**20EE304**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular / Supplementary) DEGREE EXAMINATION** | | | |
| **February,2023** | **Electrical & Electronics Engineering** | | |
| **Third Semester** | **DC Machines & 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) | | | State the Ampere’s law? | CO1 | L1 |  |
|  | b) | | | Define leakage flux and Fringing Effect | CO1 | L1 |  |
|  | c) | | | Write the expression for energy stored in an inductor? | CO1 | L1 |  |
|  | d) | | | Mention the function of yoke in a dc machine? | CO2 | L2 |  |
|  | e) | | | Mention the conditions for self-excitation in Dc generators? | CO2 | L2 |  |
|  | f) | | | Define the Commutation? | CO2 | L1 |  |
|  | g) | | | State the Fleming’s left hand rule? | CO3 | L1 |  |
|  | h) | | | Write the torque expression in a dc motor? | CO3 | L1 |  |
|  | i) | | | What is the necessity of a starter? | CO3 | L1 |  |
|  | j) | | | Mention the applications of DC Series motor? | CO3 | L1 |  |
|  | k) | | | Draw equivalent circuit of a 1-ϕ transformer. | CO4 | L2 |  |
|  | l) | | | Define All-Day Efficiency. | CO4 | L1 |  |
|  | m) | | | Define the auto transformer? | CO4 | L1 |  |
|  | n) | | | What are the necessary conditions for making the parallel operation of single phase transformers? | CO4 | L1 |  |
|  | | **Unit - I** | | | | | |
| 2. | a) | | Compare Electric and magnetic circuits? | | CO1 | L3 | 7M |
|  | b) | | Explain about the B-H curve of magnetic materials? | | CO1 | L2 | 7M |
|  | | **(OR)** | | | | | |
| 3. | a) | | Derive an expression for (i) Electrical Energy input (ii) Magnetic energy stored and (iii) Mechanical Work done for a singly-excited magnetic Systems. | | CO1 | L2 | 7M |
|  | b) | | Derive the expression for torque developed in a doubly-Excited magnetic system. | | CO1 | L2 | 7M |
|  | | **Unit - II** | | | | | |
| 4. | a) | | Classify the DC Generators based on excitation and also derive the EMF Equation of a DC Generator. | | CO2 | L2 | 7M |
|  | b) | | Explain about the armature reaction in DC machine with neat sketch? | | CO2 | L2 | 7M |
|  | | **(OR)** | | | | | |
| 5. | a) | | Explain about the parallel operation of DC Shunt generators? | | CO2 | L2 | 7M |
|  | b) | | (i) A four pole generator having wave-wound armature winding has 51 slots, each slot containing 20 conductors. What will be the voltage generated in the machine when driven at 1500 rpm assuming the ﬂux per pole to be 7.0 mWb ?(ii) A shunt generator delivers 250 A at 230 V and the resistance of the shunt field and armature are 60 Ω and 0.05 Ω respectively. Calculate the generated e.m.f? | | CO2 | L4 | 7M |
|  | | **Unit - III** | | | | | |
| 6. | a) | | Explain the different speed controlling methods of DC shunt and Series motors? | | CO3 | L2 | 7M |
|  | b) | | A 250 volt d.c.shunt motor has armature resistance of 0.25 ohm, on load it takes an armature current of 50 A and runs at 750r.p.m. If the flux of motor is reduced by 10% without changing the load torque, find the new speed of the motor. | | CO3 | L4 | 7M |
|  | | **(OR)** | | | | | |
| 7. | a) | | Explain about the 3-point starter with neat sketch? Mention the limitation of 3-point starter over 4-point starter. | | CO3 | L1 | 7M |
|  | b) | | Explain the procedure to Pre- determine the efficiency of a DC Machine by using Swinburne’s test with a neat sketch. | | CO3 | L2 | 7M |
|  | | **Unit - IV** | | | | | |
| 8. | a) | | Explain about the OC and SC test on single phase transformer? | | CO4 | L2 | 7M |
|  | b) | | The following readings were obtained from O.C. and S.C. tests on 8 kVA 400/ 120V,50-Hz transformer.  O.C. Test: (l.v. side) : 120 V; 4 A; 75 W.  S.C. Test: (h.v.side) : 9.5 V; 20 A; 110W  Obtain  a) The equivalent circuit (approximate) constants,  b) Voltage regulation and efficiency for 0.8 lagging power factor load, and  c) The efficiency at half full – load and 0.8 power factor load. | | CO4 | L1 | 7M |
|  | | **(OR)** | | | | | |
| 9. | a) | | Derive an expression for saving of copper an auto transformer comparing with two-winding ordinary transformer. Mention limitation of Auto transformer. | | CO4 | L1 | 7M |
|  | b) | | Explain the Scott Connection for conversion of 3-ϕ to 2-ϕ system with a neat sketch. | | CO4 | L1 | 7M |

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