| Seat No.: | Enrolment No. |
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## **GUJARAT TECHNOLOGICAL UNIVERSITY**

## **BE - SEMESTER- III EXAMINATION - SUMMER 2015**

Subject Code:130904 Date:11/06/2015

**Subject Name: Electrical Machine I** 

Time: 02.30pm-05.00pm Total Marks: 70

**Instructions:** 

1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

| 8 4 4 8317 |     |     | o g                                                                                                                                                                                                                                                                                                                     |      |
|------------|-----|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|            | Q.1 | (a) | Explain Swineburne's test to determine efficiency of a DC machine. State its                                                                                                                                                                                                                                            | 07   |
|            |     | (b) | advantages as well as disadvantages.<br>Clearly explain working principle of DC Generator and subsequently derive equation of generated emf.                                                                                                                                                                            | 07   |
| 1          | Q.2 | (a) | Explain critical resistance and critical speed with suitable diagram.                                                                                                                                                                                                                                                   | 07   |
|            | Q.2 | (b) | A DC shunt generator delivers 190 A at a terminal voltage of 240 V. The armature resistance and shunt field resistance are 0.02 ohm and 60 ohm respectively. The core loss and mechanical losses amounts to 900 W. Calculate (A) Total cu loss (B) BHP of prime mover (C) overall electrical and conversion efficiency. | 07   |
|            |     | (b) | OR                                                                                                                                                                                                                                                                                                                      | 07   |
|            | Q.3 | (a) | Explain power stages with different losses and derive condition for maximum                                                                                                                                                                                                                                             | 07   |
|            |     | (b) | power developed for DC motor.  What is meant by armature reaction? Describe its effects on the operation of DC machines and state methods to minimize it.  OR                                                                                                                                                           | 07   |
|            | Q.3 | (a) | Derive the equivalent circuit of a single phase transformer and highlight its importance from analytical point of view.                                                                                                                                                                                                 | 07   |
|            |     | (b) | · · · · · · · · · · · · · · · · · · ·                                                                                                                                                                                                                                                                                   | 07   |
|            | Q.4 |     |                                                                                                                                                                                                                                                                                                                         | 07   |
|            |     | (b) | three phase induction motor with reference to                                                                                                                                                                                                                                                                           | - 07 |
|            | Q.4 | (a) | 50 He industion motor is 50 kW. The total stator                                                                                                                                                                                                                                                                        | 07   |
|            |     | (b) | Define voltage regulation of an alternator Explain the synchronous impedance method of determining regulation of an alternator.                                                                                                                                                                                         | 07   |
|            | Q.5 | (a) | Derive EMF equation of alternator and explain coil span factor and distribution factor.                                                                                                                                                                                                                                 | 07   |
|            |     |     |                                                                                                                                                                                                                                                                                                                         |      |