

Printed Pages : 3



NEE-401

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

PAPER ID : 121409

Roll No.

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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 of Alternator.

A 3-phase, 50 Hz, 8-pole alternator has star-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.

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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.			
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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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