01451

DIPLOMA - VIEP - ELECTRICAL ENGINEERING

Term-End Examination

December, 2010

BIEE-027 : ELECTRICAL MACHINES - I

Time : 3 hours *Maximum Marks : 70*

Note : *Five questions are to be answered. Each question carries* ***14*** *marks. Use of scientific calculator is* ***permitted.***

1. Explain armature reaction in a dc machine. What is the use of compensating windings ? **14**

2. Explain the voltage build up process in a dc shunt generator. Define critical field resistance, critical speed and critical load resistance for a dc shunt generator. **14**

3. (a) A 220V dc generator supplies 4kW at a terminal voltage of 220V, the armature resistance being 0.4Ω. If the machine is now operated at the same terminal voltage with the same armature current, calculate the ratio of generator speed to motor speed, assume the flux/pole is made to increase by 10% as the operation is changed over from generator to motor. **7**

   (b) Explain the parallel operation of compound generators. **7**

4. Draw the torque speed characteristics of a dc shunt, series and compound motor in one figure and compare them. **14**

5. A dc motor takes an armature current of 50A at its rated voltage of 240V. Its armature resistance is 0.2Ω. If an external resistance of 1Ω is inserted in series with the armature and the field flux remains unchanged, calculate **14**
   (a) % decrease or increase in speed for the same load torque.
   (b) % decrease or increase in speed for half of the load torque.

6. Explain how auto transformer is different from a two winding transformer. Give its merits and demerits over two winding transformer and its applications. **14**

7. Describe the sumpner's back to back test and explain how losses and efficiency from this test. **14**

8. A 100 kVA, 3 phase, 50 Hz, 3300/400V transformer is delta connected on the hv side and star connected on the lv side. The resistance of the hv winding is 3.5Ω per phase and that of the lv winding is 0.02Ω per phase. Calculate the iron losses of the transformer at normal voltage and frequency if its full load efficiency be 95.8% at 0.8pf (lag). **14**

9. What are the conditions required to be satisfied when connecting two or more transformers in parallel ? **14**

10. Write a short notes on ***any two*** of the following : **7+7=14**

(a) Three winding transformers

(b) Applications of dc motors

(c) Armature windings in dc machines