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BIEE-027

01499

DIPLOMA - VIEP - ELECTRICAL ENGINEERING

Term-End Examination

June, 2011

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 the process of commutation in a dc machine and discuss the methods to improve it. **14**

2. Explain the voltage build up process in a dc shunt generator. Describe with relevant diagrams the different methods of excitation of dc machines. **14**

3. (a) Draw the external characteristics of dc separately and shunt excited generator. Which one has more drooping characteristics and why ? **7**

(b) A 400 V dc shunt motor takes a current of 5.6 A on no load and 68.3 A on full load. Armature reaction weakens the field by 3% calculate the ratio of full load speed to no load speed. Given Ra = 0.18 Ω, brush voltage = 2V and Rf = 200 Ω **7**

4. A dc motor takes an armature current of 50 A at its rated voltage of 240 V. Its armature resistance is $0.2\,\Omega$. If an external resistance of $1\,\Omega$ 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.

5. Explain the regenerative method of determining the efficiency of a dc machine. List the merits and demerits of this method. **14**

6. Draw and explain the equivalent circuit of a single phase transformer. **14**

7. Explain the open circuit test and short circuit test of a transformer. **14**

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

9. Briefly explain the polyphase connections 3 phase to 2 phase, 3 phase to 6 phase and 3 phase to 12 phase. **14**

10. Write a short note on ***any two*** of the following. **7, 7**
    (a) Auto transformer
    (b) Connections in a 3 phase transformer
    (c) Lap and wave winding