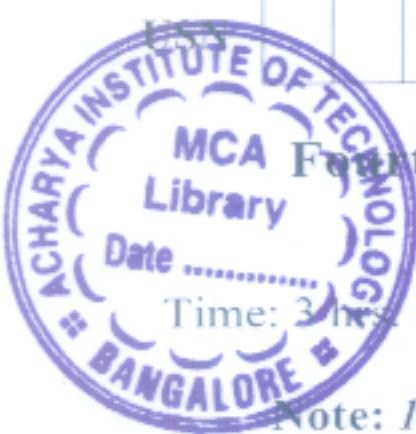


# CBCS SCHEME - Make-Up Exam



BEE401

## Fourth Semester B.E/B.Tech. Degree Examination, June/July 2025

### Electric Motors

Max. Marks: 100

**Note:** 1. Answer any **FIVE** full questions, choosing **ONE** full question from each module.  
 2. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	C
1	a.	Explain the various losses that occur in DC Machines. Derive the condition for maximum efficiency of DC motor.	10	L1	CO1
	b.	With a neat diagram, explain the swinburn's test on a DC motor. Mention the demerits of this test.	10	L1	CO1
OR					
2	a.	What is back emf? Explain the significance of back emf in DC motor.	7	L1	CO1
	b.	Explain the different characteristics of DC shunt motor.	6	L2	CO1
	c.	A 230 V DC shunt motor runs at 800 rpm takes current of 50 A. Find the resistance to be added to the field circuit on increasing the speed from 800 rpm to 1000 rpm at an armature current of 80 A. Assume flux is proportional to field current. Armature resistance is $0.15 \Omega$ and field resistance is $250 \Omega$ .	7	L3	CO1
Module – 2					
3	a.	Derive Torque equation for three phase Induction Motor.	4	L2	CO2
	b.	Explain with suitable sketches the construction of squirrel cage and ship ring induction rotor. State the advantages and disadvantage of each type.	8	L1	CO2
	c.	A 3- $\phi$ , 400 V, 50 Hz, 4 pole induction motor has star connected winding. The rotor resistance and reactance are $0.1 \Omega$ and $1 \Omega$ respectively. The full load speed is 1440 rpm. Find the torque developed on full load by the motor. Assume stator to rotor ratio as 2 : 1.	8	L2	CO2
OR					
4	a.	How to change the direction of rotating magnetic field?	4	L1	CO2
	b.	Discuss the complete torque-slip characteristics of a 3- $\phi$ Induction motor including motoring, generating and braking regions.	8	L2	CO2
	c.	A 3- $\phi$ induction motor having 6-pole stator winding in Y-connected runs on 240 V, 50 Hz supply. The rotor resistance and stand still reactance are $0.12 \Omega$ and $0.85 \Omega/\text{phase}$ . The ratio of stator to rotor turns is 1.8 and full load slip is 4%. Find the developed torque at full load, maximum torque and the speed at maximum torque.	8	L2	CO2
Module – 3					
5	a.	Explain the construction and working of double cage induction motor.	6	L2	CO3
	b.	Explain the phenomenon of cogging and crawling in a 3- $\phi$ induction motor.	8	L2	CO3
	c.	Write short notes on induction generator.	6	L2	CO3

**OR**

<b>6</b>	a.	Discuss the losses in three phase induction motor.	<b>10</b>	<b>L2</b>	<b>CO3</b>
	b.	Starting from the fundamentals, draw and explain the equivalent circuit diagram of 3- $\phi$ induction motor.	<b>10</b>	<b>L2</b>	<b>CO3</b>

**Module – 4**

<b>7</b>	a.	Explain double field revolving theory as applied to a single phase induction motor.	<b>10</b>	<b>L2</b>	<b>CO4</b>
	b.	With schematic connection diagram and phasor diagram, explain the construction, working and application of a capacitor start induction motor.	<b>10</b>	<b>L1</b>	<b>CO4</b>

**OR**

<b>8</b>	a.	Explain the Direct on line starter of 3- $\phi$ induction motor with a suitable circuit diagram.	<b>10</b>	<b>L1</b>	<b>CO4</b>
	b.	Enumerate the speed control methods of 3- $\phi$ induction motor and explain supply frequency control method.	<b>10</b>	<b>L2</b>	<b>CO4</b>

**Module – 5**

<b>9</b>	a.	With a neat sketch, explain the construction and working of linear induction motor.	<b>6</b>	<b>L2</b>	<b>CO5</b>
	b.	With a neat sketch, explain the construction and working of universal motor.	<b>8</b>	<b>L2</b>	<b>CO5</b>
	c.	With a neat diagram, explain the construction and working of switched reluctance motor.	<b>6</b>	<b>L2</b>	<b>CO5</b>

**OR**

<b>10</b>	a.	What is a Synchronous condenser and its uses?	<b>6</b>	<b>L2</b>	<b>CO5</b>
	b.	Explain the principle of operation of synchronous motor and constant load variable Excitation.	<b>8</b>	<b>L2</b>	<b>CO5</b>
	c.	With a neat sketch, explain 'V' and inverted 'V' curves of synchronous motor.	<b>6</b>	<b>L2</b>	<b>CO5</b>

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