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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATION, OCTOBER 2018

B.Tech (ECE,CE) 3rd Semester

Course Code: 10B11EC311 MAX. MARKS: 25
Course Name: Electrical Machine and Instruments
Course Credits: 04 MAX. TIME: 1.5 Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q1. a) Explain how the all-day efficiency differs from the commercial efficiency in case of transformer. For what application of a transformer, the all-day efficiency assumes more importance? (2)

b) Draw and give the explanation of each component in the equivalent circuit of a transformer. (3)

Q2. a) Enumerate the various losses that occur in a dc machine. (2)

b) Explain the relevance of terms "critical resistance" and "critical speed" in dc shunt generator. (2)

Q3 a) Explain the V-curve of synchronous motor. (2)

b) What are various methods of starting a synchronous motor? (2)

c) A three-phase, star connected, 1-MVA, 11-kV alternator has rated current of 50A. The resistance of the winding per phase is 0.45 Ω. The test results are given below:
OC Test: Field current = 120.5 A; Voltage between the lines = 422 V
SC Test: Field current = 120.5 A; Line current = 50 A
Determine the full-load voltage regulation of the alternator for (i) 0.8 power factor leading, and (ii) 0.8 power factor lagging. (4)

Q4 a) Give the reason for the following in induction motor:
(i) The speed of an induction motor can never be the same as the synchronous speed.
(ii) The induction motor can be called a generalized rotating transformer.
(iii) The value of slip corresponding to maximum torque increases with rotor resistance.
(iv) The starting torque increases on increasing the rotor resistance.
(4)

b) A 4-pole induction motor is energized from a 50 Hz supply system. If the machine runs on full-load at 4% slip, determine the running speed and the frequency of the rotor currents. (2)

c) A 6-pole, 3-phase, 50-Hz induction motor with star-connected rotor has the rotor resistance of 0.4 Ω per phase and the rotor standstill reactance of 1.7 Ω per phase. When the motor is at standstill, the emf between the slip-rings on open circuit is 175 V. If the motor runs at a speed of 960 rpm, find (i) the slip, and (ii) the rotor emf per phase. (2)