



Jansons Institute of Technology

Karumathampatti, Coimbatore – 641 659

R17-EE8301-ELECTRICAL MACHINES I

BE-EEE

Semester : III

Max Mark: 50

CIA- III

16.10.2019

Time: 90 Min

Instructions

1. Answer all the questions in Part – A, B & C

Part A

Mark: 5 x 2 = 10

1. Give the drawbacks of swinburne's test.
2. Why series motor should not be started at no load?
3. Enumerate the factors on which speed of a motor depend.
4. What are the categories of electromechanical energy conversion devices?
5. Give some examples of continuous energy conversion equipment and force producing equipment.

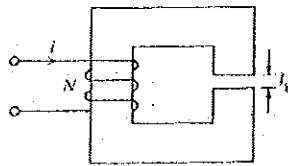
Part B

Mark: 2 x 13 = 26

- 6.a. Derive the field energy and force in a doubly excited system . (13)

(or)

- 6.b. The magnetic system in the figure has the following parameters: $N=500$, $i=2A$, Width of the airgap=2cm, depth of the air gap=2cm, length of the air gap=1mm. Neglect the reluctance of the core, leakage flux and fringing,
- (i) determine the force of attraction on both sides of the air gap.
 - (ii) determine the energy stored in the air gap.



- 7.a.A 220V DC series motor has armature and field resistance of 0.15 ohm and 0.10ohm respectively. It takes a current of 30 A from the supply (13)

while running at 1000rpm. If an external resistance of 1ohm is inserted in series with the motor, calculate the new steady state armature current and the speed. Assume the load torque is proportional to the square of the speed

(or)

- 7.b. A 220V shunt motor has armature and field resistance of 0.2 ohm and 220ohm respectively. The motor is driving a constant load torque and running at 1000rpm drawing 10A current from the supply. Calculate the new speed and armature current if an external armature resistance of 5 ohm is inserted in the armature circuit. Neglect armature reaction and saturation. (13)

Part C

Mark: 1 x 14 = 14

- 8.a. In an electromagnetic relay, functional relation between current I in the excitation coil, the position of armature is x , the flux linkage Ψ is given by $\Psi = 2\Psi^3 + 3\Psi(1-x+x^2)$, $x > 0.5$. Find the force on the armature as a function of Ψ . (15)

(or)

- 6.b i) Explain the method of retardation test and Hopkinson test for testing the efficiency of a DC machine. (15)

T.Meenakshi/EEE

HOD/EEE