

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III • EXAMINATION – WINTER • 2014

Subject Code: 2130904

Date: 30-12-2014

Subject Name: D. C. Machines and Transformer

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) Justify: 06**
- (i) C.T secondary should never be kept open in any circumstances.
 - (ii) DC Series motor should never be started without mechanical load
 - (iii) Pole shoe section of DC machine is made larger than its body.
- (b) Explain each part of DC machine with neat sketch. 08**
- Q.2 (a) The Hopkinson's test on two shunt machines gave the following results for full load : 07**
- Line Voltage=250V;Current taken from supply excluding field currents=50A;
Motor armature current=380A; field currents 5A and 4.2A.
Calculate the efficiency of the machine working as a generator. Armature resistance of each machine is 0.2 Ω .
- (b) Define Pitch Factor and Distribution factor. Enlist advantages and disadvantages of short pitch or fractional pitch coil. 07**
- OR**
- (b) State methods to control speed of DC shunt motor. Explain any one method in brief. 07**
- Q.3 (a) Discuss essential and desirable conditions to be satisfied for parallel operation of two single phase transformers. 07**
- (b) What is the necessity of starter in DC motor? Explain three point starter with neat sketch. 07**
- OR**
- Q.3 (a) Write a short note on On load tap changer. 07**
- (b) A shunt generator delivers 195A at terminal voltage of 250V.The armature resistance and shunt field resistance are 0.02 Ω and 50 Ω respectively. The iron and friction losses equal 950W. 07**
- Find:
- (i) Emf generated
 - (ii) Cu losses
 - (iii) Output of the prime mover
 - (iv) Commercial, Mechanical and Electrical efficiencies
- Q.4 (a) Derive an expression for saving of copper when auto transformer is used compared to Two winding transformer. 07**
- (b) Define armature reaction. Explain armature reaction effect in DC machine. How it can be minimized? 07**
- OR**
- Q.4 (a) Draw and explain characteristics of DC series generator. Also enlist applications of DC series generator. 07**

- (b) The following readings obtained from open and short circuit tests on 10KVA, 400/100V, 50HZ single phase transformer are: 07
O.C test: 100V, 4A, 80W on L.V. side
S.C. test: 10V, 20A, 120W on H.V. side
Compute:
(i) The equivalent circuit parameters referred to primary
(ii) Efficiency and voltage regulation at 0.8 p.f lagging

- Q.5 (a) Draw connection diagram and vector diagram for following connections of 3- 08
Phase transformer.
(i) Dd6
(ii) Dy1
(iii) Yz11
(iv) Dd0
(b) A Δ - Δ bank consisting of three 20 KVA, 2300/230V transformers supplies a load of 06
40KVA. If one transformer is removed, find for the resulting V-V connection.
(i) KVA load carried by each transformer
(ii) Percent of rated load carried by each transformer
(iii) Total KVA rating of the V-V bank
(iv) Ratio of the V-V bank to Δ - Δ bank transformer ratings.
(v) Percent increase in load on each transformer when bank is converted into V-V bank

OR

- Q.5 (a) Explain direct load test on single phase transformer with circuit diagram. 07
(b) Explain Scott connection in brief. 07
