

**B.Tech. - VIEP - ELECTRICAL ENGINEERING  
(BTELVI)**

**Term-End Examination**

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**December, 2016**

**BIEE-004 : ELECTRICAL MACHINES-I**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Answer any five questions. All questions carry equal marks. Use of scientific calculator is allowed.*

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1. (a) Explain the functions of the following parts of a D.C. machine : 7
- (i) Field poles
  - (ii) Yoke
  - (iii) Commutator
  - (iv) Commutating poles
  - (v) Armature
- (b) Give the advantages and uses of lap and wave windings. In what type of D.C. machine is wave winding employed and why? 7

2. (a) Explain with the help of neat sketches the phenomenon of commutation in D.C. machines. 7
- (b) State and discuss the methods adopted for minimising the sparking at the brushes in D.C. machines. 7
3. (a) Derive the e.m.f. equation of a D.C. generator. 7
- (b) The terminal voltage of a separately excited D.C. generator with constant excitation is constant and is equal to 250 V. Determine the percentage reduction in speed when the load changes from 250 kW to 150 kW. The armature resistance is  $0.012 \Omega$  and total contact drop at the brushes = 2 V. Neglect armature reaction. 7
4. (a) Give reasons for the following : 7
- (i) A shunt motor runs at almost constant speed irrespective of load current.
- (ii) A differential compound motor is rarely used.
- (b) Discuss the applications of shunt, series and compound D.C. motors. 7

5. (a) With the help of transformer phasor diagram for leading p.f. load, explain its working. 7
- (b) A 2200/220 V, 50 Hz, 1- $\phi$  transformer has an exciting current of 0.6 A and a core loss of 361 watts, when its h.v. side is energised at rated voltage. Determine the magnetising component of the exciting current. 7
6. (a) Outline the procedure for performing the short circuit test. What useful information is obtained from the short circuit test? 7
- (b) What is an auto-transformer? Write the advantages and disadvantages of an auto-transformer. 7
7. Write short notes on any *two* of the following: 7+7=14
- (a) Three-phase Transformer Connections
- (b) Comparison between Star and Delta Systems
- (c) Starting of D.C. Motors
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