Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **14EE2005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DC MACHINES AND TRANSFORMERS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Show the relation between energy and co-energy for a linear system. | CO1 | 5 |
| b. | Derive the expression for energy stored in a singly excited electromechanical energy conversion system. | CO1 | 15 |
| (OR) | | | | |
| 2. | a. | Discuss about electromechanical energy conservation with neat block diagram. | CO1 | 12 |
| b. | Compare and contrast separate, shunt, series and compound method of excitations of DC machines. | CO1 | 8 |
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| 3. | a. | State the principle of operation of generator. Elaborate the constructional details of DC generator with neat diagram. | CO1 | 12 |
| b. | Derive the EMF equation of a DC generator. | CO1 | 8 |
| (OR) | | | | |
| 4. | a. | Describe about the no-load characteristics of DC generator. | CO1 | 8 |
| b. | Explain, in detail, armature reaction in DC machine with suitable diagrams and its effects on the performance of DC machine. How it is minimized? | CO1 | 12 |
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| 5. | a. | Explain the principle of operation of a DC motor. | CO1 | 10 |
| b. | A 230V, DC shunt motor, takes an armature current at 3.33A at rated voltage and at a no load speed of 1000rpm. The resistances of the armature circuit and field circuit are 0.3Ώ and 160Ώ respectively. The line current at full load and rated voltage is 40A. Calculate, at full load, the speed and the developed torque in case the armature reaction weakens the no load flux by 4%. | CO1 | 10 |
| (OR) | | | | |
| 6. | a. | Draw and explain the mechanical characteristics of DC series and shunt motor. | CO2 | 8 |
| b. | Elaborate three point DC shunt motor starter. | CO2 | 12 |
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| 7. | a. | Explain the operation of transformer and derive its equivalent circuit with respect to primary. | CO2 | 12 |
| b. | A 100 kVA, 50 Hz, 440/11000 V, 1-phase transformer has an efficiency of 98.5% when supplying full-load current at 0.8 power factor lagging and an efficiency of 99% when supplying half full load current at unity power factor. Find the core losses and the copper losses corresponding to full-load current. At what value of load current will the maximum efficiency be attained? | CO3 | 8 |
| (OR) | | | | |
| 8. |  | Explain indirect method of testing DC machines and mention the separation of losses. | CO3 | 20 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss about saving of copper in autotransformer. | CO2 | 10 |
| b. | Explain the principle of operation of autotransformer with neat diagram. | CO2 | 10 |