PAPER ID-310690

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 *all* questions in brief. **2 x 07 = 14**

Q no.	Question	CO	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. A three phase, 50 Hz, 4-pole induction motor has a slip of 4%. Calculate the speed of the motor in r.p.m.	CO3	K4
g.	What is the function of synchronous condenser?	CO2	K4

SECTION B

2. Attempt any *three* of the following: **07 x 3 = 21**

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

SECTION C

3. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Explain voltage regulation in synchronous generators. 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) Ω , find the voltage regulation using synchronous impedance method.	CO1	K3
b.	Explain parallel operation of alternators. What are the reasons of parallel operation? Also describe the necessary condition for paralleling alternators.	CO1	K3

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4. Attempt any *one* part of the following: 07 x 1 = 07

a.	Explain the following for a synchronous motor: (i) V- Curves (ii) Synchronous condenser.	CO2	K4
b.	Explain Two – Reaction Theory of salient pole synchronous machine. Also draw the phasor diagram.	CO2	K4

5. Attempt any *one* part of the following: 07 x 1 = 07

a.	What is the significance of rotating magnetic field in three phase induction motor? Explain the working principle of three phase induction motor. Also draw the phasor diagram and equivalent circuit.	CO3	K4
b.	A 6-pole, 50Hz, three phase induction motor running on full load 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 (iii) the efficiency. The total stator loss is 700 W.	CO3	K4

6. Attempt any *one* part of the following: 07 x 1 = 07

a.	What is the need of starters in three phase induction motors? Explain Direct online starter and Auto transformer starter with proper diagram.	CO4	K4
b.	Discuss briefly the various methods of speed control of three phase induction motors.	CO4	K4

7. Attempt any *one* part of the following: 07 x 1 = 07

a.	Why single phase induction motors are not self starting? Explain Double revolving field theory of single phase induction motor.	CO5	K3
b.	Explain the following: (i) Split phase motor (ii) Capacitor – start capacitor – run motor (iii) Shaded pole motor.	CO5	K3