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



**End Semester Examination – Nov / Dec – 2019**

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Illustrate and explain the electromechanical energy conservation. | CO1 | 10 |
| b. | Compare and contrast different methods of excitation in DC machines. | CO1 | 10 |
| (OR) | | | | |
| 2. |  | Explain singly excited magnetic field system in electromechanical energy conversion systems. Derive the expression for energy stored in a singly excited electromechanical energy conversion system. | CO1 | 20 |
|  |  |  |  |  |
| 3. | a. | Discuss the effect of armature reaction in a DC shunt generator. How are its cross magnetizing and demagnetizing ampere turns per pole is calculated? | CO1 | 15 |
|  | b. | Determine the flux per pole for 6-pole DC machine having 240 wave connected conductors, which generates an open circuit voltage of 500V while running at 1000rpm. | CO1 | 5 |
| (OR) | | | | |
| 4. |  | State the principle of operation of generator. Explain the constructional details of DC generator with neat diagram. Derive the EMF equation of a DC generator from the principles. | CO1 | 20 |
|  |  |  |  |  |
| 5. | a. | The armature winding of a 4 pole, 250V DC shunt motor is lap connected. There are 120 slots, each slot containing 8 conductors. The flux per pole is 20mWb and current taken by the motor is 25A. The resistance of the armature and field circuit are 0.1ohm and 125ohm respectively. If the rotational losses amount to be 810W, find a) armature torque b) useful torque c) efficiency | CO2 | 10 |
|  | b. | A 500V DC Shunt motor has armature resistance and field resistance of 0.5Ω and 200 Ω respectively. When loaded and taking a total input of 25kW, it runs at 400 rpm. Find the speed at which it must be driven as a shunt generator to supply power of 25kW at a terminal voltage of 500V. | CO2 | 10 |
| (OR) | | | | |
| 6. |  | Illustrate the circuit digrams and explain the operation of three types of DC motor with their characteristics. | CO1 | 20 |
|  |  |  |  |  |
| 7. |  | Describe with neat sketches the constructional details of a transformer and derive its equivalent circuit with respect to primary. Also, brief about the action of transformer on ‘no-load’ and ‘on-load’ with the help of phasor diagrams. | CO2 | 20 |
| (OR) | | | | |
| 8. | a. | Outline the need for starters for DC motors. With a neat diagram, discuss the operation of the three point starter. | CO2 | 12 |
|  | b. | Name the three methods of Electrical braking. Explain any two with the help of diagrams. | CO2 | 8 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. |  | Describe the constructional features of an auto-transformer and deduce its equivalent circuit. | CO3 | 20 |