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

PAPER ID : 199213 Roll No. | | | | | | | | | | |

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 ?

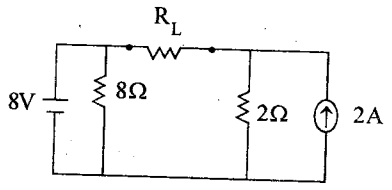
(i) Write down the applications of Synchronous Motor.

(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 :



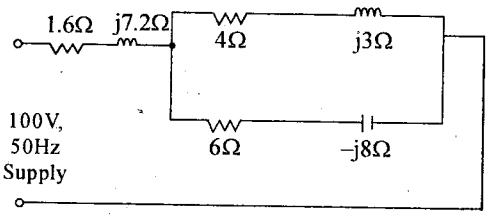
(b) Determine the following in the circuit show in figure.

(i) Admittance of each parallel branch

(ii) Total Circuit impedance.

(iii) Supply Current and Power Factor

(iv) 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.

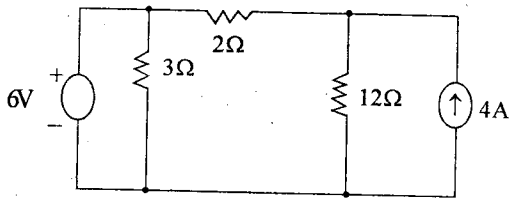
(e) Discuss why single-phase induction motors do not have starting torque. Explain its principle of operation and various methods of starting.

SECTION—C

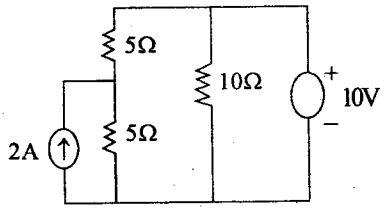
Note :— Attempt **all** questions in this Section. **(10×5=50)**

3. Attempt any **two** parts :

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



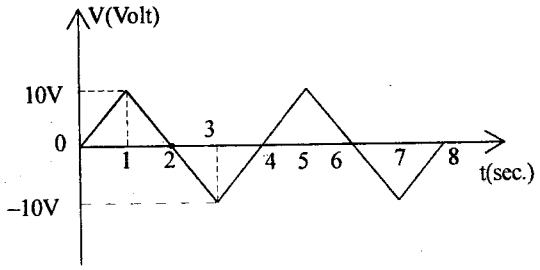
(b) Using Superposition Theorem. Find the current flowing through each branch in figure.



(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 10Ω 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 2Ω. 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 an 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 0.115Ω and of field winding as 115Ω. Find the ratio of the speed of generator to the speed of motor with the line current in each case being 100 A.