# GUJARAT TECHNOLOGICAL UNIVERSITY
## BE- SEMESTER–IV (NEW) EXAMINATION – WINTER 2020

**Subject Code: 3140913**                                **Date: 15/02/2021**
**Subject Name: Electrical Machine- I**
**Time: 02:30 PM TO 04:30 PM**                       **Total Marks: 56**

**Instructions:**
1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

|   |   |   | Marks |
|---|---|---|---|
| **Q.1** | **(a)** | What is tap changing? Why is it required? | **03** |
| | **(b)** | Distinguish between singly excited and doubly excited magnetic systems. | **04** |
| | **(c)** | Sketch diagram of 3 point starter and explain working. | **07** |
| | | | |
| **Q.2** | **(a)** | Why Secondary of current transformer should not be open? | **03** |
| | **(b)** | What is the necessity of starter in a DC motor? | **04** |
| | **(c)** | Define Pitch Factor and Distribution factor. Enlist advantages and disadvantages of short pitch or fractional pitch coil. | **07** |
| | | | |
| **Q.3** | **(a)** | Derive the EMF equation of a DC generator from first principle. | **03** |
| | **(b)** | Mention the conditions for satisfactory parallel operation of three phase transformers. | **04** |
| | **(c)** | Explain the procedure and calculations for Field test on identical DC series machines. | **07** |
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| **Q.4** | **(a)** | Derive the equation of pitch factor for short pitch coil. | **03** |
| | **(b)** | Draw the vector diagram of a transformer on load. Consider the winding resistances, leakage reactance and no load losses. | **04** |
| | **(c)** | Draw and explain internal and external characteristics of dc series generator. | **07** |
| | | | |
| **Q.5** | **(a)** | Describe function of compensating winding. | **03** |
| | **(b)** | Draw the schematic diagrams and explain the winding connections for the short shunt and long shunt compound generators. | **04** |
| | **(c)** | Enlist different speed control methods of DC shunt motor. Explain any one method. | **07** |
| | | | |
| **Q.6** | **(a)** | State advantages and disadvantages of Swinburne's test. | **03** |
| | **(b)** | Define armature reaction. Explain cross magnetizing and demagnetizing effects of armature reaction in brief. | **04** |
| | **(c)** | Explain the direct load test for determination of voltage regulation and efficiency of transformer with necessary diagram. | **07** |
| | | | |
| **Q.7** | **(a)** | Justify following statements: <br> i. Transformer core is laminated. <br> ii. Transformer rating is in KVA. | **03** |
| | **(b)** | Differentiate between core type and shell type transformer. | **04** |
| | **(c)** | Explain V-V connection of 3 phase transformer. | **07** |

**Q.8** **(a)** Explain polarity test of single phase transformer. **03**

**(b)** Draw connection diagrams and winding diagrams for Dd0, Yd1, and Dy11. **04**

**(c)** Derive an expression for saving of copper when auto transformer is used compared to Two winding transformer. **07**