

Code No: 133AM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, October - 2020

ELECTRICAL MACHINES – I

(Electrical and Electronics Engineering)

Time: 2 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

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- 1.a) Define residual flux and coercive force. Explain how self-excited generator works to develop an emf on its own?
- b) The OCC data of a dc generator when separately excited and driven at 800 rpm is given by
- |                    |    |     |     |      |      |      |      |      |
|--------------------|----|-----|-----|------|------|------|------|------|
| Field amperes (A): | 0  | 0.2 | 0.4 | 0.65 | 1.02 | 1.75 | 3.15 | 5.00 |
| O.C voltage (V):   | 10 | 40  | 80  | 120  | 160  | 200  | 240  | 260  |
- Draw the OCC at 800 rpm and find its critical field resistance at this speed. [7+8]
- 2.a) Draw and explain external characteristics of dc cumulative compound generators.
- b) In a DC compound generator, the resistance of the armature, shunt field, series field resistances are 0.06 ohm, 25 ohms and 0.04 ohms respectively. The load consists of 200 lamps each rated at 55W at 110V, find the total emf generated and the armature current when the machine is connected in short shunt mode. Also find the total power generated by the armature. [8+7]
- 3.a) Explain the significance of counter emf that appear in dc motors.
- b) A 440V DC shunt motor is running at 1500rpm and it takes a line current of 30A. The output is 15HP. The load torque varies as the square of speed. Calculate the resistance to be connected in series with the armature for reducing the motor speed to 1300rpm. [7+8]
4. Mention the factors affecting the speed of a DC motor. Explain different methods of speed control? List out its limitations. [15]
5. Explain the procedure to determine the efficiency of dc shunt machine using Swinburne's test. List the limitations of this test. [15]
6. Why is Hopkinson's test called as regenerative test? With neat diagram explain how the efficiency of dc machines can be determined using Hopkinson's test. [15]
- 7.a) Distinguish between all-day efficiency and power efficiency of transformers.
- b) Find All-day efficiency of 500kVA distribution transformer whose copper loss and iron loss at full-load are 4.5 kW and 3.5kW respectively. During a day of 24 hours, it is loaded as under. [6+9]

No. of hours	Loading in kW	Power factor
6	400	0.8
10	300	0.75
4	100	0.8
4	0	-

- 8.a) Describe Auto-transformer in brief with neat diagram.
- b) In a transformer, the core loss is found to be 52W at 40Hz and 90W at 60Hz measured at same flux density. Calculate the hysteresis and eddy current losses at 50Hz. [8+7]

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