

**FACULTY OF INFORMATICS****B.E. 2/4 (IT) I-Semester (Suppl) Examination, June 2013****Subject : Electrical Circuits and Machines****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions of Part - A and answer any five questions from Part-B.****PART – A (25 Marks)**

1. What is the apparent power if the active and reactive powers are P and Q respectively? (2)
2. Obtain the form factor of a sinusoidal voltage. (3)
3. How are its phase and line voltages related in a balanced three-phase star and delta connections? (3)
4. Draw the no-load equivalent circuit of a single phase transformer and explain the significance of each parameter. (3)
5. Show the external characteristic of a shunt generator. (2)
6. Draw the speed torque characteristics of a separately excited dc motor with voltage control. (2)
7. What is the slip of an induction motor of a 4-pole, 50Hz running at a speed of 1425 rpm? (2)
8. Sketch torque speed characteristics of a three-phase induction motor with voltage control. Consider rated and half the rated voltage. (3)
9. What do you understand by synchronous impedance of an alternator? (3)
10. What are the applications of stepper motors? (2)

**PART – B (50 Marks)**

- 11.(a) Explain what you have understood by Thevenin equivalent circuit. (3)  
(b) Show the steady current, voltage, and power waveforms in an inductor conducting cosinusoidal current. Also, show that the average power in the inductor is zero. (7)
12. A balanced Y-connected load having an impedance of  $(72 + j 21)$  ohms per phase is connected in parallel with a balance delta connected load having an impedance of  $150 \angle 0$  ohm per phase. The paralleled loads are fed from a line having an impedance of  $j1$  ohm per phase. The magnitude of the line to neutral voltage of the Y-loads is 7650 V.  
(a) Draw the complete circuit diagram stated above showing all the parameters with their values. (4)  
(b) Calculate the magnitude of the current in the line feeding the loads. (6)
- 13.(a) What are the essential differences between dc motor and dc generator from energy conversion and V-I relations point of view. Show the necessary diagrams. (6)  
(b) List out the different parts of a dc machine. (4)
- 14.(a) Show the per phase stator equivalent and rotor equivalent circuit at any slips S of a three-phase induction motor. (5)  
(b) Neglecting stator losses and no load losses, obtain expressions for air gap power ( $P_{ag}$ ), rotor copper losses and gross mechanical power output. (5)
- 15.(a) Obtain an expression for the EMF induced in an alternator. (5)  
(b) Explain with a neat diagram the operation of a single-phase capacitor start and capacitor run induction motor. Mention its applications. (5)
- 16.(a) Explain the principle of operation of an autotransformers. (3)  
(b) A two winding 10 KVA, 440 / 110V transform is reconnected as step down 550 /440V auto transformer. Calculate  
(i) primary and secondary currents of the two winding transformer  
(ii) Input and output current of autotransformer  
(iii) KVA rating of the autotransformer. (7)
17. Write short notes on the following: (5+5)  
(a) Three-point starts (b) Stepper motor

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