

**R16**

Code No: 133AM

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year I Semester Examinations, November/December - 2018****ELECTRICAL MACHINES - I**  
(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

**Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

**PART-A****(25 Marks)**

- 1.a) Why equalizer connection is necessary for the armature winding of a dc machine with lap-winding? [2]  
b) What are the various methods of improving commutation? [3]  
c) What is significance of Back EMF? [2]  
d) Draw the torque-current characteristics of dc compound motors. [3]  
e) Hopkinson's test is also called a regenerative test. Justify? [2]  
f) What are the advantages and disadvantages of Hopkinson's Test? [3]  
g) Draw the exact equivalent circuit of a Transformer. [2]  
h) What is stacking factor? What is its approximate value? [3]  
i) What are the advantages of auto transformer over two winding transformer? [2]  
j) Why OC-test conduct on LV-side and SC-test conduct on HV-side? [3]

**PART-B****(50 Marks)**

- 2.a) Explain the concept of Armature reaction and how it overcomes.  
b) A dc shunt generator has the following open circuit magnetization curve running at 800 rpm  
Field current (A) : 0    0.5    1.0    2.0    3.0    4.0    5.0  
EMF (V) : 10    50    100    175    220    245    262  
Find graphically the critical resistance of shunt field circuit. If the field resistance is changed to 75 ohms, what will be the critical speed for the machine to build up. [5+5]

**OR**

- 3.a) Distinguish between self excited and separately excited DC Generators. Give the circuit diagrams of Self excited DC Generators and derive the voltage equations.  
b) Derive e.m.f equation of d.c generator. [5+5]  
4.a) Draw and explain the Electrical characteristics of DC series and shunt motor.  
b) Derive the expression for the speed of a dc motor in terms of back emf and flux per pole. [5+5]

**OR**

- 5.a) Explain with a neat sketch, the function of a 3-point starter.  
b) A dc shunt motor takes 1.5A on no-load when connected to 250V mains with an armature resistance of  $1.0\Omega$  when the field current is 0.5A. Determine the load current corresponding to maximum efficiency. [5+5]

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- 6.a) Explain the procedure to separate the stray losses in a DC Motor.  
b) Hopkinson's test on two similar DC shunt machines gave the following data:  
Line voltage 230V, line current excluding both the field currents is 40A, motor armature current 350A, field currents 5A and 4.2A. Calculate the efficiency of each machine. Armature resistance of each machine is  $0.02\Omega$ . [5+5]

**OR**

7. With a neat sketch, explain the procedure of Swinburne's test? Mention its advantages and disadvantages. [10]

8. Discuss the working principle of single phase Transformer and also explain the constructional details. [10]

**OR**

- 9.a) Explain why hysteresis and eddy current losses occur in a transformer. What are the methods to reduce these losses?  
b) Draw and explain the phasor diagram of single phase transformer on load considering winding resistance. [5+5]

10. Derive the equations for the currents supplied by each transformer when two transformers are operating in parallel with equal and unequal voltage ratios. [10]

**OR**

- 11.a) What is auto transformer? Explain the working principle of auto transformer.  
b) What are the advantages of poly phase transformers? Give different configurations. [5+5]

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