



Roll No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**BTECH**  
**(SEM VI) THEORY EXAMINATION 2024-25**  
**SPECIAL ELECTRICAL MACHINES**

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.	Write two applications of Isolated induction Generator.	4	K1
b.	Write two applications of Linear Induction Motor.	4	K1
c.	Define pull in torque in a stepper motor.	2	K1
d.	Determine the resolution of a stepper motor with a step angle of 1.8 degree.	1	K3
e.	Draw the L-θ profile of switched reluctance motor.	3	K1
f.	Define Dwell span in L-θ profile of switched reluctance motor	3	K2
g.	Write the name of three magnetic materials used in PM motors.	1	K1
h.	Write four applications of BLDC motors.	4	K1
i.	Draw the torque speed characteristics of 1-phase hysteresis motor.	2	K1
j.	What are the daily applications of a universal motor.	4	K1

**SECTION B**

**2. Attempt any three of the following:**

**10 x 3 = 30**

Q No.	Question	CO	Level
a.	Explain, why inertia is an important factor in the performance of servomotors. Describe how inertia is reduced in a 2-phase AC servomotor's during its construction.	1	K2
b.	Explain the operation of Hybrid stepper motor.	2	K2
c.	Demonstrate the operation of incremental and absolute speed encoders.	3	K2
d.	Explain the equivalent circuit and phasor diagram of permanent magnet synchronous generator.	2	K2
e.	Explain the Construction and operation of 1 phase synchronous reluctance motor.	1	K2

**SECTION C**

**3. Attempt any one part of the following:**

**10 x 1 = 10**

Q No.	Question	CO	Level
a.	Explain the constant power and constant torque operations in slip ring induction motor for both sub and super synchronous modes.	3	K2
b.	Demonstrate how a Doubly-Fed Induction Generator (DFIG) is applied in wind turbine systems to enable variable-speed operation and efficient energy conversion.	4	K4



Roll No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**BTECH**  
**(SEM VI) THEORY EXAMINATION 2024-25**  
**SPECIAL ELECTRICAL MACHINES**

TIME: 3 HRS

M.MARKS: 100

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

Q No.	Question	CO	Level
a.	Explain the design and operation of multistack variable reluctance stepper motor.	1	K2
b.	Explain the closed loop control of stepper motors with the help of block diagrams.	3	K2

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

Q No.	Question	CO	Level
a.	Illustrate how sensorless operation is implemented in a Switched Reluctance Motor (SRM) using appropriate techniques or algorithms.	3	K3
b.	Explain the operation of 8:6 Switched Reluctance motor.	1	K2

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

Q No.	Question	CO	Level
a.	Demonstrate the 6-pulse operation of BLDC motor using appropriate power electronics converter.	1	K2
b.	A permanent magnet DC motor has an armature resistance of 1.03 ohm . It draws a current of 1.25 A at no load with 50 V supply and running at 2100 rpm. Find (a) speed-voltage constant, (b) rotational losses and (c) output power when it runs at 1700 rpm at 48 V supply.	3	K3

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

Q No.	Question	CO	Level
a.	Explain the operation of a repulsion motor. Also draw its torque speed characteristics.	2	K2
b.	Describe the construction and working principle of a single-phase AC Series (Universal) motor. Explain its torque-speed characteristics and phasor diagram. What modifications are necessary in a conventional DC series motor to enable its operation on an AC supply	2	K2