Printed Pages:02 **Sub Code: REE-064**

Paper Id: 120258 **Roll No.** | | | | | | | | | | |

B.TECH.
(SEM. VI) THEORY EXAMINATION 2018-19
SPECIAL ELECTRICAL MACHINES

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a. What is the effect of high inertia loads on induction motors?
b. What is the drawback of resistance split phase induction motor?
c. What is meant by detent torque?
d. What is the origin of the name stepper motor?
e. Why is the torque developed in hybrid stepping motor greater than that of PM or VR type stepping motors?
f. Give the applications of Permanent Magnet Generator.
g. Explain Linear Force in single phase commutator motor.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a. Explain that the rotor resistance starter allows fast start with less heating of induction motor.
b. What is a two phase servomotor? Describe its construction and working. Draw its torque-speed characteristics for various control voltages.
c. Discuss the Method of rotor position sensing and sensor less operation in Switched reluctance motor.
d. Explain the construction and principle of operation of a Hysteresis motor.
e. Describe construction and principle of operation of single phase commutator motors.

SECTION C

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

(a) The resistance and reactance (equivalent) values of a double-cage induction motor for stator, outer and inner cage are 0.35, 2.0 and 0.25 ohm resistance and 2.5, zero and 4.0 ohm reactance respectively. Find the starting torque if the phase voltage is 240 V and the synchronous speed is 2000 rpm.
(b) What is meant by slip power recovery? How the principle is used to control the speed, torque of 3 phase induction motors?

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

(a) Describe the construction and working of a capacitor start single phase induction motor.
(b) i) Discuss why single phase induction motors do not have a starting torque.
ii) Explain working of Shaded pole motor.

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

(a) Define detent torque. Describe the construction and operation of a hybrid stepper motor. What are the main advantages and disadvantages of hybrid stepper motors compared with variable reluctance stepper motors?

(b) i) Calculate the stepping angle for a 3 phase, 24 pole permanent magnet stepper motor.
ii) A single stack, eight phase (stator) multi pole, stepper motor has six rotor teeth. The phases are excited one at a time. Determine step size, steps per revolution, speed, if the excitation frequency is 120 Hz.

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

(a) Draw and explain the torque-speed characteristic of a hysteresis motor. What are the common applications of hysteresis motor?

(b) Describe Types of Permanent magnets and explain their magnetization characteristics of permanent magnet dc motors.

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

(a) Explain the construction and principle of operation of a linear induction motor.

(b) Explain the construction, principle of operation, characteristics of universal and repulsion motors in detail with circuit diagram.