**Printed Pages—3** **TEE406**

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

**PAPER ID : 2050** **Roll No.** | | | | | | | | | | |

## B. Tech.

## (SEM. IV) THEORY EXAMINATION 2010-11

## ENERGY CONVERSION

*Time : 3 Hours* *Total Marks : 100*

**Note :** Attempt **all** the questions. All questions carry equal marks.

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

   (a) A pole, 3-phase, 50 Hz, 2.3 kV synchronous machine has 42 slots. Each slot has two conductors in a double layer winding. The Coil pitch is 17 slots. Each phase winding has two parallel paths. Calculate the flux/pole required to generate a phase voltage of 2300/ $\sqrt{3}$V.

   (b) Explain the rotating magnetic field concepts for rotating machines.

   (c) Derive emf equation for an alternator. Explain clearly the meaning of —

   (i) Distribution factor and

   (ii) Coil span factor.

   Give expression for them.

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

   (a) A 220 V D.C. shunt motor draws a no-load armature current of 2.5 A when running 1400 rpm. Determine its speed when taking an armature current of 60 A, if armature

reaction weakens the flux by 3 percent. Take armature resistance = 0.2 Ω.

(b) Derive an expression for the torque of a DC motor. Also differentiate between the generator action and motor action of a DC machine.

(c) Discuss the application of shunt, series and compound motors.

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

(a) What are V-curves ? How are they determined experimentally ?

(b) (i) Draw equivalent circuit of a 3-phase induction motor.

(ii) A 12 pole, 3 phase alternator is coupled to an engine running at 500 rpm. It supplies a 3-phase induction motor having a full -load speed of 1440 rpm. Find the percentage slip and number of poles of motor.

(c) Discuss briefly the following :

(i) Crawling

(ii) Cogging.

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

(a) State the difference between an SCR and TRIAC, also discuss common methods of turning off of a thyristor.

(b) Write short notes on :

(i) IGBT

(ii) power MOSFET

(iii) GTO

(c) Define the following keeping in mind rectification :

(i) Form Factor of output voltage

(ii) Ripple factor of output voltage

(iii) Transformer utilization factor

(iv) Harmonic factor

(v) Displacement factor

(vi) Crest factor.

(d) A three phase bridge rectifier is supplied from a star connected supply having 440 V line value at 50 Hz frequency. The average load current being 100A. Find the load resistance and load voltage.

(e) Why half wave rectifiers are not much used in industries ? What is its possible effective application in industry ?

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

(a) How is it possible to construct a transistorised three phase bridge inverter using six transistors ? Describe the operation for both 180° mode of conduction. Why this inverter is called quasi-square wave inverter ?

(b) Draw the schematic of a three phase current source inverter and describe its operation.

(c) How inverters can be used as voltage controller of rotor circuit for a three phase wound rotor induction motor ?