No. of Printed Pages : 3

BIEE-008

B.Tech. IN ELECTRICAL ENGINEERING (BTELVI)

00891

Term-End Examination

December, 2013

BIEE-008 : ELECTRO MECHANICAL 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 determination of magnetic force/torque in 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 $\upsilon = V\cos\omega t$. **10**

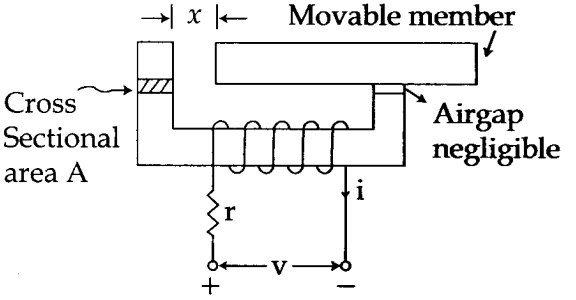

Fig. (a)

3. With the help of neat diagrams bring out the difference between lap and wave windings used for DC machine armature. What are the main factors for the choice between lap and wave windings ? 10

4. Distinguish between the following. 10
   (a) emf and resistance commutation.
   (b) Over and under commutation.
   (c) Cross magnetisation and demagnetization effect of armature reaction.

5. Draw the load characteristics of 10
   (a) Separately excited
   (b) Shunt excited
   (c) Cumulatively compounded DC generators on the same graph. Assume that no-load voltage and full-load currents of each of the three generators are the same. Give reasons for the shape of the characteristics.

6. How will you find the efficiency and various losses of a DC machine using a test other than the load test ? Explain in detail. 10

7. Draw the equivalent circuits for a single phase trasformer, explaining the significance of each portion of the circuits. Construct a vector diagram comparing it step by step with the equivalent circuit diagram. 10

8. Explain how the efficiency and regulation of a transformer can be calculated by the aid of data obtained from the open-circuit and short-circuit tests. 10

9. Why do electric arc furnaces use a 2-phase supply and how is such supply arranged ? **10**

10. Write short notes on ***any two*** of following. **2x5=10**

(a) Ward-Leonard speed control

(b) Draw vector diagrams for

(i) open delta connection

(ii) 3 -phase to 1-phase conversion

(iii) 3 - phase to 2-phase conversion

(iv) 3 -phase to 6-phase conversion

(c) Sketches of the core of 3-phase core type transformer and the shell of single phase shell type transformer.