**20EE304**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **March, 2022** | **Electrical and Electronics Engineering** | | |
| **Third Semester** | **DC MACHINES AND TRANSFORMERS** | | |
| **Time:** Three Hours | | **Maximum: 7**0 Marks | |
| *Answer Question No.1 compulsorily.* | | | (14X1 = 14 Marks) |
| *Answer ONE question from each unit.* | | | (4X14=56 Marks) |

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| 1. | a) | | Define magnetic flux density. | CO1 |  |
|  | b) | | Define magnetic reluctance. | CO1 |  |
|  | c) | | Write the expression for energy stored in magnetic circuit in terms of current. | CO1 |  |
|  | d) | | What is the principal operation of D.C generator? | CO2 |  |
|  | e) | | Draw the open circuit characteristics of D.C Generator. | CO2 |  |
|  | f) | | What are the applications of D.C generator? | CO2 |  |
|  | g) | | What is the condition for maximum efficiency in D.C machines? | CO3 |  |
|  | h) | | Draw the speed torque characteristics of a D.C shunt motor. | CO3 |  |
|  | i) | | What are the losses in a D.C machine? | CO3 |  |
|  | j) | | List the speed control methods of D.C motor. | CO3 |  |
|  | k) | | Define the voltage regulation of a transformer | CO4 |  |
|  | l) | | List the various losses occurred in a transformer. | CO4 |  |
|  | m) | | Draw the no load phasor diagram for a single phase transformer | CO4 |  |
|  | n) | | List the conditions to be satisfied for parallel operation of transformer. | CO4 |  |
| **Unit - I** | | | | | |
| 2. | a) | Give comparison between electric and magnetic circuits. | | CO1 | 7M |
|  | b) | An iron ring of mean length 100 cm with an air gap of 2mm has a winding of 500 turns. The relative permeability of iron is 600. When a current of 3A flows in the winding. Determine the flux density, Neglect fringing. | | CO1 | 7M |
| **(OR)** | | | | | |
| 3. | a) | Express magnetic field energy stored in single excited magnetic system in terms of current. | | CO1 | 7M |
|  | b) | Derive an expression for the force developed in a permanent magnet system | | CO1 | 7M |
| **Unit - II** | | | | | |
| 4. | a) | Derive the EMF equation of a DC generator. | | CO2 | 7M |
|  | b) | A 4 pole lap wound DC shunt generator has a useful flux per pole of 0.07 Wb. The armature winding consist of 220 turns, each turn having a resistance of 0.004 Ω. Calculate the terminal voltage when running at 1000 rpm if the armature current is 60 A? | | CO2 | 7M |
| **(OR)** | | | | | |
| 5. | a) | Explain the effects of armature reaction in a D.C generator. | | CO2 | 7M |
|  | b) | Draw internal and external characteristics of D.C shunt and series generator, explain them. | | CO2 | 7M |
| **Unit - III** | | | | | |
| 6. | a) | Sketch and explain the different characteristics of D.C. series motor. | | CO3 | 7M |
|  | b) | A 220 V D.C. shunt motor draws a no-load armature current of 2.5 A when running at 1400 rpm. Determine its speed when taking an armature current of 60 A, If armature reaction weakens the flux by 3%. | | CO3 | 7M |
| **(OR)** | | | | | |
| 7. | a) | Explain the method of controlling the speed of a D.C shunt motor by Ward-Leonard system. | | CO3 | 7M |
|  | b) | Find the efficiency of D.C shunt machine using Swinburne’s test. | | CO3 | 7M |
| **Unit - IV** | | | | | |
| 8. | a) | Derive the EMF equation of 1-phase Transformer. | | CO4 | 7M |
|  | b) | Discuss the procedure for O.C and S.C test on a single phase transformer with circuit diagrams. | | CO4 | 7M |
| **(OR)** | | | | | |
| 9. | a) | Explain the concept of three phase to two phase conversion (Scott connection) with a neat circuit diagram. | | CO4 | 7M |
|  | b) | Demonstrate the working of an off-load tap-changer with the help of a neat-schematic diagram. | | CO4 | 7M |

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