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,120Won H.V. side

Compute:

(i) The equivalent circuit parameters referred to primary

(ii) Efficiency and voltage regulation at0.8 p.f lagging

Q.5 **(a)** Draw connection diagram and vector diagram for following connections of 3-Phase transformer. **08**

(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 40KVA.If one transformer is removed, find for the resulting V-V connection. **06**

(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**

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