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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) Describe the constructional features of both slip ring and squirrel cage induction motor. Discuss the merits of one over the other.
  b) In case of an 8-pole induction motor the supply frequency was 50 Hz and the shaft speed was 735 rpm. Compute (i) Synchronous speed (ii) Slip speed per unit slip (iii) Percentage slip. [8+7]

2.a) Explain the torque-slip characteristics of an induction motor.
  b) Derive the torque equation of an induction motor. Derive the condition for maximum torque. [8+7]

3.a) Derive an expression for e.m.f induced per phase in a 3-phase alternator? Mention how different winding factors affect the induced e.m.f.
  b) The following test results are obtained from a 3 phase, 6000 kVA, 6600V, star connected, 2 pole, 50 Hz turbo alternator: With a field current of 125A, the open circuit voltage is 8000V at the rated speed; with the same field current and rated speed the short circuit current is 800A. At the rated full load, the resistance drop is 3%. Find the regulation of alternator on full load and at a p.f of 0.8 lagging. [8+7]

4.a) Explain the variation of current and power factor of a synchronous motor with excitation.
  b) A 2.3 kV, 3-phase star connected synchronous motor has $Z_s=(0.2+j2.2)$ ohms per phase. The motor is operating at 0.5 power factor leading with a line current of 200 A. Determine the generated e.m.f per phase. [8+7]

5. Describe the construction, working principle, characteristics and applications of a shaded pole motor. [15]

6.a) Explain clearly what is meant by synchronous impedance and synchronous reactance of an alternator and how it can be determined experimentally.
  b) Discuss the advantages of deep bar rotors in an induction motor. [10+5]

7.a) What are the causes of harmonics in the voltage waveform of an alternator? How can these be minimized?
  b) Explain the effect of armature reaction on the performance of an alternator. How it depends on the load power factor? Explain with suitable diagrams. [8+7]

8.a) What are various methods of making synchronous motors self starting? Briefly explain.
  b) List out the applications of synchronous motor. [10+5]

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