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

Paper ID : 121409 Roll No. | | | | | | | | | |

B.TECH.

Theory Examination (Semester-IV) 2015-16

ELECTRO-MECHANICAL ENERGY CONVERSION-II

Time : 3 Hours ***Max. Marks : 100***

Section-A

1. All questions are mandatory. (10×2 = 20)

(i) What do you mean by positive and negative voltage regulation of a synchronous alternator?

(ii) Explain the basic role of damper winding in synchronous machines.

(iii) Write the main application of the three phase synchronous motor.

(iv) What do you understand by term mechanical vibration in a synchronous machine?

(v) Explain the equivalent circuit of a single phase induction motor.

synchronous motor.

(x) What are the importances of armature reaction in three phase synchronous machine?

Section-B

2. **Attempt any five questions.** (5×10 = 50)

(a) Explain the constructional features and working principle of the synchronous motor and develop the Torque expression of synchronous motor.

(b) Discuss the working principle of capacitor start capacitor run motor and also explain its equivalent circuit.

(c) Explain the principle of operation of a universal motor. Draw and explain its operational characteristics.

(f) Discuss the various methods of starting of a 3-phase induction motor.

(g) A 3-phase, 4-pole, 60 Hz induction motor has a slip of 5% at no load, and 7% at full load. Determine the following :

(i) The relative speed between stator surface and rotor field.

(ii) The relative speed between stator field and rotor field.

(iii) The relative speed between stator surface and rotor surface.

(h) State & explain the MMF method for calculation of voltage regulation of synchronous alternator.

Section-C

Attempt any two questions. (2×15 = 30)

3. State & explain forward and backward revolving field theory associated with single phase induction motors. Also draw & explain its torque-speed characteristics.

4. State & explain two reaction theories applicable to cylindrical synchronous machine. Also give the real power and reactive power flow equations of the cylindrical machine.

5. A 220V, 50 Hz, 6 pole, single phase induction motor has the following circuit model parameters as follows:

R_{1M}	3.6 ohms
R2	6.8 ohms
$X_{1M}+X_2$	15.6 ohms
X_c	96 ohms

The rotational losses of the motor are estimated to be 75 watts. At a motor of 940 rpm, determine the line current, power factor, shaft power and efficiency.