Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: NOV/DEC 2022

(Regulation 2018)

Third Semester

MECHATRONICS ENGINEERING

U18MCI3202**:** Electrical Machines

COURSE OUTCOMES

CO1: Describe the construction, principle of operation and performance of DC motors
CO2: Elucidate the construction, principle of operation and performance of Induction Machines
CO3: Summarize the speed control methods of electrical machines
CO4: Explain the construction, principle of operation and performance of special machines and Permanent magnet machines.
CO5: Select suitable motor for simple 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.	What is the basic principle of operation of DC motor?	CO1	[K_2]
2.	A 220-V DC. machine has an armature resistance of 0.5 ohms. If the full-load armature current is 10 A, find the induced emf. when the machine acts as motor.	CO1	[K_3]
3.	Can we add extra resistance in series with squirrel cage rotor? State the reason.	CO2	[K_2]
4.	Give the conditions for maximum torque for 3-phase induction motor	CO2	[K_2]
5.	Mention different types of speed control of slip ring induction motor	CO3	[K_2]
6.	What is the effect of inserting resistance in the field circuit of a DC shunt motor on its speed and torque?	CO3	[K_2]
7.	Define step angle of a Stepper motor.	CO4	[K_2]
8.	What is the need for position sensor in BLDC motor?	CO4	[K_2]
9.	How will you select the motor rating for a specific application?	CO5	[K_2]
10.	Why DC series motor is better suitable for traction than DC shunt motor?	CO5	[K_3]

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

11.	a)	Explain the electrical and mechanical characteristics of DC series motor.	10	CO1	[K_2]
	b)	Derive the emf equation of DC generator.	6	CO1	[K_2]

12.	a)	Explain construction and working principle of three-phase slipring induction motor	8	CO2	[K_2]
	b)	Derive the expression for torque of 3 phase Induction motor and explain Slip Torque characteristic .	8	CO2	[K_2]
13.	a)	What are the methods of speed control of a DC shunt motor? and briefly explain them with help of neat diagram.	10	CO3	[K_2]
	b)	A 500 V shunt motor runs at its normal speed of 250 rpm when the armature current is 200 A. The resistance of armature is 0.12 ohm. Calculate the speed when a resistance is inserted in the field reducing the shunt field to 80% of normal value and the armature current is 100 A.	6	CO3	[K_3]
14.	a)	What is a stepper motor? List the different types of stepper motor and explain the construction and various modes of excitation of PM stepper motor.	16	CO4	[K_2]
15.	a)	Explain construction, working and applications of Permanent magnet brushless DC motor.	8	CO4	[K_2]
	b)	Discuss about the Speed control of three phase induction motor using slip power recovery scheme	8	CO3	[K_2]
16.	a)	Discuss about the factors that influence the choice of Electrical motors.	8	CO5	[K_2]
	b)	Explain about the Classes of Motor Duty with a neat diagram.	8	CO5	[K_2]

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