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

**Supplementary Examination – June – 2017**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **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. |  | Describe the working principle of a DC Generator and its constructional details with neat diagrams. | CO2 | 20 |
| (OR) | | | | |
| 2. | a. | Portray the basic electromechanical energy conversion system with necessary diagrams. | CO1 | 7 |
| b. | A separately excited DC Generator running at 1000 rpm is supplied 110A at 220V to a resistive load. If the load resistance remains constant, what will be the load current if the speed is reduced to 800 rpm? Armature resistance is 0.02 Ω. Field current is unaltered. Assume a voltage drop of 1V per brush. Ignore the effect of armature reaction | CO3 | 7 |
| c. | Compare lap and wave windings of a DC Machine. | CO1 | 6 |
| 3. | a. | A 110 KW belt driven DC Shunt generator runs at 375 RPM on 220V Bus bar continues to run as a DC Motor when the belt breaks taking a Power of 5.5 KW. Obtain its speed as a DC Motor, if the armature and field resistances are 0.025 Ω and 110 Ω respectively. Assume BCD as 1V per brush | CO3 | 10 |
| b. | Derive the emf equation of a DC Generator. | CO2 | 6 |
|  | c. | Sketch the O.C.C. of DC Generator. | CO1 | 4 |
| (OR) | | | | |
| 4. | a. | With neat diagrams, discuss the various speed control methods of DC Motor. | CO3 | 10 |
| b. | List out the applications of shunt, series and compound type DC Motor. | CO2 | 10 |
| 5. | a. | Obtain the torque equation of a DC Motor. | CO3 | 6 |
| b. | Determine the no load speed, full load speed and speed regulation, for a 4-pole, 230V, 20kW DC shunt motor having the following details: If or Ish = 4A, Ra = 0.04 Ω, Φ = 0.04wb, Z = 160, A = 2, full load current Ilf = 84A, no load current Ilo = 8A. | CO3 | 8 |
| c. | Elucidate the working of 3-point starter for a DC Motor with neat diagram | CO1 | 6 |
| (OR) | | | | |
| 6. | a. | Analyze the performance of DC Shunt and Series Motor with various characteristics. | CO2 | 8 |
| b. | A DC motor has the following specifications: 10 hp, 37.5 A, 230V; flux/pole = 0.01 Wb, number of poles = 4, number of conductors = 666, number of parallel paths = 2. Armature resistance = 0.267Ω. The armature reaction is negligible and rotational losses are 600W. The motor operates from a 230V DC supply. If the motor runs at 1000 rpm, the output torque produced in (in Nm) is \_\_\_\_\_\_\_\_\_\_. | CO3 | 12 |
| 7. | a. | Acquire the emf equation of a transformer. | CO1 | 8 |
| b. | A 20 kVA, 440V / 220V single phase transformer has resistances 0.09Ω and 0.022 Ω. The values of reactances are 0.15Ω and 0.037Ω. Calculate for the transformer: Total resistance referred to primary (Rt1); Total resistance referred to secondary(Rt2); Total reactance referred to primary (Xt1); Total reactance referred to secondary (Xt1); Full-load copper loss (Total) WcuT. | CO3 | 12 |
| (OR) | | | | |
| 8. | a. | Explain the principle of operation of Transformer and mention its types | CO1 | 8 |
| b. | A 3.3 kV/240 V 1- phase transformer draws a no-load current of 0.7A and absorbs 650W on no-load. Find the magnetizing current (Im) and iron loss current (Iw or Il) | CO2 | 6 |
|  | c. | Sketch the no load phasor diagram of a single phase transformer. | CO1 | 6 |
|  | | **Compulsory:** |  |  |
| 9. |  | Derive the equivalent circuit of ideal single phase transformer in steps with reference to the primary side with necessary diagrams. | CO3 | 20 |

ALL THE BEST