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B TECH
(SEM VI) THEORY EXAMINATION, 2017-18
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 synchronus 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?