.f. ?

(ii) Which electrical device have working e.m.f. in terms of static e.m f. ?

(iii) Obtain mathematical expression and draw with complete equivalent circuit of transformer when primary referred to secondary side.

(b) Determine the efficiency of a 150 kVA transformer at 25%, 33% and 100% full-load (i) At unity p. f. (ii) At 0.8 p. f. lag if the copper loss is 1600 W at full-load and the iron loss is 1400 W.

(c) Explain O. C. and S. C. test of single-phase transformer with its equivalent circuit.

4. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Define the following :

(i) Bilateral and Non-linear element

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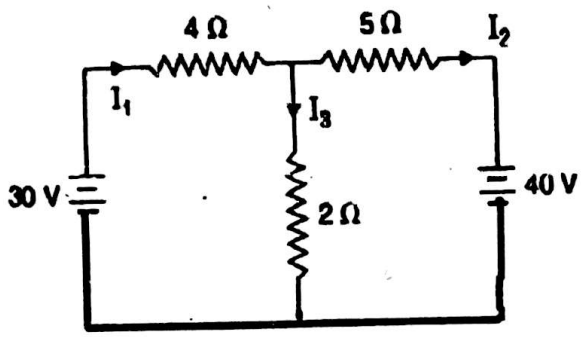
(ii) Bandwidth

(iii) Form Factor and average value

(iv) Time period and frequency

(b) Using NODAL analysis determines all branch currents.



(c) Define maximum power transfer theorem for d.c. circuit and derive the condition of maximum efficiency.

5. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) (i) What is the principle of D.C. machine with its construction diagram ?

(ii) Derive expression for resultant m.m.f. in three-phase rotating magnetic field.

(b) The power into a balanced 3-phase inductive load measured by two wattmeters are

1500 W and 1000 W. The line voltages are 440 V, 50 Hz. Determine the active power, reactive power, kVA and power factor of the load.

(c) The power input to the rotor of a 440 V, 50 Hz, 6-pole, 3-phase induction motor is 100 kW. The rotor electromotive force is observed to make at 960 r. p. m.

Calculate :

(i) The slip.

(ii) The rotor speed

(iii) Speed of stator field with respect to rotor.

(iv) Frequency of rotor current at standstill.

(v) Speed of rotor magnetic field with respect to stator magnetic field.

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