

**INDIAN MARITIME UNIVERSITY**  
(A Central University, Government of India)  
**End Semester Examinations- June-July 2019**  
**Semester – III**  
**B.Tech (Marine Engineering)**  
**Electrical Mechanics – I (UG11T3306)**

Date: 20-07-2019

Maximum Marks: 100

Time: 3 Hrs

Pass Marks: 50

**PART – A**

**Marks:10 X 3=30**

**(All questions are compulsory)**

1. a) Draw circuit model of long shunt and short shunt dc compound generator. (3)
- b) Classify dc machines according to method of excitation. (3)
- c) What is necessity of starter for starting dc motor. List the starters of dc motors. (3)
- d) List speed control methods of dc motors. (3)
- e) Draw phasor diagram for practical transformer on no load. (3)
- f) Define all day efficiency of transformer. (3)
- g) Write parts of transformer with their functions. (3)
- h) Write uses of auto transformer. (3)
- i) Write advantages and disadvantages of ac transmission. (3)
- j) List dc and ac (LV & HV) switchgear components. (3)

**PART – B**

Marks:5X14=70

(Answer any 5 of the following)

2. a) Derive equation for emf generated in dc generator considering both types of windings i.e. wave and lap. (7)
- b) 4 pole, 220v, shunt motor has 540 lap wound conductors. It takes 32 amp from supply mains and develops output power of 5.595kw. the field winding takes 1 amp. The armature resistance is 0.09 ohm and flux per pole is 30 mwb. Calculate speed and torque developed in n-m. (7)
3. a) Explain in detail following terms in with reference to dc generator: Armature Reaction and Commutation. List appropriate measures to keep them under control. (7)
- b) A 4 pole, long shunt lap wound generator supplies 25kw at a terminal voltage of 500v. The armature resistance is 0.03 ohm, series field resistance is 0.04 ohm and shunt field resistance is 200 ohm. The brush drop may be taken as 1.0v. determine the emf generated. Also calculate the number of conductors if the speed is 1200 rpm and flux per pole is 0.05 wb. (7)

4. a) Draw neat and labelled diagram of 3-point starter of dc shunt motor. Explain its construction in brief. (7)
- b) An 8 pole generator has an output of 200 amp at 500 volt, lap connected armature has 1280, 240 commutator segments. If brushes are advanced 12 segments from the no load neutral axis, estimate armature demagnetizing and cross magnetizing ampere turns per pole. (7)
5. a) Draw neat circuit diagrams for open circuit and short circuit tests of transformer. Explain procedure in brief of conducting these tests. (7)
- b) A single phase transformer with a ratio of 440v/110v takes a no load current of 5amp at 0.2 power factor lagging. If the secondary supplies a current of 120 amp at a pf of 0.8 lagging, estimate the current taken by the primary. (7)
6. a) Draw equivalent circuit of transformer to show parameters on individual sides and explain significance of each parameter. (7)
- b) A 25kva, single phase transformer has 250 turns on the primary and 40 turns on the secondary. The primary is connected to 1500 volt, 50 hz mains. Calculate primary and secondary currents on full load, secondary emf and maximum flux in the core. (7)
7. a) Define efficiency of transformer. Derive condition for maximum efficiency. (7)
- b) A 600 kva, 1 phase transformer when working at unity pf has an efficiency of 92% at full load and also at half load. Determine efficiency when it operates at unity pf at 60% of full load. (7)
8. a) Write note in detail on use of current and potential transformer in industry. (7)
- b) Explain three wire dc distribution system. (7)

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