

**Code No: 133AM****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year I Semester Examinations, May/June - 2019****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) What is multiplex winding? [2]
- b) What is the purpose of laminating the armature? [3]
- c) Define Back EMF. [2]
- d) How commutation takes place in DC motor? [3]
- e) What is the purpose of conducting brake test? [2]
- f) What are the limitations of field's test? [3]
- g) What is the effect of variation of supply voltage on iron losses? [2]
- h) How to minimize hysteresis loss? [3]
- i) What is an auto transformer? [2]
- j) Write short notes on open delta connection in case of a 3-phase transformer connection. [3]

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

- 2.a) Explain the constructional features of DC generator in detail.
- b) A 4-pole generator has a wave-wound armature with 722 conductors, and it delivers 100 A on full load. If the brush lead is  $8^\circ$  calculate the armature demagnetizing and cross magnetizing ampere turns per pole. [5+5]

**OR**

- 3.a) Derive the expression for demagnetizing AT/pole.
  - b) Draw a developed diagram of 2 layer lap winding for a 4 pole DC generator with 16 coils. [5+5]
- 4.a) Explain the principle of operation of DC motor in detail.
  - b) A 200 V d.c shunt motor with an armature resistance of  $0.3\Omega$  is excited to give constant main field. At full load the motor runs at 600 rpm and takes an armature current of 30 A. If a resistance of  $1\Omega$  is placed in the armature circuit, find the speeds at full load torque and double full load torque. [5+5]

**OR**

- 5.a) With the help of neat sketch, explain the working of 3 point starter.
- b) A 200V DC shunt motor runs at 600 rpm when the armature current is 30A. Calculate the speed if the torque is doubled. Given that  $R_a = 0.18\Omega$ . [5+5]

- 6.a) Explain the procedure of conducting brake test on d.c. machine with a neat circuit diagram.  
b) With the help of neat sketch, explain about swinburne's test. [5+5]

**OR**

- 7.a) Explain in detail about the purpose of conducting various tests on DC machines.  
b) With the help of neat sketch, explain the Hopkinson's test. [5+5]
- 8.a) Draw the equivalent circuit of single phase transformer and explain.  
b) A 8 KVA, single phase transformer has a turns ratio of 8:3 and is supplied from a 2.0 KV supply. Neglecting Losses, determine (i) Primary current (ii) The full load secondary current (iii) The secondary Voltage. [5+5]

**OR**

- 9.a) Define all day efficiency? Derive the expression.  
b) The percentage resistance and percentage leakage reactance of a 5 kVA, 500 V/ 1000 V, 50 Hz., single phase transformer are respectively 3% and 4%. Calculate the voltage to be applied to the HV side to carry out short circuit test at rated current and also calculate the voltage to be applied to the LV side to carry out short circuit test at half the rated current. [5+5]
- 10.a) A 5KVA, 1000/200 V, 50 Hz single phase transformer gave the following test results:  
Open circuit test (LV side): 200 V, 1.2 A, 90 W  
Short circuit test (HV side): 50 V, 5 A, 110 W.  
Compute the parameters of approximate equivalent circuit referred to LV side.  
b) With the help of neat sketch, explain in detail about parallel operation of single phase transformers. [5+5]

**OR**

- 11.a) Three number of single phase ideal transformers, each of rating 5 kVA, 200V/100V, 50 Hz is connected in star/delta fashion to supply a balanced three phase 10 kW, 0.8 power factor load at 100 V (line to line). Calculate line and phase currents on the secondary and primary sides.  
b) Give the comparison of autotransformer with two winding transformer on various aspects. [5+5]

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