

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2019

**Subject Code: 2131005**

**Date: 18/06/2019**

**Subject Name: Electrical Machines**

**Time: 02:30 PM TO 05:00 PM**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

|     |     |                                                                                                            | MARKS |
|-----|-----|------------------------------------------------------------------------------------------------------------|-------|
| Q.1 | (a) | Explain working principle and derive the emf equation of single phase transformer.                         | 03    |
|     | (b) | Explain the main parts of a D.C. machine with neat diagram.                                                | 04    |
|     | (c) | Explain different types of D C Generator according to its field winding.                                   | 07    |
| Q.2 | (a) | What is load factor, diversity factor and plant utilization factor?                                        | 03    |
|     | (b) | Explain power factor. How can we improve power factor?                                                     | 04    |
|     | (c) | Explain open circuit and short circuit test on single phase transformer.                                   | 07    |
|     |     | <b>OR</b>                                                                                                  |       |
|     | (c) | What is regulation of alternator. Explain ZPF method for finding regulation in alternator.                 | 07    |
| Q.3 | (a) | Explain the losses of transformer. How these losses are reduce?                                            | 03    |
|     | (b) | What is need of starter in DC machine? Explain construction and working of three point starter.            | 04    |
|     | (c) | What is slip in induction motor? Explain torque/slip characteristics of induction motor.                   | 07    |
|     |     | <b>OR</b>                                                                                                  |       |
| Q.3 | (a) | Explain equipments used in a substation.                                                                   | 03    |
|     | (b) | What is the role of damper winding in (i) synchronous generator and (ii) synchronous motor?                | 04    |
|     | (c) | With help of phasor diagram explain the operation of practical transformer on load.                        | 07    |
| Q.4 | (a) | Give comparison of squirrel cage and wound rotor motors.                                                   | 03    |
|     | (b) | State types of single-phase induction motor and explain any one.                                           | 04    |
|     | (c) | Write advantages and application of auto transformer.                                                      | 07    |
|     |     | <b>OR</b>                                                                                                  |       |
| Q.4 | (a) | State advantages and disadvantages of hydro power plant.                                                   | 03    |
|     | (b) | Explain the working principle of synchronous motor and state the methods of starting of synchronous motor. | 04    |
|     | (c) | Explain scott connection in transformer.                                                                   | 07    |

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|------------|------------|----------------------------------------------------------------------------------------|-----------|
| <b>Q.5</b> | <b>(a)</b> | Write different starters used for 3 phase induction motor and explain any one of them. | <b>03</b> |
|            | <b>(b)</b> | Explain the Swinburne's test of a d.c. machine                                         | <b>04</b> |
|            | <b>(c)</b> | Explain equivalent circuit of the single phase transformer.                            | <b>07</b> |
| <b>OR</b>  |            |                                                                                        |           |
| <b>Q.5</b> | <b>(a)</b> | Draw and explain the internal & external characteristics of d.c. shunt generators.     | <b>03</b> |
|            | <b>(b)</b> | Explain armature reaction of the d.c. machine. Give its remedies also.                 | <b>04</b> |
|            | <b>(c)</b> | Explain three phase four wire and three phase three wire AC system and merits of each. | <b>07</b> |

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