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B. Tech. (ME) Evening **FIRST SEMESTER**

SUPPLIMENTARY EXAMINATION **(FEB-2019)**

CEE 105 ELECTRICAL TECHNOLOGY

Time: 3 Hours ***Max. Marks: 40***

Note: Answer five questions. Question No. 1 is compulsory. Each question carry equal marks. Assume the missing data suitably (if any).

1. State true and false. Also, justify your answer with the help of suitable example/diagram (if any). **[8x1=8]**

(a) The superposition theorem is applicable for linear and non-linear circuits.

(b) The value peak factor can be determined with the help of peak value and average value of an alternating quantity.

(c) In series resonance, the frequency corresponding to maximum value of current is known as resonant frequency.

(d) If the copper and core losses in a transformer at half load is 50 W and 30 W respectively, then the copper loss and core loss at full load would be 100 W and 30 W respectively.

(e) The distribution transformers are designed for approximately 100% efficiency.

(f) An incandescent lamp of 100 W is operated for 10 hours/day. The energy consumed in 1 month will be 3 kWh.

(g) In three phase star connected system, the reactive power can be calculated using $3V_PI_P \cos\theta$

(h) The slip of three phase induction motor is determined using the relation $(N_s - N_r)/N_s$.

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2 (a) State and explain maximum power transfer theorem. Derive the condition of maximum power transfer. Also write down the applications of maximum power transfer theorem. [4]

(b) State and explain Thevenin's theorem. Determine the current in 25 Ω resistance of the network shown in Fig. 1. using Thevenin's theorem. [4]

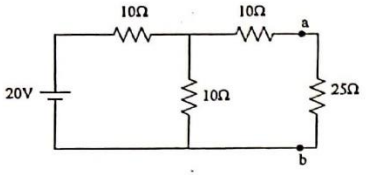

Fig. 1.

3 (a) Find the impedance, power factor and current in each branch of the network shown in Fig. 2. [4]

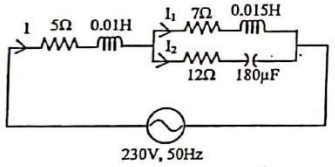

Fig. 2.

(b) A coil having a resistance of 8 Ω and an inductance of 0.05 H is connected across a 230 V, 50 Hz supply. Calculate the current, phase angle, apparent power, active and reactive power. [4]

4 (a) In a three phase, 4 wire system as shown in Fig. 3, the line voltage is 415 V and non-inductive load of 10 kW, 8 kW and 5 kW are connected between the three-line conductors and neutral. Calculate (i) the current in each line (ii) the current in the neutral conductor [4]

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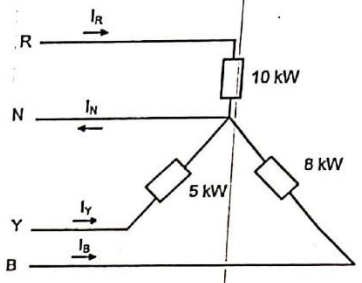

Fig. 3.

(b) Derive the relation between phase and line voltages, and phase and line currents for balanced three phase load when (i) star connected (ii) delta connected. [4]

5 (a) The primary and secondary windings of a 500-kVA transformer have a resistance of 0.42 Ω and 0.0019 Ω respectively. The primary and secondary voltages are 11000 V and 400 V respectively and the core loss is 2.9 kW, assuming the power factor of the load to be 0.8. Calculate the efficiency at full load and half load. [4]

(b) With the help of phasor diagram, derive the expression for approximate voltage regulation of a transformer at lagging power factor. Also draw the equivalent circuit of transformer. [4]

6 (a) With the help of neat diagram, explain the working principle of three phase induction motor? [4]

(b) With the help of neat diagram, draw and explain torque-slip characteristics three phase induction motor? Also, discuss its significance. [4]

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