

Code No: 124AB

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, July/August - 2021

ELECTRICAL MACHINES – II

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

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- 1.a) In what conditions the magnetizing branch of equivalent circuit of a transformer is not neglected? Obtain the equivalent circuit of a 1- $\phi$  transformer.  
b) Define all day efficiency. Give its significance. [9+6]
- 2.a) The primary of a certain transformer takes 1 A at a power factor of 0.4 on load with 230 V, 50 Hz supply. The number of turns on the primary is twice that of secondary. A load taking 50 A at 0.8 lagging power factor is now connected across the secondary. Sketch and explain briefly the phasor diagram of this condition? Neglecting the voltage drops in the transformer.  
b) The primary and secondary windings of 100 kVA transformer have the resistances of  $0.42 \Omega$  and  $0.0015 \Omega$  respectively. The primary and secondary voltages are 11 kV and 400 V respectively and core loss is 1.9 kW. Assuming the power factor of the load to be 0.7 lagging calculate efficiency on (i) full load and (ii) half full load. [8+7]
- 3.a) Describe the equations for the determination of regulation of transformer using sumpner's test.  
b) A 100 kVA, 11000/400V, single phase transformer gave the following test results. Open – circuit test: 400V, 5A, 0.70 kW, Short – circuit test: 250V, rated current, 1.8 kW. Calculate the equivalent circuit parameters referred to the h.v side? [8+7]
- 4.a) Derive the expressions for load shared by two transformers in parallel when no-load voltages of these transformers are not equal.  
b) Two similar 200 kVA, 1-phase transformers gave the following results when tested by back-to-back method:  $W_1$  in the supply line, 4kW,  $W_2$  in the primary series circuit, when full-load current circulated through the secondaries, 6 kW. Calculate the efficiency of each transformer. [8+7]
5. Explain with the help of connection and phasor diagrams, how Scott connection is used to obtain two-phase supply from 3-phase supply mains. [15]
- 6.a) For what purpose tertiary windings used on 3-phase transformers? Explain how they can assist in unbalanced loading condition if suitably connected.  
b) What are distinguishing features of Y-Y and Y- $\Delta$ , three phase connections? [8+7]
- 7.a) Explain the phenomenon of cogging and crawling in 3-phase induction motor in brief.  
b) A squirrel-cage induction motor has a slip of 4% at full load, its starting current is five times the full-load current. The stator impedance and magnetizing current may be neglected; the rotor resistance is assumed constant. Calculate the maximum torque and the slip at which it would occur. [8+7]

8. A three phase, 400 V, 50 Hz, 4-pole, delta connected, squirrel cage induction motor has the following data:

No-load: 400 V, 3.0 A, 300 W, at 0.3 p.f

Blocked rotor: 120 V, 7.0 A 500 W, at 0.85 p.f

Draw the circle diagram, determine starting torque, maximum torque and efficiency when the motor works with a slip of 5%. The stator effective resistance per phase is equal to 4  $\Omega$ . [15]

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