B TECH
(SEM VI) THEORY EXAMINATION, 2018-19
SPECIAL ELECTRICAL MACHINE

Time: 3 Hours   Max Marks: 100

Note: Attempt all the sections. Assume missing data suitably, if any.

SECTION – A

1) Attempt **all** parts of the following: (10×2= 20)
   (a) What are the uses of PMAC motor?
   (b) During plugging operation of a wound rotor induction motor, usually an external resistance is inserted into the rotor circuit, why?
   (c) What are the applications of PCB motor?
   (d) Write the four differences between stepper and conventional motor.
   (e) A hybrid VRSM has 8 main poles which have 5 teeth each. Calculate the stepping angle, if the rotor has 50 teeth.
   (f) How does switched reluctance motor differ from synchrorus reluctance motor?
   (g) Draw the torque speed characteristics of to two phase AC servomotor.
   (h) Why centrifugal switches are provided in most Single phase induction machine?
   (i) What are the advantages of Constant power and constant torque controls in slip ring induction motor?
   (j) Compare Permanent magnet brushless DC motor with Permanent magnet synchronous motor.

SECTION – B

2) Attempt any **three** questions of this section.   (3×10= 30)

   a) Explain the construction principle of operation, characteristics of universal and repulsion motors in detail with circuit diagram.
   b) Describe the operation of brushless dc motor drive and explain its advantages.
   c) Explain the torque versus stepping rate characteristics of a stepper motor. What is the slew range?
   d) Elaborate the construction and torque speed characteristics of two phase AC servomotors.
   e) Discuss about the principle of operation of a universal motor.

SECTION-C

3) Attempt any **one** of the following: (1X10=10)

   (a) Explain why a 1-phase induction motor, as compared to 3-Phase induction motor, has larger slip, less efficiency and more noise.
   (b) Describe the theory that reveals that a single phase induction motor is inherently non-self starting, but once started, run like a three phase induction motor.

4) Attempt any **one** of the following: **(1X10=10)**

   a) Derive the EMF and torque equation of permanent magnet synchronous motors.
   b) Explain the principle of operation of linear induction motor and show how does it differ from AC series motor?

5) Attempt any **one** of the following: **(1X10=10)**

   a) Explain the operation of the different types of stepper motor. Compare them with applications.
   b) Discuss the following in brief about operations in Switched reluctance motor:
   (i) Method of rotor position sensing (ii) Sensor less operations

6) Attempt any **one** of the following: **(1X10=10)**

   a) What are the important features of a hysteresis synchronous motor? What are its applications?
   b) Describe the construction of double cage three phase induction motor. How does it differ from the slip ring and deep bar induction motors?

7) Attempt any **one** of the following: **(1X10=10)**

   a) Explain the construction and principle of operation of shaded pole induction motor along with torque-slip characteristics and the applications.
   b) Describe how can speed of a slip ring induction motor be controlled by injecting EMF in rotor circuit?