Printed Pages : 3 EEE012

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

PAPER ID : 2494 Roll No. | | | | | | | | | | |

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 ?

SECTION – B

2. Attempt any **three** question parts : **3 × 10 = 30**

(a) (i) Explain the magnetizing & demagnetizing characteristics using B-H loop.

(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

Main winding = $3 + j2.7$

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)