PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer/Winter 2018-19 Examination

Semester: 3rd   Date: 12/12/2018
Subject Code: 03106202   Time: 2:00 PM to 4:30 PM
Subject Name: Electrical Machine-I   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than Five in case   **(15)**
of MCQ) (All are compulsory) (Each of one mark)

1. The DC series motor should always be started with load because
(A) At no load, it will rotate at dangerously high speed
(B) It will fail to start.
(C) It will not develop high starting torque.
(D) All are true.

2. Back emf in a DC motor is given as
(A) V+IaRa (B)V-IaRa (C) V (D) IaRa

3. The commutator segment of a D.C. machine are made up of
(A) Stainless steel (B) Hard drawn copper (C) Brass (D) Bronze.

4. For a D.C. generator when the number of poles and the number of armature conductors is fixed, then which winding will give the higher emf?
(A) Lap winding
(B) Wave winding
(C) Either of (a) and (b) above
(D) Depends on other features of design

5. For a transformer, the condition for maximum efficiency is _____.

6. A transformer having 100 turns of primary side is applied with 200 V AC. In order to get 400 V AC on secondary side the number of turns on secondary side must be _____.

7. In which part copper loss occur in transformer?

8. A DC generator running at 1600 rpm gives 240 V DC. If the speed is dropped to 1400 rpm without change in flux the new emf will be _____.

9. In a DC machine if P is the number of poles, N is the armature speed in rpm and then the frequency of magnetic reversals will be _____.

10. Which DC motor has approximately constant speed?
(A) Series motor
(B) Shunt motor
(C) Differential Compound motor
(D) All of the above

11. In D.C. generators, lap winding is used for _____ voltage and _____ current.

12. Define pole pitch.

13. Application of Dummy Coils in Machine.

14. If "k" is the degree of multiplicity and "P" is the number of poles, the number of parallel paths in a wave winding will be _____.

15. In which type of transformer part of primary winding also serves as the secondary winding?

Q.2 Answer the following questions. (Attempt any three)   **(15)**
A) Explain the principle of energy conversation. Explain the general block diagram representation of an electromechanical energy conversion model.
B) Compare lap and wave winding. (Any Five)
C) Derive an expression for saving of copper when auto transformer is used compared to two winding transformer.
D) Explain the open circuit characteristic of DC shunt generator. Also define the critical resistance speed from the characteristic.

Q.3 A) State and explain the various losses which take place in a DC machine. Derive the condition for   **(07)**
maximum efficiency of a DC generator.

B) A shunt generator delivers 195 A at terminal voltage of 250V. The armature resistance and shunt **(08)**
field resistance are 0.02Ω and 50Ω respectively. The iron and friction losses equal 950W.
Find: (a) EMF generated, (b) Cu losses, (c) Output of the prime mover, (d) Commercial, Mechanical
and Electrical efficiencies.

OR

B) Write working principle of DC motor. Derive its torque equation, the Equations for Armature **(08)**
torque and Shaft torque for DC Motor.

Q.4 A) Explain Swinburne's test experimental setup. Equation for efficiency if machine working as **(07)**
generator. Advantages and Disadvantages of Swinburne's test.

OR

A) Explain O.C. and S.C. test on single phase transformer with neat circuit diagram and draw **(07)**
equivalent circuit for single phase transformer.

B) What is the necessity of starters in DC motors? Explain 3 point starter for DC motor with neat **(08)**
sketch.