

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 199213

Roll No.

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**B.Tech.**

**(SEM. II) THEORY EXAMINATION 2013-14**

**ELECTRICAL ENGG.**

*Time : 3 Hours*

*Total Marks : 100*

**Note :- Attempt all Sections.**

**SECTION—A**

1. Attempt all parts :

**(10×2=20)**

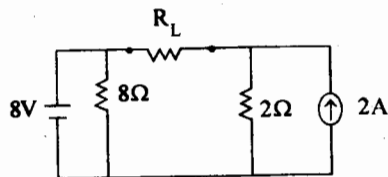
- (a) What do you understand by unilateral and bilateral elements ? Give examples.
- (b) Write the values of internal resistance of ideal voltage and ideal current sources ? Is it possible to convert an ideal voltage into ideal current source ?
- (c) Prove that the average power consumption in a pure inductor is zero when ac voltage is applied.
- (d) Why is the series resonance called the voltage resonance ?

- (e) A 3-phase balanced load draws 10 kW power from a 400V, 3-phase, 50 Hz, 4-wire supply at 0.8 lagging power factor. Determine Line Current.
- (f) Indicate the various quantities that can be measured with a multimeter.
- (g) What is meant by leakage and fringing ?
- (h) Why transformer is not used on dc ?
- (i) Write down the applications of Synchronous Motor.
- (j) A 3-phase slip-ring, 4 pole induction motor has a rotor frequency of 2Hz while connected to 400 V, 3-phase, 50 Hz supply. Determine rotor speed.

### SECTION—B

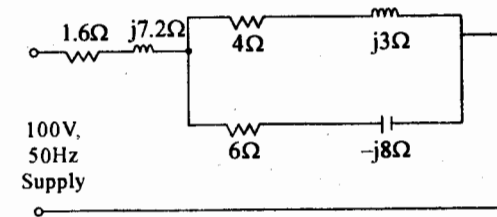
2. Attempt any **three** parts : (10×3=30)

- (a) State and prove maximum power transfer theorem. Using this theorem find the value of Load Resistance  $R_L$  for maximum power flow through it and value of maximum power also in the figure :



(b) Determine the following in the circuit show in figure.

- Admittance of each parallel branch
- Total Circuit impedance.
- Supply Current and Power Factor
- Total Power Supplied.



- (c) Derive and explain the two wattmeter method of measurement of three phase power for a balanced star connected load. Give the expression for power factor along with relevant phasor diagram and show variations in readings for different power factors of loads from Unity to Zero.
- (d) A 25 kVA, 2000/200V transformer has full Load Copper and Iron Losses of 1.8 kW and 1.5 kW respectively. Calculate :

- (i) The efficiency at half the rated kVA and at unity power factor.
- (ii) The efficiency at Full Load and at 0.8 power factor lagging.
- (iii) KVA load for maximum efficiency and value of maximum efficiency.

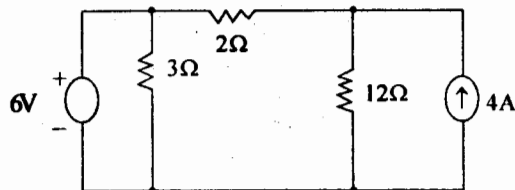
- (e) Discuss why single-phase induction motors do not have starting torque. Explain its principle of operation and various methods of starting.

### SECTION—C

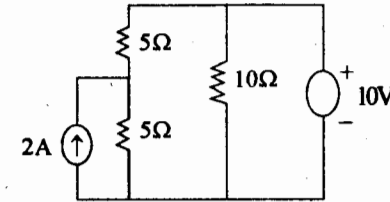
Note :— Attempt all questions in this Section. (10×5=50)

3. Attempt any two parts :

- (a) Calculate currents in all the resistances of the Circuit using node analysis method.



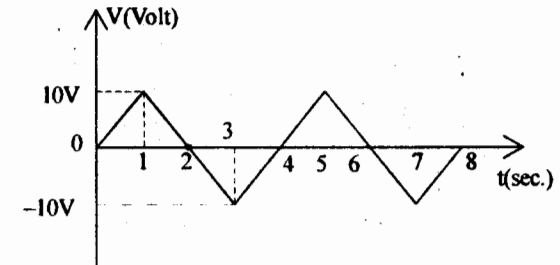
- (b) Using Superposition Theorem. Find the current flowing through each branch in figure.



- (c) Derive expressions for converting a delta network to a star equivalent network.

4. Attempt any two parts :

- (a) Calculate average value and rms value of the given wave form :



- (b) A non inductive resistance of  $10\Omega$  is connected in series with an inductive coil across 200V, 50 Hz ac supply. The current drawn by the series combination is 10A. The resistance of the coil is  $2\Omega$ . Determine
  - (i) Inductance of the coil

- (ii) Power factor
  - (iii) Voltage across the coil.
  - (c) For an LCR series circuit, derive an expression for resonant frequency, bandwidth and quality factor.
5. Attempt any **one** part :
- (a) Derive the relationship between line current, phase current, line voltage and phase voltage in a 3-phase delta connected circuit. A balanced 3-phase star connected load of 18 kW taking a leading current of 60 Amperes when connected across a 3-phase 440 V, 50 Hz Supply. Find the values and nature of Load.
  - (b) (i) Discuss the construction and working principle of PMMC type measuring instruments.
  - (ii) Using a suitable diagram explain the working principle of a multimeter. Also write its various applications.
6. Attempt any **two** parts :
- (a) Describe the analogies that can be made between electric and magnetic circuit.
  - (b) Draw the general layout of an electrical power system and explain briefly.

- (c) Describe the working of an auto-transformer. How does it differ from conventional two-winding transformer, state its application ?
7. Attempt any **two** parts :
- (a) Draw and explain the torque-slip characteristics of a 3-phase induction motor. What will happen if rotor resistance of motor changes ?
  - (b) Write the working principle of Synchronous Motor. State the differences between Synchronous and Induction Motor.
  - (c) A dc shunt machine connected to 230 V supply has resistance of armature as  $0.115\Omega$  and of field winding as  $115\Omega$ . Find the ratio of the speed of generator to the speed of motor with the line current in each case being 100 A.