

Code No: 153AQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, October - 2020

ELECTRICAL MACHINES-1
(Electrical and Electronics Engineering)

Time: 2 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

- 1.a) Explain the following terms as applied to a DC armature winding.
i) Front Pitch ii) Back Pitch iii) Pole pitch iv) Commutator Pitch
- b) A 50 KW, 500 V, 4 – pole generator has a 2 layer simplex lap winding in 36 slots with 10 conductors in each layer. If the brushes are given an actual lead of 10° , calculate:
i) Demagnetizing AT / pole ii) Cross – magnetizing AT / Pole. iii) Number of turns per pole on the compensating winding if the pole arc to pitch is 0.8 and brushes are placed on geometric neutral plane. [6+9]
- 2.a) Sketch and explain the load characteristics of the following types of DC Generators:
i) Series Generator ii) Differentially compounded generator.
- b) The external characteristic of a series generator from zero to 70 V at 350 A is a straight line. This generator is connected as a booster between a station bus – bar and a feeder of 0.35Ω resistance. Find the voltage between the bus-bar and far end of the feeder at a current of 200 A. [8+7]
- 3.a) Derive an expression for the torque of a DC Motor.
- b) A 250V DC Shunt motor has an armature resistance of 0.5Ω and a field resistance of 250Ω . When driving a constant torque load at 600 rpm, the motor draws 21 A. What will be the new speed of the motor if an additional 250Ω resistance is inserted in the field circuit? [8+7]
- 4.a) Derive the condition for maximum efficiency of a DC Motor.
- b) A 500 V series motor takes a current of 200A to develop 89.52 KW. The armature resistance is 0.1Ω and series field resistance is 0.05Ω . If the output is reduced to 44.76 KW, find the input current and efficiency. [8+7]
5. A 210 V shunt motor develops 18 KW when taking 21 KW. The field resistance is 60Ω and armature resistance 0.05Ω . What is the efficiency and power input when the output is 8 KW? [15]
6. What is Hopkinson's test and why is it called regenerative test? Draw and explain the connection diagram to conduct this test. [15]
- 7.a) Distinguish between a core type and a shell type transformer.
- b) Draw and explain the equivalent circuit of a Transformer. [7+8]
8. Explain the significance and procedure of a Sumpner's test and draw the necessary connection diagram for it and how it is different from OC and SC test. [15]