Printed Pages : 3

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121409

Roll No.

B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15
ELECTRO-MECHANICAL ENERGY CONVERSION - II

Time : 3 Hours]   [Total Marks : 100

Note: (i)   Attempt All questions

(ii)   All questions carry equal marks.

1   Attempt any two parts.   (10×2 = 20)

(a)   Explain E.M.F. equation cf Alternator.

A 3-phase, 50 Hz, 8-pole alternator has astar-connected winding with 120 slots and 8 conductors per slot. The flux per pole is 0.05 Wb, sinusoidally distributed. Determine the phase and line voltages.

(b)   Sketch and explain the open-circuit and short-circuit characteristics of a synchronous machine. How voltage regulation can be calculated by the use of their results.

(c)   Explain the Potier-triangle method of determining the voltage regulation of an alternator.

2   Attempt any two parts.   (10×2=20)

(a)   Explain the two reaction theory applicable to silent-pole synchronous machine.

(b)   Explain starting method of synchronous motor and its working as synchronous condenser.

(c)   Explain hunting of a synchronous machine. What are V-curves of a synchronous motor?

3   Attempt any four parts.   (5×4=20)

(a)   Explain the principle of operation of a 3-phase induction motor.

(b)   A 4-pole, 50 Hz induction motor runs with 4% slip at full load.

What will be the frequency of current induced in the rotor

     (i)   At starting

     (ii)   At full-load

(c)   Develop the equivalent circuit for a 3-phase induction motor.

(d)   Sketch the torque-slip characteristics of a 3-phase induction motor indicating there in the starting torque, maximum torque and the operating region.

(e)   A 6-pole, 50 Hz induction motor runs with 5 percent slip. What is its speed? What is the frequency of the rotor current?

(f)   Explain the voltage build-up of an isolated induction generator.

4   Attempt any two parts.   (10×2=20)

(a)   Explain the phenomenon of crawling and cogging in a 3-phase induction motor.

(b)   Discuss briefly the various methods of speed control of 3phase induction motors.

(c)   If the outer cage has an equivalent impedance of (0.6 + j0.6) ohm and the inner cage an equivalent impedance of (0.1 + j0.8) ohm both at supply frequency, calculate the current and torque in synchronous watts for the two cages at standstill and at 10% slip. The effective standstill e.m.f. of each cage is 200 V.

5   Attempt any two parts.   (10×2=20)

(a)   Why the 1-phase induction motor is not self-starting? Explain double revolving field theory.

(b)   Explain the operation of a stepper motor and state some important application of stepper motors.

(c)   Explain starting methods of 1-phase induction motor. What is Repulsion motor?

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