

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/AE) First Semester (Supplementary) Examination, June/July 2011

ELECTRICAL CIRCUITS & MACHINES

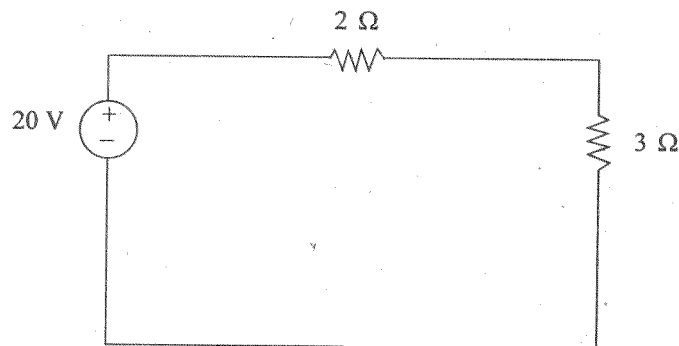
Time : Three Hours]

[Maximum Marks : 75

Note :— Answer ALL questions from Part A. Answer any FIVE questions from Part B.

PART—A (Marks : 25)

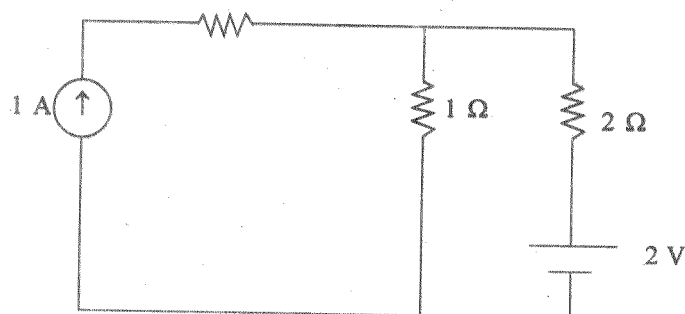
1. For the figure shown below calculate power observed by the circuit : 3



2. Define form factor for sinusoidal voltage. 2
3. Define voltage regulation for a single phase transformer. 2
4. Compare line and phase voltages and currents of star and delta connections. 3
5. Explain production of emf in a dc generator. 3
6. Mention various types of excitation for a d.c. machine. 2
7. Mention various methods of starting of 3-phase induction motor. 2
8. A 6-pole 3-phase induction motor is supplied by a 10-pole alternator which is driven at 600 rpm. If motor is running at 970 rpm, calculate slip. 3
9. Mention the applications of capacitor run motor. 2
10. Differentiate brushless d.c. motor and conventional d.c. motor. 3

## PART—B (Marks : 50)

11. (a)



For the circuit shown above calculate current flow in  $2\ \Omega$  resistor by using Norton's theorem.

- (b) Derive expression for energy stored in capacitor and inductor. 5
12. Explain OC and SC tests conducted on single phase transformer with help of neat circuit diagrams and determine how equivalent circuit, efficiency and regulation can be determined from these tests. 10
13. (a) Derive emf equation of a D.C. machine. 5  
 (b) Explain speed control methods of D.C. motors in brief. 5
14. (a) Explain principle and operation of a 3-phase induction motor. 5  
 (b) A 3-phase, 50 Hz, 3-phase induction motor draws 60 kW from the mains. If the stator losses are 2.5 kW and rotor emf is observed to make 100 complete oscillations per minute, calculate (i) rotor copper loss (ii) gross mechanical output. 5
15. Explain principle and operation of following motors with neat diagrams :  
 (a) Stepper motor.  
 (b) 1-phase split phase motor. 10
16. (a) The power input to a 2000 V, 50 Hz, 3-phase motor running on full load at an efficiency of 90% is measured by two wattmeters which indicates 300 kW and 100 kW respectively. Calculate : (i) Input (ii) p.f. (iii) line current. 5  
 (b) Explain various characteristics of d.c. shunt and series motors. 5
17. Write short notes on the following :—  
 (a) Dot convention  
 (b) Auto-transformer  
 (c) Losses and efficiency of D.C. machine. 3+4+3