JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, June - 2022
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)   Derive e.m.f equation of a 1-ϕ transformer.
  b)   In a test to determine the losses of a 440 V, 50 Hz transformer, the total iron losses were found to be 2500 W at normal frequency and voltage. When the applied voltage and frequency is 220 V and 25 Hz, the iron losses were found to be 850 W. Calculate the eddy current loss at normal voltage and frequency.   [7+8]

2.a)   What is all day efficiency of a transformer? Give its significance.
  b)   Obtain an expression for minimum voltage regulation of a transformer.
  c)   Explain various losses of a transformer.   [5+5+5]

3.a)   In all aspects, Compare auto transformer with two winding transformers.
  b)   The following test results were obtained for a 20 kVA, 50 Hz, 400/240 V distribution transformer:
       OC test(lv side) : 240 V, 1.066 A, 126.6 W
       SC test(hv side) : 57.5 V, 8.34 A, 284 W
       Calculate:
       i) Equivalent circuit parameters when referred to hv side.
       ii) Efficiency of the transformer at half full-load with 0.8 power factor lagging.   [7+8]

4.a)   Explain the operation of Scott connection in poly-phase transformers? List out its applications.
  b)   A star/star/delta (P/S/T) transformer has rated voltages of 11 kV, 1.1 kV and 440 V. There is a balanced load of 500 kVA at 0.8 pf lagging in the secondary and 100 kVA at UPF in the tertiary. Find the primary currents and its power factor.   [7+8]

5.a)   Compare the performance of squirrel cage and phase wound rotor Induction motors.
  b)   In a 6 pole, 3-phase 50 Hz induction motor with star connected rotor, the rotor resistance per phase is 0.3 ohm, the reactance at standstill is 1.5 ohm per phase and an emf between the slip rings on open circuit is 175V. Calculate:
       i) slip at a speed of 960 rpm
       ii) rotor emf per phase
       iii) rotor frequency and reactance at a speed of 950 rpm.   [7+8]

6.a) Explain the crawling and cogging in induction motor.
  b) A 3-phase, 400 V, 5.6kW, 4-pole, 50Hz has a wound rotor, the ratio of primary to secondary turns on rotor is 2.62/1. When running light on 400V, it took a current of 6 amperes at 0.087 power factor, and on standstill with the rotor locked, and an applied voltage of 100V, the current taken was 12A at a power factor of 0.347. The stator resistance/phase is 0.67 Ω and of rotor is 0.185 Ω. Determine:
  i) Ratio of maximum torque to full-load torque
  ii) Maximum power.   [7+8]

7.a) What is Circle diagram of induction motor? Explain how various operating parameters are determined for induction motor?
  b) Explain the operation of a y-Δ starter used in a 3-phase Induction motor.   [8+7]

8.a) Explain the rotor rheostat control of 3-phase slip ring induction motor.
  b) Explain speed control of induction motor with injection of an emf into rotor circuit. [7+8]

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