

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- III (NEW) EXAMINATION – SUMMER 2015

Subject Code: 2130904

Dates: 11/06/2015

Subject Name: DC MACHINES AND TRANSFORMER

Time: 02.30pm-05.00pm

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)** Derive an emf equation for transformer with usual notation. **07**
- (b)** A shunt generator deliver 195A at 250V, armature and shunt field resistances are 0.02Ω and 50Ω respectively. The iron and friction losses are 950W. Calculate (1) Emf generated, (2) Total copper loss, (3) Output of prime-mover, (4) Mechanical efficiency, electrical efficiency and total efficiency. **07**
- Q.2 (a)** Explain Hopkinson's test with its advantages & disadvantages. **07**
- (b)** Explain O.C & S.C. test on 1- Φ transformer. **07**
- OR**
- (b)** A 200V 4-pole lap wound DC shunt motor has 800 conductors of its armature winding. The armature and field winding resistances are 0.5Ω and 200Ω respectively. Motor takes 21A and flux /pole is 30mwb. Find the torque and speed of the motor. **07**
- Q.3 (a)** Explain the constructional details of transformer. **07**
- (b)** A 200V dc shunt motor develops an output of 17.158kW, when taking 20.2kW. The field resistance and armature resistances are 50Ω and 0.06Ω respectively. What is the efficiency and input power if output power is 7.46kW? **07**
- OR**
- Q.3 (a)** List the methods of speed control of DC series motor, explain any one in detail. **07**
- (b)** A 40 kVA, single phase transformer has 400 turns on primary and 100 turns on secondary. The primary is connected to 2000 V. 50 Hz supply. Determine: (i) The secondary Voltage on open circuit. (ii) The current flowing through the two windings on full load. (iii) The maximum value of flux. **07**
- Q.4 (a)** Write a note on T-T connection for 3- Φ transformer. **07**
- (b)** A 600 kVA, 1-phase transformer has an efficiency of 92% both at full-load and half-load at unity power factor. Determine its efficiency at 60% of full load at 0.8 power factor lag. **07**
- OR**
- Q.4 (a)** What is DC motor? Derive its torque equation. **07**
- (b)** A 10 KVA, 2000/400 V single phase transformer has $R_1=5\Omega$, $X_1=12\Omega$, $R_2=0.2 \Omega$ and $X_2= 0.48\Omega$. Determine the equivalent impedance of the transformer referred to (1) primary (2) secondary side **07**
- Q.5 (a)** Describe parallel operation of transformer. **07**
- (b)** Explain the O.C. characteristic of DC shunt Generator, also define the critical resistance & speed from the characteristic. **07**
- OR**
- Q.5 (a)** Explain 3-point starter for DC motor. **07**
- (b)** Explain the transformer ON-LOAD with vector diagrams **07**
