

R18

Code No: 153AQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2021

ELECTRICAL MACHINES - I

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

- 1.a) Explain the working principle of DC generator in detail.
b) The OCC of a separately excited DC generator driven at 600 rpm is as follows

| | | | | | | | | |
|-------------------|------|------|------|------|------|------|------|------|
| Field current (A) | 0.2 | 0.4 | 0.6 | 0.8 | 1.0 | 1.2 | 1.4 | 1.6 |
| EMF (V) | 16.0 | 31.0 | 40.0 | 48.0 | 51.0 | 55.0 | 60.0 | 62.0 |

If the machine is connected as shunt generator and driven at 600 rpm and has a field resistance of 100Ω , find the open circuit voltage and exciting current. [7+8]

- 2.a) Explain the differences between self and separately excited DC generators.
b) Draw a developed diagram of 2 layer wave winding for a 8 pole DC generator with 60 armature conductors. [7+8]
- 3.a) Derive the condition for maximum efficiency in a DC shunt motor.
b) A 150V DC shunt motor with armature resistance of 0.3Ω runs at 500 rpm at full load and takes an armature current of 12A. if the resistance of 2.5Ω is placed in the armature circuit, find the speeds at full load torque and half full load torques. [7+8]
- 4.a) Discuss in detail about the applications of DC compound motors.
b) A 100V DC shunt motor runs at 1000 rpm at no load and takes 10A. The total armature and shunt field resistances are given by 0.25Ω and 250Ω respectively. Calculate the speed when loaded and taking 40A. Assume the flux to be constant. [7+8]
- 5.a) How to separate stray losses in DC motors? Explain.
b) Discuss in detail about Field's test with necessary equations. [7+8]
- 6.a) Draw the phasor diagram of single phase transformer under leading power factor conditions and explain.
b) A 2000/100 V transformer draws a no-load primary current of 0.5A and absorbs 100 watts. Find the magnetizing and iron loss currents. [7+8]
- 7.a) Explain in detail about Sumpner's test on transformers.
b) A 10kVA, 2000/200V, single-phase transformer gave the following test results:
Open-circuit test: 200V, 0.9A, 50W
Short-circuit test: 70V, 5A, 45W
Calculate the efficiency at half-load and full-load at 0.8 p.f. [7+8]
8. Explain the procedure of conducting swinburne's test as d.c. machine. [15]

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