

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE SEM-III Examination May 2012****Subject code: 130904****Subject Name: Electrical Machines - I****Date: 10/05/2012****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**

- Q.1** (a) Draw a neat sketch of a D.C. machine and label the component parts. **07**  
Name the material used for each component parts.
- (b) (1) Explain why a D.C. motor should not be started direct on line. **04**  
(2) Back e.m.f. in a D.C. motor is given as **01**  
(i)  $V + I_a R_a$  (ii)  $V - I_a R_a$   
(iii)  $V$  (iv)  $I_a R_a$
- (3) In a D.C. machine, the carbon brushes **01**  
(i) reduces commutator wear only,  
(ii) reduces commutator wear and also aid commutation,  
(iii) aid commutation wear.  
(iv) aid commutation wear but hinder in commutation.
- (4) The commutator segment of a D.C. machine are made up of **01**  
(i) Stainless steel (ii) Hard drawn copper  
(iii) Brass (iv) Bronze.
- Q.2** (a) State and explain the various losses which takes place in a d.c. machine. **07**
- (b) Explain and compare the various methods of speed control of D.C. motors. **07**
- OR**
- (b) A D.C. shunt machine when run as a motor on no-load takes 440W at 220V and runs at 1000rpm. The field current and armature resistance are 1A and 0.5Ω respectively. Calculate the efficiency of the machine when running **07**  
(1) As a generator delivering 40A at 220V,  
(2) As a motor taking 40A from a 220 supply.
- Q.3** (a) Describe the two types of rotor construction of three phase Induction motor. **07**
- (b) Write the equation for torque of a polyphase induction motor at any value of slip defining all the terms. **07**
- OR**
- Q.3** (a) Explain all the types of Induction motors and also clarify the meaning of 'SLIP' with a method of measuring the same. **07**
- (b) Explain why a.c. armature winding is known as a open winding whereas d.c. winding is closed winding and also explain working principle of a three phase induction motor. **07**
- Q.4** (a) Deduce e.m.f. equation of a Transformer. **07**
- (b) Define voltage regulation of a Transformer and deduce the expression **07**

for voltage regulation.

**OR**

- Q.4** (a) Explain why a Transformer primary draws current from the supply even when the secondary is open circuit. Also explain the purpose do these current serves. **07**
- (b) List out all the items of he name plate of Transformer and also explain the meaning of all. **07**

- Q.5** (a) List out the D.C.generators by the means of excitation and explain all in detail. **07**
- (b) Explain in detail armature reaction. **07**

**OR**

- Q.5** (a) Explain the checkpoints which should be consider at the time of connection of alternator with the bus bar. **07**
- (b) Explain in detail commutation. **07**

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