KUMARAGURU
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B.E/B.TECH DEGREE EXAMINATIONS: NOV / DEC 2024

(Regulation 2018)

Fourth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EEI4201: Induction and Synchronous Machines

COURSE OUTCOMES

CO1:   Understand the construction and principle of operation of different types of induction motor and synchronous generator

CO2:   Describe the types of speed control, starting and performance characteristics of three phase and single-phase induction motors

CO3:   Determine the voltage regulation and analyze the performance characteristics of synchronous generator using different testing methods

CO4:   Understand the starting methods and performance characteristics of synchronous motor

CO5:   Select induction and synchronous machines for various applications

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	A three phase 4 pole, induction motor is found to run at 1728 rpm at a slip of 4%. Calculate the frequency of the supply.	CO1	[K_4]
2.	Sketch the Torque-Slip characteristics of a three phase induction motor.	CO2	[K_2]
3.	State the necessity of Starters of three phase induction motor.	CO2	[K_2]
4.	List the different braking methods of a three phase induction motor.	CO2	[K_1]
5.	Draw the equivalent circuit of a Single phase induction motor.	CO2	[K_2]
6.	List the features of a Universal motor.	CO2	[K_1]
7.	What are the effects of Armature reaction? How can it be minimized?	CO3	[K_1]
8.	How is Hunting suppressed in a Synchronous motor?	CO4	[K_2]
9.	Write the significance of a Synchronous Condenser.	CO5	[K_2]
10.	Recall the starting methods of a Synchronous motor.	CO4	[K_1]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Explain with neat diagram, the constructional details and principle of operation of a three phase Squirrel cage induction motor.	8	CO1	[K1]
	b)	Demonstrate with neat diagram, the procedure to draw Circle diagram for a three phase induction motor with the help of equivalent circuit parameters.	8	CO2	[K6]
12.	a)	Illustrate with a neat diagram, the working of a Star-Delta starter. Develop the relation between stating torque of Star-Delta starter to starting torque of DOL starter.	8	CO2	[K4]
	b)	Two induction motors are connected in cascade with 6 poles and 8 poles respectively on a 50 Hz supply. Determine the speed of motors at which this setup can be run under cumulative cascaded and differentially cascaded.	8	CO2	[K4]
13.	a)	Demonstrate with neat diagram, the Double field revolving theory used in operation of single phase induction motor with its characteristics.	8	CO2	[K2]
	b)	Illustrate with neat diagram, the construction details and the principle of operation of Shaded pole induction motor.	8	CO2	[K2]
14.	a)	Explain with neat diagram, the constructional details and working of a Synchronous generator.	8	CO3	[K2]
	b)	Develop the expression of EMF equation of an Alternator.	8	CO3	[K4]
15.		A 100kVA, 3000V, 50 Hz, 3 phase star connected alternator has an effective armature resistance of 0.2 Ω. The field current 40A produces short circuit current of 200A and open circuit EMF of 1040V (line value). Calculate the full-load voltage regulation at 0.8 power factor lagging and 0.8 power factor leading by using Synchronous impedance method. Draw the relevant phasor diagrams.	16	CO3	[K4]
16.	a)	Sketch V and inverted V curves. Discuss the effect of excitation on armature current and power factor.	6	CO4	[K2]
	b)	Develop the expression for mechanical power of a Synchronous motor with relevant phasor diagram.	10	CO4	[K4]

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