F.E. Sem.I (CBGS) EEE / 20-12-2016

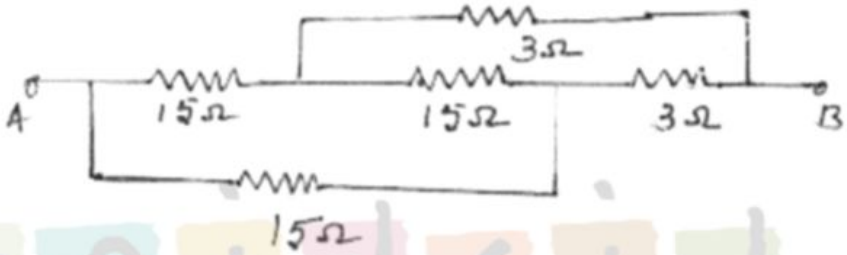
Basic Electrical & Electronics Engg.

Q.P. Code : 529500

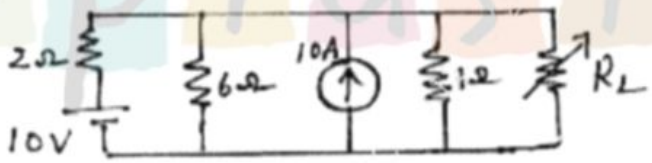
(3 Hours) **[Total Marks : 80**

N.B. : (1) Question No.1 is compulsory.
(2) **Answer** any **three** from the remaining **five** questions.
(3) Assumption made should be clearly stated.
(4) Answer to questions should be grouped together and written together.

1. a) Find equivalent resistance across the terminal AB. 3



b) Find load resistance which dissipate maximum power. 3



c) Find the rms value of a sinusoidal waveform. 3

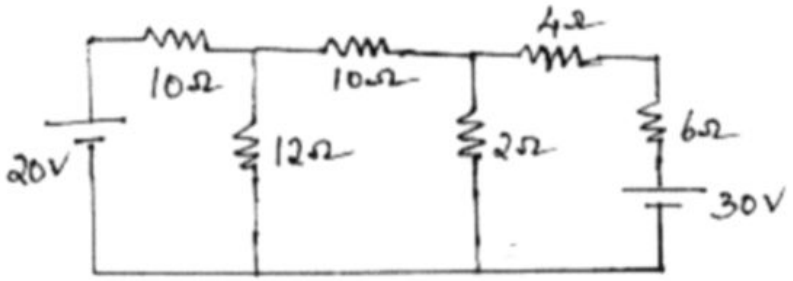
d) Draw resonance graph and write any four conditions of series resonance. 3

e) Write equations for three phase active power and reactive power along with its units. 2

f) Derive the conditions for maximum efficiency of a single phase transformer. 4

g) Draw the input and output voltage waveform of a half wave rectifier. 2

2. a) Using Mesh analysis find current through 2 Ω resistor. 6



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b) The impedances (12) Ω and (10 -j20)Ω are connected in parallel and current through 12 Ω is 10<0. Determine current through other branch, total current and kVA, kVAR, kW and power factor of the whole circuit. 8

c) Draw phasor diagram of a single phase transformer connected to a inductive load. 6

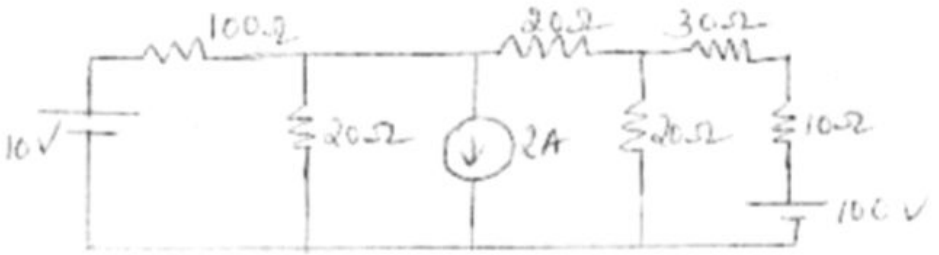
3. a) In a delta connected load each phase consists of a resistance of 100 Ω in series with a capacitor of capacitance 31.8 μF. When it is connected to a 400 V , three phase 50 Hz supply calculate
i) the line current ii) Power factor iii) The power absorbed and iv) total kVA 8

b) A 50 kVA, 2200/220 V, 50 Hz single phase transformer gave the following test results. 6
Open circuit test(H.V side): 2200 V, 0.5 A, 1000 W
Short circuit test(H.V side): 100 V, 20 A, 500 W
Determine i) Half load efficiency at 0.8 pf lagging and
ii) KV A at which maximum efficiency occurs and maximum efficiency at unity power factor.

c) With neat circuit diagram and characteristics explain the input and output characteristics of a CE transistor configuration. 4

d) Draw the circuit diagram and output voltage waveform of a full wave bridge rectifier with capacitor filter. 2

4. a) Find current through 10 Ω using source transformation. 7

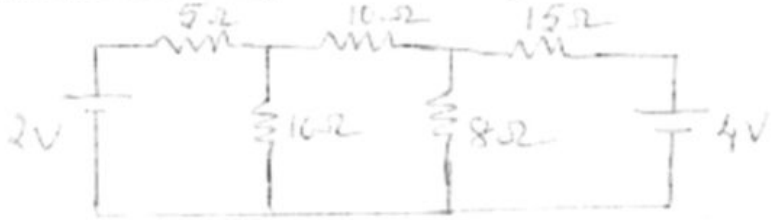


b) A balanced three phase star connected load has an impedance of 50< 60 Ω each phase connected across a three phase 1100 V, 50 Hz supply. Two watt meters are used to measure power. Find the reading of each wattmeter. 4

c) An alternating current of frequency 50 Hz has a maximum value of 12 A. Write down instantaneous current eauation. Find the value of current after 2.77 ms. Also find time taken to reach 9.6 A for the first time. 5

d) Derive rectification efficiency and ripple factor of a full wave centre tapped rectifier. 4

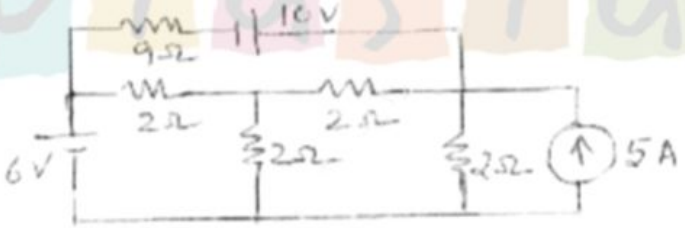
5. a) Calculate the current through 5 Ω resistor using Thevenin's theorem. 8



b) For an RL circuit prove that average power over one complete cycle is $V_{rms} I_{rms} \cos\emptyset$. 4

c) A 12 kVA, 400/200 V single phase 50 Hz transformer has maximum efficiency of 95 % at 85 % of full load at unity power factor. Determine the efficiency at full load at 0.8 power factor lagging. 8

6. a) Find current through 9Ω resistor using superposition theorem. 7



b) A series RLC circuit has the following parameter values R=10 Ω , L=0.01H, C=100 μH. Compute the resonant frequency, Q factor of the circuit, band width, lower and upper cut off frequency. 7

c) Prove that the power and power factor in a balanced three phase circuit can be calculated from the reading of two watt meters. Draw relevant connections and phasor diagram. 6
