

# Model Question Paper

## FIFTH SEMESTER B. Tech DEGREE EXAMINATION

### (MECHANICAL ENGINEERING BRANCH) ELECTRICAL TECHNOLOGY

#### PART A

##### Answer All Questions

(10 x 4 = 40 marks)

1. What are the conditions for building up of a DC Shunt Generator ?
2. Explain the load characteristics of DC shunt and compound generator?
3. What are the factors determining electromagnetic torque in a DC Motor ?
4. Derive EMF equation of a DC generator ?
5. What are the application of DC shunt and series motors ?
6. What is the difference between maximum efficiency and all day efficiency ?
7. Explain the difference between Squirrel Cage and Slip ring induction motor ?
8. Explain the working of transformer on No load with phasor diagram ?
9. What are the application of synchronous motor ? What do you mean by a Synchronous Condenser ?
10. What do you mean by Regenerative breaking ?

#### PART B

##### Answer Any One of the Following Pairs.

(20x3 = 60marks)

11. a. Describe armature reaction in a DC machine? What are its effects ? (8 marks)  
b. A 250V DC Shunt motor has an armature circuit resistance of  $0.5\Omega$  and field circuit resistance of  $125\Omega$ . It drives a load at 1000 rpm and takes 30A. The field circuit resistance is then slowly increased to  $150\Omega$ . If the flux and field current assumed to be proportional and if the load torque remains constant. Calculate final speed and armature current? (12 marks)
- OR
12. a. Explain the necessity of motor starter ? (4 marks)  
b. Explain one method of testing DC shunt motor ? (4 marks)  
c. The Input to 230 V DC shunt motor is 11KW. Calculate a) torque developed b) efficiency c) speed at this load. The particulars of motor are as follows No load current = 5A No load speed = 1150 rpm, Armature resistance =  $0.5\Omega$ , shunt field resistance =  $110\Omega$ ? (12 marks)
13. a. Derive condition for maximum efficiency of a transformer? (4 marks)  
b. Difference between autotransformer and ordinary transformer ? (4 marks)  
c. A 200 KVA transformer has an efficiency of 98 % at full load. If the maximum efficiency occurs at  $\frac{3}{4}$  of the full load, Calculate a) iron loss at Full load b) Cu loss at Full Load c) Efficiency at half load. Ignore magnetizing current and assume power factor of 0.8 at all loads ? (12 marks)

OR

14. a. Explain the methods of starting of 3 phase induction motors ? (8 marks)  
b. Draw the circle diagram from no load and SC tests of a 3phase 14.92 KW, 400 V, 6 pole induction motor from the following tests (line values).

No – load : 400 V, 11 A, pf 0.2

SC test : 100 V, 25 A, pf 0.4

Rotational Cu losses at stand still is half the total Cu loss? Find a) line current, slip, efficiency and pf at full load b) Maximum torque ? (12 marks)

15. a. "Single phase Induction motor is not self starting" Explain ? (8 marks)  
b. Derive the emf equation of an alternator ? (4 marks)  
c. Explain 'V' curve and inverted 'V' curves of synchronous motor (4 marks)  
d. Compare different types of 1phase induction motors ? (4 marks)

OR

16. a. Draw and Explain the functional schematic of AC electric locomotive? (12 marks)  
b. Explain the different methods of speed control of DC motors ? (8 marks)