

**Bachelor of Electrical Engineering(Evening),3<sup>rd</sup> Year 1st Semester  
Examination,2018(OLD)**

**SUBJECT : ELECTRICAL MACHINES-II**

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Time: Three Hours

Full Marks: 100 (50 each part)

**Use a separate Answer-Script for each part**

**Question  
No.**

**PART - I**

**Marks**

**Answer Question No.1 and any two from the rest.**

1.
  - i) Wave connected D.C. machines require equalizer connection-Justify. 6x3
  - ii) Due to armature reaction the magnetic neutral axis shifted against the direction of rotation for a D.C. generator - Justify.
  - iii) D.C. series motor should not be operated under no-load condition-Justify.
  - iv) For high current and low voltage D.C. machines, lap connection is preferred-Explain.
  - v) D.C. separately excited generator has better voltage regulation than the D.C. shunt generator-Explain.
  - vi) Hopkinsons method of testing of D.C. machines is called regenerative test-Explain.
  
2.
  - (i) What are the effects of armature reaction in D.C. machines and what are the methods of reducing it ? 8
  - (ii) What are the roles of Interpoles in the commutation process in D.C. machines ? 8
  
3.
  - (i) Derive the torque-current characteristics of D.C. shunt motor. Why D.C. shunt motors are extensively used in industry? 8
  - (ii) A 100 KW, belt driven shunt generator running at 300 rpm at 220 V bus-bars continues to run as a motor when the belt breaks, taking 10 KW. What will be its speed? Armature resistance of the machine is 0.025 ohm and the field resistance is 60 ohms. Contact drop under each brush is 1V. 8

4

- (i) Explain the external characteristics of D.C. compound generator. Explain why differentially compound D.C. generator is used in welding application. 8
- (ii) A direct current machine generates 200V on open circuit at 800 rpm. Armature resistance, including brushes is 0.4 ohm and the field resistance is 100 ohms. The input to the machine running as a motor on no-load is 3A at 200 V. Calculate the speed of the machine. 8

5.

- (i) Discuss in brief the different methods of speed control of D.C. shunt motor. 8
- (ii) Derive the expressions of load shared by two D.C. shunt generators when operated in parallel. 8

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**Use a separate Answer-Script for each part****PART - II****Answer any three. Question no. 3 carries the maximum marks**

1. (i) From the harmonics point of view core type of three phase transformer is better than the shell type three phase transformers. **5+5+6**
- (ii) What type of problem may arise for Y-y connected three phase transformer?
- (iii) How Delta winding is used to overcome the problems of harmonics in a three phase transformers?
2. (i) Draw the connection diagram and phasor diagram of the following connections. **6+4+6**
- a) Yz11 , b) Dz6
- (ii) Why Yy0 transformer cannot be connected to a Dd6 transformer?
- (iii) Discuss about the difficulties to incorporate tapings for tap-changing in the transformer windings.
3. (i) If one winding on either side becomes faulty in a Delta/delta connected transformer, how it can be operated in open delta to give three phase output to give a three phase output equal to 0.577 of the total rated output. **6+6+6**
- (ii) Explain the single phasing of three phase transformers.

**PART - II**

- (iii) Write down the advantages of tertiary winding.
4. (i) Draw and explain the phasor diagram of AC series motor. **8 + 8**
- (ii) Why Speed of a AC series motor is less than that of a equivalent DC series motor?
5. i) How single phase supply can be obtained from a three phase supply using a **Scott-connected** transformer? **4+12**
- ii) Resistive load of  $5\Omega$  and  $10\Omega$  are connected respectively across the teaser and main transformer secondaries of a Scott-connected arrangement of transformer, fed from 3-phase, 230V supply mains. If the main transformer primary to secondary turns ratio is 2 then determine the supply line currents. The magnetizing current and the internal impedance drops are neglected. Draw the phasor diagram computed.