Register Number:……..

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

(Regulation 2018)

Fourth Semester

MECHANICAL ENGINEERING

U18EEI4207 : Electrical Drives and Control

COURSE OUTCOMES

CO1: Describe the construction, principle of operation and characteristics of DC motors.

CO2: Distinguish the construction and operation various types of induction motors.

CO3: Familiarize the speed control techniques for DC motor and induction motor.

CO4: Describe the construction and operation of special electrical machines.

CO5: Choose the suitable motor for specific application.

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

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	The series field winding has low resistance while the shunt field resistance has high resistance. Why?	CO1	[K_3]
2.	Why are electro-magnets referred over permanent magnets for use in large DC Machines? Name the type of DC motor used in electric train and justify?	CO1	[K_2]
3.	Infer Why the induction motor is called rotating transformer?	CO2	[K_2]
4.	Draw the no load phasor diagram of a single phase transformer.	CO2	[K_2]
5.	List the factors considered for the choice of electric drive system.	CO3	[K_2]
6.	Why is current controller placed in the inner loop of the speed control system?	CO3	[K_3]
7.	Explain field oriented control of induction motor. Infer why it is superior to other types of speed control.	CO3	[K_3]
8.	Mention the methods which can be used for the speed control of induction motor from stator and rotor side.	CO3	[K_2]
9.	Illustrate the block diagram for the closed loop control technique employed for permanent Magnet Synchronous Motor (PMSM) drive.	CO3	[K_2]
10.	Compare and contrast the performance of SR motor and VR stepper motor	CO3	[K_3]

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

11.	a)	Describe the construction of DC motor and explain the working of the DC machine with neat diagram. Highlight the importance of back emf with its equations.	8	CO1	[K_2]
	b)	Classify the types of DC machines based on the excitation. Write its voltage equation.	8	CO1	[K_2]
12.		Explain double field revolving theory for single phase induction motor and describe the operation of any one type of single phase induction motor with neat diagram.	16	CO2	[K_3]
13.	a)	In L&T construction work at a multi-storey apartment, a machine operator wants to transport the construction materials under full control and flexibility with the motor in operation from ground floor to the construction place at 5th floor and vice versa. Identify suitable drive mechanism which is employed in the construction work and explain its operation.	8	CO3	[K_4]
	b)	Explain the different modes of operation of an electrical drive including starting, stopping, motoring and braking.	8	CO2	[K_2]
14.	a)	Explain the speed control of 3 phase induction motor using stator voltage control method and draw its speed torque characteristics.	8	CO3	[K_2]
	b)	Why is a transformer necessary in slip recovery scheme? Explain how slip power recovery scheme helps to achieve sub synchronous speed control of the slip ring induction motor with improvements in overall efficiency.	8	CO4	[K_2]
15.	a)	Describe the construction and principle of operation of Permanent magnet synchronous motor with its neat diagram	12	CO4	[K_2]
	b)	Examine the operation of a single phase fully controlled rectifier fed separately excited DC motor with its waveform and obtain the expression for various conduction modes	4	CO3	[K_2]
16.	a)	Suggest a suitable drive scheme to run an induction motor for water pumping applications in a hill station where there is no electric supply	8	CO5	[K_3]
	b)	Suggest a suitable drive scheme to run a dc motor for water pumping applications in a remote village where there is no electric supply	8	CO5	[K_3]

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