Code No: 123BR

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, March - 2022
BASIC ELECTRICAL ENGINEERING
(Common to CSE, IT)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Define the following and mention their units:
(i) Electric charge, (ii) electric current, (iii) electric potential, (iv) emf, (v) electric resistance, (vi) conductance, (vii) resistivity, (viii) conductivity.

b) A circuit consists of three resistances of 12 ohm, 18 ohm, and 3 ohm, respectively, joined in parallel connected in series with a fourth resistance. The whole circuit is supplied at 60 V and it is found that power dissipated in 12 ohm resistance is 36 W. Determine the value of fourth resistance and the total power dissipated in the group. [8+7]

2.a) Determine the current I in 4 ohm resistance for the following circuit (figure 1).

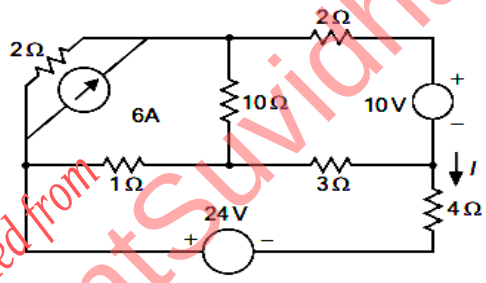

Figure: 1

b) State and explain maximum power transfer theorem. [8+7]

3.a) Derive a relation for peak factor and form factor of a sinusoidal quantity.

b) A capacitor has a capacitance of 30 μF. Find its capacitive reactance for frequencies of 25 and 50 Hz. Find in each case the current if the supply voltage is 440 V. [8+7]

4.a) Draw the phasor and wave diagram for voltage and current in an R–L series circuit connected with sinusoidal excitation.

b) A non-inductive resistance of 10 Ω is connected in series with an inductive coil across 200 V, 50 Hz AC supply. The current drawn by the series combination is 10 A. The resistance of the coil is 2 Ω. Determine (i) inductance of the coil, and (ii) voltage across the coil. (figure 2). [8+7]

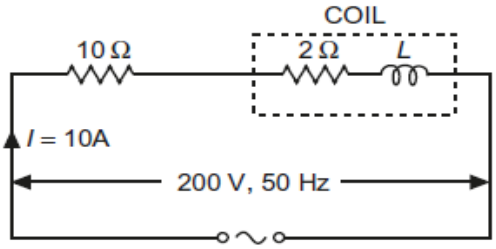

Figure: 2

5.a) Explain the construction and working principle of a transformer and derive its emf equation.

b) A 25 kVA transformer has 500 turns on the primary and 40 turns on the secondary winding. The primary is connected to 3000 V, 50 Hz mains, calculate (i) primary and secondary currents at full load, (ii) the secondary emf, and (iii) the maximum flux in the core. Neglect magnetic leakage, resistance of the winding and the primary no-load current in relation to the full-load current. [8+7]

6.a) Draw and explain the equivalent circuit of a loaded Single – Phase transformer from different tests.

b) List and explain the various losses that occur in a Single – Phase transformer. [9+6]

7.a) Explain the working principle of 3-phase induction motor.

b) Calculate the voltage induced in the armature winding of a 4-pole, wave wound DC machine having 500 conductors and running at 1,000 rpm. The flux per pole is 30 mWb. [8+7]

8.a) Explain the various methods of providing controlling torque in indicating instruments.

b) Explain with neat sketches the principle, construction, and working of moving iron repulsion-type instruments. [7+8]

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