



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

InSem Examination-II Summer 2025	
Exam Seat No.:	
Academic Year:2024-2025	Semester: VI
Class: TY	Program: B.Tech
Branch Code: ELE	Pattern:2022
Name of Course: Computer-Aided Machine Design	Course Code: ELE223011
Max. Marks:30	Duration:1.15 Hrs.

**Instructions:** Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains \_\_02\_\_ page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

**Marks CO**

**Question No. 1**

- 1 Solve any one (7) CO2
- a) Define heating time constant and hence derive the equation for the same with usual notations.
  - b) Define cooling time constant and hence derive the equation for the same with usual notations.

**Question No. 2**

- 2 a) The heat dissipating surface of an 8 kW of induction motor can be approximated as a cylinder of 0.7 m diameter and 1 m in length. The motor can be considered to be made up of homogeneous material weighing 380 kg and having specific heat of 725 J/kg-°C. The specific heat dissipation from its surface is 12W/m<sup>2</sup>-°C. Find the temperature rise of machine at full load if the efficiency is 86%. Also find thermal time constant of machine. (8) CO1

**OR**

- 2 b) Temperature rise of a transformer is 27 °C after one hour and 39.5 °C after two hours of starting from cold conditions. Calculate its final steady temperature rise and heating time constant. If its temperature falls from final steady value to 40 °C in 1.5 hour when disconnected, calculate its cooling time constant. The ambient temperature is 32 °C. (8) CO1

**Question No. 3**

- 3 Solve any one (7) CO2
- a) Derive the output equation in kVA for single transformer with usual notations.
  - b) Describe the procedure of design of tank with tubes and hence derive the expression for number of cooling tubes.

**Question No. 4**

- 4 a) A 300 kVA, 6600/415 V, three phase core type transformer has a total loss of 5000 Watt at full load. (8) CO2  
The transformer tank is 1.3 m in height and 1m×0.5m in plan. Calculate the number of tubes to be provided if 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 1.45 m. Specific heat dissipation due to radiation and convection is respectively 6 and 6.5 W/m<sup>2</sup> °C.

**OR**

- 4 b) Calculate the overall dimensions of a 250 kVA, 6600/400 V, 50 Hz, three phase core type transformer. (8) CO2

The following data may be assumed:

Emf per turn = 16 V, maximum flux density = 1.29 Wb/m<sup>2</sup>, current density = 2.51 A/mm<sup>2</sup>, window space factor = 0.3, overall height = overall width, stacking factor = 0.9. Use three stepped core.

Width of largest stamping = 0.9 d, net iron area = 0.6 d<sup>2</sup> where d is the diameter of circumscribing circle.

..... End of question paper.....