

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination –Summer 2023

Course: T.Y.B. Tech. Branch: Electrical Engineering. Semester: VI

Subject Code & Name: (BTEEC602-EE) Principles of Electrical Machine Design

Max Marks: 60

Date:15/07/2023

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

Q.1 Solve Any Two of the following.

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|--|------------|---|
| A) What are the limitations in the design of Electrical Machines? Explain them? | Remember | 6 |
| B) Explain briefly study of Magnetic, Electric, Dielectric material? | Understand | 6 |
| C) Define dielectric breakdown and dielectric strength of the dielectric material and Mention the various breakdown mechanisms | Remember | 6 |

Q.2 Solve Any Two of the following.

- | | | |
|---|------------|---|
| A) Derive expression of design of heating elements. | Remember | 6 |
| B) Explain the design procedure for chokes (Small Inductors). | Understand | 6 |
| C) A 250 V, 37kW, d.c. shunt motor has to exert a maximum torque of 150 per cent of full load torque during the starting period. The resistance of armature circuit is 0.2Ω and full load efficiency is 84 per cent. The number of studs is 8. Determine (i) The upper and lower limits of current during starting.
(ii) The resistance of each section. | Analyze | 6 |

Q.3 Solve Any Two of the following.

- | | | |
|---|------------|---|
| A) Define the following terms [1 M each]
1) Turn (2) lap winding (3) wave winding (4) Coil Span Factor
(5) Distribution Factor (6) Winding factor | Remember | 6 |
| B) What is the difference between AC and DC winding? | Understand | 6 |
| C) Define the concept of multiplex winding and give reasons for choosing them. | Understand | 6 |

Q.4 Solve Any Two of the following.

- | | | |
|---|------------|---|
| A) Explain different mode of heat dissipation. | Understand | 6 |
| B) Derive the equation of temperature rise of a machine when it is run under steady load conditions starting from cold condition? (Heating Time-Constant & Heating - Curve) | Remember | 6 |

C) Derive the expression for quantity of cooling medium (air, water, oil, hydrogen coolant) Remember 6

Q. 5 Solve Any Two of the following.

A) Derive expression for design of tank with tubes. Remember 6

B) Determine the dimensions of core & yoke for a 200 kVA, 50 Hz, single phase core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core laminations. Assume voltage per turn 14 V, max. Flux density 1.1 wb/m^2 , window space factor 0.32, current density 3 A/mm^2 & stacking factor = 0.9 the net iron area is 0.56 d^2 in a cruciform core. Also the width of largest stamping is 0.85 d . Analyze 6

C) Explain important and advantages of Computer Aided Designing of transformer and rotating machines Remember 6

***** End *****