



Code No. : 5438/N

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/CSE) II Semester (New) (Main) Examination, May/June 2012

ELECTRICAL CIRCUITS AND MACHINES

Time : 3 Hours]

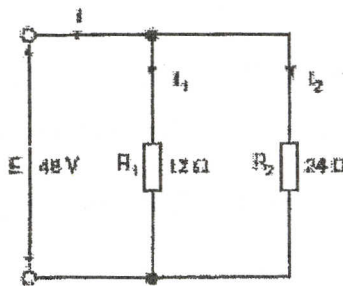
[Max. Marks : 75

**Note :** Answer *all* questions from Part A, Answer *any five* questions from Part B.

PART – A

25

1. Define frequency and time period for sinusoidal source. 2
2. For the circuit shown below calculate currents  $I$ ,  $I_1$  and  $I_2$ . 3



3. Draw vector diagram of 1-phase transformer for a lagging pf load. 3
4. Why transformer rating is in KVA ? 2
5. What are the functions of commutator in a DC machine ? 2
6. Draw the speed-torque characteristics of DC shunt and series motors. 3
7. A balanced three-phase 50 Hz voltage is applied to a 3 phase, 4 pole, induction motor. When the motor is delivering rated output, the slip is found to be 0.05 ? Calculate speed of the rotor m.m.f. relative to the rotor structure. 3
8. Mention the various types of 3-phase induction motors. 2
9. Compare conventional DC motor and brushless DC motor. 3
10. How the speed of the rotor can be reversed for single phase split phase motor ? 2



## PART – B

50

11. A resistance of  $25\Omega$ , inductance of  $0.02\text{ H}$  and capacitance of  $120\ \mu\text{F}$  are connected in series and are fed from a  $220\text{ V}$ ,  $50\text{ Hz}$  supply. Determine inductive reactance, capacitive reactance, impedance, current, active power, reactive power and power factor. Also draw the phasor diagram. 10
12. a) A  $25\text{ KVA}$  transformer has  $500$  turns on the primary and  $50$  turns on the secondary winding. The primary is connected to  $3000\text{ V}$ ,  $50\text{ Hz}$  supply. Find the full load primary and secondary currents, the secondary emf and maximum flux in the core. 5
- b) Explain the two-wattmeter method for measuring 3 phase power with neat circuit diagram. 5
13. a) Explain the speed control of DC shunt motor with neat circuit diagrams. 5
- b) Explain with neat circuit diagrams for various types of excitations for DC generators. 5
14. a) Explain the principle operation of 3-phase induction motor. 5
- b) Explain various methods of starting of 3-phase induction motors. 5
15. a) Explain the constructional details and principle operation of brushless DC motor. 5
- b) Explain the principle operation of stepper motor. 5
16. For a  $4\text{ KVA}$ ,  $200/400\text{ V}$ ,  $50\text{ Hz}$ , 1 – phase transformer, calculate the efficiency, voltage at the secondary terminals and primary input current when supplying a full-load secondary current at  $0.8$  lagging power factor.
- The following are the test results :
- Open circuit with  $200\text{ V}$  applied to the L.V. side :  $0.8\text{ A}$ ,  $70\text{ W}$ .
- Short circuit with  $20\text{ V}$  applied to the H.V. side :  $10\text{ A}$ ,  $60\text{ W}$ . 10
17. Write short notes on the following :
- a) Energy stored in the inductor
- b) Losses of DC machines
- c) 1-phase capacitor start induction motor. (4+2+4)