

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: T.Y.B. Tech.

Branch :Electrical Engg and Allied Branches Semester :VI

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

Max Marks: 60

Date: 17/08/2022

Duration: 3.45 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 brief study of Magnetic, Electric, Dielectric material? | Remember | 6 |
| B) Explain in brief the various limitations in design of electrical machines. | Understand | 6 |
| C) What is the importance and purpose of specification in design and manufacturing of electrical machines? State the standard specification of transformer. | Remember | 6 |

Q.2 Solve Any Two of the following.

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|--|------------|---|
| A) Explain detail design of heating coils? | Understand | 6 |
| B) Grade the resistance of a 5 section starter for a 7.5 kW, 260 V, 750 r.p.m. d.c. shunt motor from the following data: | Analyze | 6 |

Maximum torque during starting period = 1.5 times full load torque ; full load efficiency =86.5 per cent. Armature circuit copper loss is 50 per cent of total loss. Field current = 2.6 A. Find the speed at each stud when the notching takes place.

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|----------------------------------|------------|---|
| C) Explain design of choke coil? | Understand | 6 |
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Q. 3 Solve Any Two of the following.

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|---|------------|---|
| A) Draw the winding diagram in developed form for a simplex lap wound 24slot, pole d.c. armature with 24 commutator segments. Also draw the sequence diagram to show the position of brushes. | Analyze | 6 |
| B) What is the concentric winding and what are the types? | Understand | 6 |
| C) What is the role of equalizer connections? Why do we dispose equalizer connection in case of simplex wave windings? | Understand | 6 |

Q.4 Solve Any Two of the following.

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|---|------------|---|
| A) What are the different modes of heat dissipation in electric machines? | Understand | 6 |
|---|------------|---|

What is thermal resistance? What is its unit?

- B) Derive the equation of temperature rise with time in electric machine. Remember 6
What is heating time constant?
- C) Explain and compare the distribution and power transformers? Understand 6

Q. 5 Solve Any Two of the following.

- A) A 250 kVA, 6600/400 V, 3 phase core type transformer has a total loss of 4800 W at full load. The transformer tanks is 1.25 m in height and 1 m x 0.5 m in plan. Design a Suitable scheme for tubes if the average temperature rise is to be limited to 35° C. The diameter of tubes is 50 mm and are spaced 75 mm from each other. The average height of tubes is 1.05 m. Specific heat dissipation due to radiation and convection is respectively 6 and 6.5 W/m² -°C. Assume that convection is improved by 35 per cent due to provision of tubes. Analyze 6
- B) A 100 kV A, 2000/400 V, 50 H, single phase shell type transformer has sandwich coils. There are two full h.v. coils, one full l.v. coil and two half l.v. coils. Calculate the value of leakage reactance referred to h.v. side. Also calculate p.u. leakage reactance. The data given is:
depth of h.v. coil = 40 mm, depth of l.v. coil = 36 mm,
depth of duct between h.v. and l.v. = 16 mm,
width of winding = 0.12 m, length of mean turn = 1.5 m.
The number of turns in h.v. winding are 200. Analyze 6
- C) Give the advantages of aided computer designing of transformer? Understand 6

*** End ***