

# Subject Code: BEE503

**Roll No:** 

## **BTECH** (SEM V) THEORY EXAMINATION 2024-25 **ELECTRICAL MACHINES-II**

### **TIME: 3 HRS**

**M.MARKS: 70** 

**Note:** Attempt all Sections. In case of any missing data; choose suitably.

### **SECTION A**

1.	Attempt <i>all</i> questions in brief.	2 x 07	7 = 14
Q no.	Question	СО	Level
a.	Why is rotating field system is used in preference to a stationary field in alternators?	CO1	K3
b.	What are the effects of hunting in synchronous motor?	CO2	K4
c.	Why cannot an induction motor run at synchronous speed?	CO3	K4
d.	How universal motor works on AC or on Dc supply?	CO5	K3
e.	Explain cogging and crawling in three phase induction motors.	CO4	K4
f.	Define slip in Induction motor.	CO3	K4
	A three phase, 50 Hz, 4-pole induction motor has a slip of 4%. Calculate		
	the speed of the motor in r.p.m.		
g.	What is the function of synchronous condenser?	CO2	K4

## SECTION B

#### $\frac{07 \times 3 = 21}{CO1 \ K^3}$ 2. Attempt any *three* of the following: Derive the EMF equation of alternator. Explain the armature reaction in a. synchronous machines at (i) unity power factor, (ii) lagging power factor and (iii) leading power factor. Explain why the synchronous motor does not have a starting torque? CO2 K4 b. Describe the working principle and methods of starting of a synchronous motor. Derive the torque equation of three phase induction motor. Also find the CO3 K4 c. condition for maximum torque. A 746 kW, 3-phase, 50 Hz, 16 pole induction motor has a rotor impedance of $(0.02 + j0.15)\Omega$ at standstill. Find the speed of the motor at which maximum torque occurs. What are the advantages of high-torque cage motors? Explain Deep-Bar CO4 K4 d. cage motors and Double - Cage motors. Why single phase induction motors are not self starting? Explain Double CO5 K3 e. revolving field theory of single phase induction motors.

# **SECTION C**

3.	Attempt any <i>one</i> part of the following:	07 x 1	l = 07
a.	Explain voltage regulation in synchronous generators.	CO1	K3
	A 3-phase, 10 kVA, 400 V, 50Hz star connected alternator supplies the		
	rated load at 0.8 power factor lagging. If the armature impedance is		
	$(0.5+j10) \Omega$ , find the voltage regulation using synchronous impedance		
	method.		
b.	Explain parallel operation of alternators. What are the reasons of parallel	CO1	K3
	operation? Also describe the necessary condition for paralleling		
	alternators.		



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4.	Attempt any one part of the following:	<b>07 x</b> 1	l = 07
a.	Explain the following for a synchronous motor:	CO2	K4
	(i) V- Curves		
	(ii) Synchronous condenser.		
b.	Explain Two – Reaction Theory of salient pole synchronous machine.	CO2	K4
	Also draw the phasor diagram.		

5.	Attempt any one part of the following:	<b>07 x</b> 1	1 = 07	
a.	What is the significance of rotating magnetic field in three phase	CO3	K4	
	induction motor? Explain the working principle of three phase induction			
	motor. Also draw the phasor diagram and equivalent circuit.			
b.	A 6-pole, 50Hz, three phase induction motor running on full load	CO3	K4	
	develops a useful torque of 150 Nm at a rotor frequency of 1.5Hz.			
	Calculate the shaft power output. If the mechanical torque lost in friction			
	be 10 Nm, determine (i) rotor copper loss, (ii) the input to the motor, and			N
	(iii) the efficiency. The total stator loss is 700 W.			0'
			(	って
6.	Attempt any <i>one</i> part of the following:	<b>07 x</b> 1	1 = 07	+
a.	What is the need of starters in three phase induction motors? Explain	CO4	K4	
	Direct online starter and Auto transformer starter with proper diagram.			
b.	Discuss briefly the various methods of speed control of three phase	CO4	K4	

6.	Attempt any <i>one</i> part of the following:	<b>07</b> x 1	1 = 07
a.	What is the need of starters in three phase induction motors? Explain	CO4	K4
	Direct online starter and Auto transformer starter with proper diagram.		
b.	Discuss briefly the various methods of speed control of three phase	CO4	K4
	induction motors.	$\sim$	
		X	

7.	Attempt any one part of the following:	<b>07</b> x 1	1 = 07
a.	Why single phase induction motors are not self starting? Explain Double	CO5	K3
	revolving field theory of single phase induction motor.		
b.	Explain the following:	CO5	K3
	(i) Split phase motor		
	(ii) Capacitor – start capacitor – run motor		
	(iii) Shaded pole motor.		
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