

Printed Pages : 3

EEE012

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2494

Roll No.

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B.Tech.**(SEMESTER VI) THEORY EXAMINATION, 2012-13****SPECIAL ELECTRICAL MACHINES****Time : 3 Hours]****[Total Marks : 100****SECTION - A**

1. Attempt **all** question parts : **10 × 2 = 20**
- (a) What are the different ways of controlling slip ?
 - (b) Draw the torque-slip characteristics for double cage.
 - (c) Name the different types of fractional kilowatt Motor.
 - (d) Sketch the circuit diagram of capacitor start, capacitor run Induction motor & draw speed-torque characteristic.
 - (e) Compare variable reluctance & permanent magnet stepper motor.
 - (f) What are the different mode of operation of SRM ? (Switch Reluctance Motor)
 - (g) List out the applications of Brushless DC motor.
 - (h) Differentiate hysteresis & reluctance motor.
 - (i) What are the characteristics of universal motor ?
 - (j) What is Linear Induction motor ?

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SECTION – B

2. Attempt any **three** question parts : **3 × 10 = 30**
- (a) (i) Explain the magnetizing & demagnetizing characteristics using B-H loop.
 - (a) (ii) Draw and explain permanent magnet DC motor.
 - (b) With neat sketch, explain the construction of Double cage rotor.
 - (c) Explain the construction, working principle & torque-speed characteristics of shaded pole Induction motor.
 - (d) With neat sketch, explain briefly about the construction and working principle of repulsion motor.
 - (e) Explain the construction and principle of operation of Hybrid stepper motor.

SECTION – C

Attempt **all** questions : **5 × 10 = 50**

3. Attempt any **two** parts : **2 × 5 = 10**

- (a) Explain the principle of slip control by slip frequency EMF injection in rotor circuit with neat sketch.
- (b) Write a note on the construction of deep bar Induction motor.
- (c) A 3 phase 50 Hz, 12 pole, 200 kW slip ring Induction motor drives a pump whose torque is proportional to the square of speed. At full load the motor slip is 0.045. The rotor resistance measured between any two slip ring is 0.61 mΩ . What resistance should be added in the rotor circuit to reduce the speed of pump to 450 rpm ?

4. Attempt any **one** part : **1 × 10 = 10**

- (a) Explain the construction, working principle & torque-speed characteristics of two-phase AC servomotor.

- (b) The main & auxiliary winding impedances of a 50 Hz, capacitor start single phase induction motor are

$$\text{Main winding} = 3 + j2.7$$

$$\text{Auxiliary winding} = 7 + j3$$

Determine the value of the capacitor to be connected in series to achieve a phase difference of $\alpha = 90^\circ$ between the currents of two windings at start.

5. Attempt any one part : 1 × 10 = 10

(a) With neat sketch, explain briefly about the construction and working principle of Universal motor.

(b) A universal motor has its 2 poles with 960 conductors. At a certain load, the motor speed is 5000 rpm & the armature current is 4.6 amps. The armature terminal voltage and power are 100 volt & 300 watts respectively. Compute the following, assuming armature resistance of 3.5 ohm :

(i) Effective armature reactance

(ii) Maximum value of flux/pole

6. Attempt any one part : 1 × 10 = 10

(a) With neat sketch, explain the construction, operating principle & characteristics of Hysteresis motor.

(b) With neat sketch, explain the construction, operating principle & characteristics of Brushless DC motor.

7. Attempt any two parts : 2 × 5 = 10

(a) With neat sketch, explain any one of drive circuit of stepper motor.

(b) What are static characteristic ? Explain briefly.

(c) Derive the torque equation of SRM. (Switch Reluctance Motor)