

Code No: 154AU

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester (Special) Examinations, January/February - 2021

ELECTRICAL MACHINES – II
(Electrical and Electronics Engineering)

Time: 2 Hours

Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks

1. A 50kW, 400V, 3-phase, 6-pole, 50Hz wound rotor induction motor has a full-load slip of 0.04 when operating at rated voltage and frequency with rotor winding short circuited at slip rings. The slip at maximum torque is 0.2. Stator resistance and rotational losses are neglected. Determine: (a) The maximum torque (b) Full-load rotor ohmic losses. [7+8]
2. In a 6-pole, 3-phase, 50Hz motor with star connected rotor, the rotor resistance per phase is 0.3Ω , the reactance at standstill is 1.5Ω per phase, and an e.m.f between the slip rings on open circuit is 175V. Find: (a) slip at a speed of 950 r.p.m (b) Rotor e.m.f per phase (c) Rotor frequency and reactance at a speed of 950 r.p.m. [5+5+5]
3. Explain various speed control methods available for induction motor. [15]
- 4.a) What is cogging in induction motor? Explain clearly.
b) A 3-phase induction motor takes starting current which is 5 times full-load current at normal voltage. Its full-load slip is 4 percent. What auto-transformer would enable the motor to be started with not more than twice the full-load current drawn from the supply? What would be the starting torque under this condition? [7+8]
5. The OCC of a 1800kVA, 6928V, 3 phase 50Hz star connected alternator is given below.

Field current (A)	0	5	10	15	20	25	30	35	40	45
Open circuit voltage per phase	0	1120	2160	3000	3600	4000	4320	4600	4800	4960

- Field current of 25A produces an excitation of 5000AT/pole. The armature leakage reactance per phase is 2.5Ω , the resistance is neglected. The joint phase armature reaction when carrying balanced current of 150A is 2000AT/pole. Calculate the field current required a) to produce rated armature current on short circuit b) to supply rated current at normal voltage at a power factor of 0.86lagging and corresponding regulation. [7+8]
6. Explain about armature reaction in alternators for various types of load power factors. [15]
 7. With the relevant phasor diagrams, describe about effect of excitation on armature current and power factor of synchronous motor. [15]
 8. Explain about double field revolving theory in case of single phase induction motor. [15]

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