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

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

B. Tech.

(SEM. VI) THEORY EXAMINATION 2011-12

SPECIAL ELECTRICAL MACHINES

Time : 3 Hours   *Total Marks : 100*

Note : Attempt *all* questions.

1.   Attempt any *four* parts of the following :   **(5×4=20)**

   (a)   Discuss the relative merits and demerits of single-cage and double cage induction motors.

   (b)   Explain, how the equivalent circuit of an ordinary polyphase induction motor is also applicable to deep bar induction motors.

   (c)   Discuss the concept of constant torque control with examples.

   (d)   Discuss the starting characteristics of split-phase single-phase induction motors with applications.

   (e)   Efficiency and p.f. are important in industrial power drives but not for ac servomotors. Justify the statement.

   (f)   Enumerate the merits and demerits of an ac servometer as compared to other servometers.

2.   Attempt any *two* parts of the following :   **(10×2=20)**

   (a)   State and describe the methods of starting of single-phase induction motors. Explain how a rotating field is produced in each one of them at the time of starting.

(b) Discuss the static slip power recovery control scheme with neat diagram.

(c) If the standstill impedance of the outer cage of a double cage machine is $(0.3 + j0.4)\ \Omega$ and of the inner cage is $(0.1 + j1.5)\ \Omega$. Compare relative currents and torques of two cages—

(i) at standstill

(ii) at a slip of 5%.

3. Attempt any *two* parts of the following : (10×2=20)

(a) Discuss in detail the principle of operation and characteristics of hybrid stepper motors with applications.

(b) Discuss in detail the construction, principle of operation and torque production in switched reluctance motors.

(c) A 16-pole, 3-ϕ induction freq. convertor is driven at 2250 rpm and its stator is connected to a 50 Hz system. If the rotor terminal voltage at standstill is 15 V, then find what voltage and frequencies can be obtained from this frequency converter.

4. Attempt any *two* parts of the following : (10×2=20)

(a) Discuss the brushless dc motor with their important features and with help of suitable applications.

(b) Discuss in detail, the construction, operating principle and characteristics of reluctance hysteresis motors.

(c) A universal series motor when operating on 220 V d.c., draws 10 A and runs at 1400 r.p.m. Find the new speed and p.f., when connected to 220 V, 25 Hz supply, the motor current remaining the same. The motor has total resistance of 1 Ω and total inductance of 0.1 H.

5. Attempt any *two* parts of the following : (10×2=20)

(a) Discuss in detail the construction, principle of operation and characteristics of repulsion motors with neat diagram and application also.

(b) A series motor has a total resistance of 25 Ω and a total inductance of 0.2 H. The motor runs at 1000 rpm when it draws 1 A from 220 V d.c. source. Calculate the speed and pf when it draws the same current from 220 V, 50 Hz source.

(c) Write short notes on any *two* of the following :

    (i) Linear Induction Motor

    (ii) Universal Motor

    (iii) 1-φ hysteresis Motor

    (iv) Shaded Pole Motors.