No. of Printed Pages : 3 **BIEE-008**

B.Tech. IN ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

June, 2013

BIEE-008 : ELECTROMECHANICAL ENERGY CONVERSION - I

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any seven** questions . All questions carry equal marks.*

1. Define field energy and co-energy. What is the significance of co-energy in torque/ force derivation in an electromechanical energy conversion device ? 10

2. For the electromagnetic device shown in Fig. (a) assume the reluctance of the iron part of the magnetic circuit to be negligible. Determine the time average force on the movable member at any fixed position of the moving member if $i = I \cos \omega t$. 10

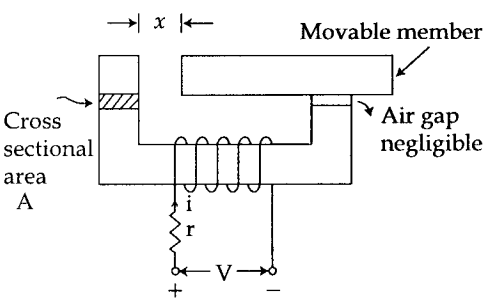

Fig. (a)

3. List the different parts of a DC machine along with their functions. Name the materials used in the construction of each part and derive the induced emf equation of a DC machine from basic fundamentals. **10**

4. Prepare the winding table for a 4 - pole DC machine armature have 32 coil sides number of parallel paths required is 4. **10**

5. Derive the speed - torque characteristics of : **10**

   (a) DC shunt motor

   (b) DC series motor

   (c) DC compound motor.

   Discuss the applications of these motors in light of these characteristics.

6. How is Swinburne test conducted on a DC machine ? How can the efficiency be determined from the results of this test when the machine works as : **10**

   (a) motor mode

   (b) generator mode.

   Why this test is not conducted on series machine ?

7. Draw and explain the phasor diagram of a single phase transformer supplying **10**

   (a) lagging load

   (b) leading load

   (c) UPF load

8. In an Auto - Transformer the power transfer from primary to secondary is partly by conduction and partly by induction. Explain. **10**

9. Explain the following connections with circuit and vector diagrams **10**
   (a) open delta connection
   (b) 3-phase to 1-phase conversion
   (c) 3-phase to 2-phase conversion
   (d) 3-phase to 6-phase conversion

10. Write short notes on ***any two*** of the following : **2x5=10**
   (a) Ward Leonard speed control
   (b) Sumpners test
   (c) Sketches of the core of 3-phase core type transformer and the shell of single phase shell type transformer.