

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B. Tech. Winter 2022 - 23 Examination**

**Semester: 3**  
**Subject Code: 203106209**  
**Subject Name: Electrical Machines**

**Date: 06/10/2022**  
**Time: 2:00pm to 4:30pm**  
**Total Marks: 60**

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**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 energy stored in a magnetic field is given by \_\_\_\_\_ where L=self-inductance and Rl=reluctance.

- a)  $1/2 Li^2$
- b)  $1/2 (mmf \cdot Rl)^2$
- c)  $1/2 \phi Rl$
- d)  $1/2 \phi^2 i$

2. If dc voltage is applied to the primary of a transformer it may

- a) Work
- b) Burn the winding
- c) Not work
- d) Give lower voltage on the secondary side

3. During open circuit test (OC) of a transformer \_\_\_\_\_

- a) primary is supplied rated kVA
- b) primary is supplied full-load current
- c) primary is supplied current at reduced voltage
- d) primary is supplied rated voltage

4. Which of the following part is used in construction of DC machine but not in AC machine?

- a) Armature Winding
- b) Field winding
- c) Commutator
- d) Shaft

5. At standstill condition the value of slip is

- a) 0
- b) Infinity
- c) One
- d) None of the above

6. In BLDC motor field winding is kept on \_\_\_\_\_

7. Define synchronous speed in a three phase induction motor.

8. What are the advantages of shell type transformer over core type transformers?

9. What are the disadvantages of repulsion motor?

10. A three phase, 50 Hz induction motor has a full load speed of 1440 rpm. Rotor frequency is?

11. What is step up and step down transformer?

12. What are the various types of dc motors?

13. Mention the methods of speed control for a dc motor?

14. What is an end ring?

15. The squirrel cage rotor is also known as short circuited rotor. Why?

- Q.2** Answer the following questions. (Attempt any three) **(15)**
- A) Describe star -star and delta – delta connection of 3 phase transformer with neat diagram.
- B) A 4 pole, 3 phase induction motor operates from a supply whose frequency is 50 Hz. Calculate:
- (i) The speed at which the magnetic field of the stator is rotating.
  - (ii) The speed of the rotor when the slip is 0.04.
  - (iii) The frequency of the rotor currents when the slip is 0.03.
  - (iv) The frequency of the rotor currents at standstill.
- C) Discuss about stepper motor.
- D) Derive EMF equation of DC generator.

- Q.3** A) Draw the power flow diagram of a three phase induction motor and derive the torque developed in this machine. **(07)**

B) Explain the principle of energy conservation. Also explain general block diagram representation of an electromechanical energy conversion model. **(08)**

OR

B) Define voltage regulation. Draw the phasor diagram for lagging power factor and determine voltage regulation. **(08)**

- Q.4** A) Draw the characteristic curves of D.C. shunt, series and compound motors. Use these curves to explain the applications for which these motors are used. **(07)**

OR

A) A shunt generator delivers 450 A at 230 V and the resistance of the shunt field and armature are 50 ohm and 0.03 ohm respectively. Calculate the generated emf? **(07)**

B) List out all speed control methods of three phase induction motor. Discuss in brief. **(08)**