(b) A 3-phase, 50 Hz, 8 pole alternator has a star connected winding with 120 slots and 8 conductors per slot. The flux per pole is 0.05 wp, sinusoidally distributed. Determine the phase and line voltage.   10

SECTION – D

8. (a) Derive the power-angle equation and draw the power angle characteristics of salient pole synchronous machine.   10

(b) Write a short note on :   10

   (i)   V-curve of synchronous motor

   (ii) Damper winding

9. (a) What are the application of synchronous motor ?   10

(b) Show that synchronous motor is a variable power factor motor.   10

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24225

B. Tech. 5th Sem. (EE)

Examination – December, 2016

ELECTRICAL MACHINES-II

Paper : EE-311-F

Time : Three Hours]   _[Maximum Marks : 100_

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt _five_ questions in all, selecting _one_ from each section & Question No. **1** is _compulsory_.

1. Write short notes on : $4 \times 5 = 20$

(a) What are the advantages of rotating field and stationary armature in synchronous machine ?

(b) What does you mean by synchronous speed 3-phase induction motor ?

(c) Deduce an expression for frequency of rotor current in an induction motor.

(d) Define coil span and pole pitch.

SECTION – A

2. (a) Describe mathematically development of rotating magnetic field in 3-phase induction motor. 10

(b) Explain Torque-slip characteristics of 3-phase induction motor. 10

3. What are the various methods of speed control of 3-phase induction motor. 20

SECTION – B

4. (a) Using Double Revolving Field Theory, explain why a single phase Induction motor is not self starting. 10

(b) Explain various methods to make a single-phase induction motor self-start. 10

5. A 2-pole, 240 V, 50 Hz, single-phase induction motor has the following constants referred to the stator : 20

$$R_1 = 2.2\,\Omega;\ X_1 = 3.0\,\Omega;\ R_2'\ 3.8\,\Omega;\ X_2' = 2.1\,\Omega$$

$$X_m = 86\,\Omega$$

Find the stator current and input power when the motor is operating at a full-load speed of 2820 r.p.m.

SECTION – C

6. (a) Explain and derive the expression for : 10

(i) Coil span factor (K_c)

(ii) Distribution factor (K_d)

(b) Draw and explain Equivalent circuit of alternator and draw the phasor diagram of a loaded alternator for the following conditions : 10

(i) Lagging power factor

(ii) Leading power factor

(iii) Unity power factor

7. (a) Explain potier triangle method of determining the voltage regulation of an alternator. 10