PAPER ID-310688

Roll No: | | | | | | | | | | | | | |

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

TIME: 3 HRS **M.MARKS: 100**

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

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	CO	Level
a.	Explain the role of Rotating Magnetic Field (RMF) in alternators.	1	K3
b.	Discuss the advantages of "chording" of armature winding in a 3-phase synchronous machine.	1	K3
c.	State the reason why damper windings are used in synchronous motors?	2	K4
d.	Differentiate between "transient" and "sub-transient" reactance in synchronous motors.	2	K4
e.	Draw the complete equivalent circuit of 3-phase induction motor and explain each term.	3	K4
f.	Compute the condition of maximum torque in a 3-phase induction motor.	3	K4
g.	Explain what do you mean by "Cogging" in an induction motor.	4	K4
h.	Express why starters are necessary for starting 3-phase induction motors.	4	K4
i.	Write a short note on repulsion motor.	5	K3
j.	Illustrate various starting methods of 1-phase induction motor.	5	K3

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a.	A 3-phase, 2-pole, 50 Hz, star-connected turboalternator has 54 slots with 4 conductors per slot. The pitch of the coil is 2 slots less than the pole pitch. Determine the useful flux per pole required to generate a line voltage of 3.3 kV.	1	K3
b.	Explain in detail "Two Reaction Theory" for a salient pole synchronous machine.	2	K4
c.	A 746 kW, 3-phase, 50 Hz, 16-pole induction motor has a rotor impedance of (0.02+j0.15) ohm at standstill. Full load torque is obtained at 360 rpm. Calculate: (i) The speed at which maximum torque occurs (ii) The ratio of full load to maximum torque (iii)The external resistance pr phase to be inserted in the rotor circuit to get maximum torque at starting.	3	K4
d.	Distinguish between deep bar and double cage rotor construction and operation.	4	K4
e.	Examine the working of (i) shaded pole motor and (ii) capacitor-start capacitor-run motor.	5	K3

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

a.	Why parallel operation of alternators is needed? Also, explain synchronizing procedures for parallel operation of alternators.	1	K3

PAPER ID-310688

Roll No: | | | | | | | | | | | | |

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

TIME: 3 HRS **M.MARKS: 100**

b.	Explain Ampere Turns Method (MMF method) to determine voltage regulation of alternators.	1	K3

4. Attempt any *one* part of the following: 10 x 1 = 10

a.	Derive the torque-angle characteristics of salient pole rotor synchronous machine.	2	K4
b.	With the help of suitable diagram explain why synchronous motors are not self-starting? Also, explain the methods of starting synchronous motors.	2	K4

5. Attempt any *one* part of the following: 10 x 1 = 10

a.	A 3-phase induction motor has a starting torque of 100% and a maximum torque of 200% of the full load torque. Determine (a) slip at which maximum torque occurs (b) full load slip.	3	K4
b.	Derive the expression for torque developed in a 3-phase induction motor. State the condition of maximum torque. Also, draw torque-slip characteristics describing its three important regions.	3	K4

6. Attempt any *one* part of the following: 10 x 1 = 10

a.	Express in detail the phenomenon of "Crawling" in 3-phase induction motor.	4	K4
b.	With a neat sketch describe Auto-transformer method of starting in 3-phase induction motor.	4	K4

7. Attempt any *one* part of the following: 10 x 1 = 10

a.	Investigate in detail working and construction of Universal motor.	5	K3
b.	Explain the concept of double revolving field theory in 1-phase induction motor. Also, draw equivalent circuit of 1-phase induction motor based on this theory.	5	K3