

**INDIAN MARITIME UNIVERSITY**  
(A Central University, Government of India)  
**End Semester Examination Dec 2019/Jan 2020**  
**B.Tech (Marine Engineering)**  
**Semester -III**  
**UG11T1306/2306 - Electrical Machines-I**

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**Date: 21.12.2019**  
**Time: 3 Hours**

**Max Marks: 70**  
**Pass Marks: 35**

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**Part – A (compulsory)**

**Answer the following (10x2=20 Marks)**

1. What are different types of generators based on construction?
2. What is back emf?
3. AC motor takes an armature current of 110 A at 480 V. The armature circuit resistance is  $0.2 \Omega$  and machine has 6 poles with lap-connected armature with 864 conductors. If flux per pole is  $0.05 \text{ Wb}$ , calculate speed.
4. How the speed of DC motor does reversed?
5. What is Transformer and its principle of operation?
6. Why transformer rating is in kVA?
7. What are the conditions for parallel operation of transformer?
8. What is an auto-transformer?
9. What is the use of circuit breaker in electrical system?
10. What is armature reaction and its effects?

**Part – B**

**Answer any 5 out of 7 questions (5 x 10= 50 marks)**

11. (a) Derive EMF equation of transformer.  
(b) A 25 kVA transformer has 500 turns on primary and 50 turns on secondary winding. The primary is connected to 3000 V, 50 Hz supply. Find the full load primary and secondary currents, the secondary emf and the maximum flux in the core. (Neglect leakage drop and no load primary current).  
(10 Marks)

12. What are the different losses taking place in transformer? Also give the expression for condition for maximum efficiency of transformer. (10 Marks)
13. Give the difference between core type and shell type transformer with proper sketch. (10 Marks)
14. Sketch the practical DC generator and write note on following parts of it.  
a. Yoke  
b. Pole core and pole shoe  
c. armature core  
d. armature windings  
e. Commutator. (10 Marks)
15. What is Swinburne's Test and its use? With the help of this test calculate full load current and efficiency for a 44.76 kW, 220 V, DC shunt motor having following results –  
Input current = 13.25 A                      Field current = 2.55 A  
Resistance of armature = 0.032  $\Omega$       brush drop = 2 V. (10 Marks)
16. Write note on Speed control methods of DC shunt motor. (10 Marks)
17. Draw and explain air circuit breaker (ACB) in detail. (10 Marks)

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