X

NPTEL

reviewer4@nptel.iitm.ac.in ▾

Courses » Transport Phenomena of Non-Newtonian Fluids

Announcements **Course** Ask a Question Progress FAQ

Unit 9 - Week 7: Heat Transfer Phenomena of Non-Newtonian Fluids

Register for Certification exam

Course outline

How to access the portal

Week 00

Week 1: Introduction of Non-Newtonian Fluids

Week 2: Rheology Measuring Instruments

Week 3: Equations of Change

Week 4: Momentum Transfer of Non-Newtonian Fluids

Week 5: Momentum Transfer of Non-Newtonian Fluids

Week 6: Flow of Non-Newtonian Fluids though

Week 07 Assignment 01

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2019-03-20, 23:59 IST.**

Week 07 Assignment 01

1) For non-isothermal conditions, the variations in density due to temperature gradient would cause: ***4 points***

- Changes in velocity profile due to natural convection
- Changes in density with time
- Changes in pressure with time
- None of the above a), b) and c) points are true

No, the answer is incorrect.
Score: 0

Accepted Answers:
Changes in velocity profile due to natural convection

2) For non-isothermal flow causing free convection, which of the following approximation is appropriate to incorporate changes in density due to temperature difference ***4 points***

- Poisson flow approximation
- Stokes flow approximation
- Boussinesq approximation
- None of the above a), b) and c) points are true

No, the answer is incorrect.
Score: 0

Accepted Answers:
Boussinesq approximation

3) Density variation with respect to the temperature can be approximated by Boussinesq approximation as ***4 points***

No, the answer is incorrect.
Score: 0

Accepted Answers:

4) Consider laminar free convection flow between two vertical plates (0.4cm apart from each other) at different temperatures 30°C and 130°C. Properties at averaged reference temperature are: thermal expansion coefficient 1×10^{-3} K^{-1}, kinematic viscosity 0.15cm^2/s. What is the average upward velocity of the fluid circulating between two plates due to natural convection alone? ***10 points***

- 5.73 cm/s
- 4.73 cm/s
- 3.73 cm/s
- 2.73 cm/s

No, the answer is incorrect.
Score: 0

Accepted Answers:
2.73 cm/s

5) The temperature distribution at the tip of a ball point pen due to the viscous dissipation is given by ***15 points***

what is the maximum dissipative temperature difference by warming of the pen due to viscous dissipation if the clearance between ball and holding cavity is 5×10^{-5} inch, diameter of ball is 1 mm, viscosity of ink is 10^4 cP, speed of writing 100 inch/min and thermal conductivity of ink is 5×10^{-4} cal/s.cm.ºC?

- 1.01K
- 0.01K
- 2.01K
- 3.01K

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.01K

6) Consider viscous heat generation between two coaxial cylinders maintained at different temperatures and are at distance 0.8cm apart. For this case temperature profile can be obtained as: ***15 points***

Outer rotating cylinder is at T_b = 50°C and inner stationary cylinder is at T_0 = 30°C. What is the temperature (in °C) at midpoint between two cylinders if Brinkman number is 1?

- 37.5
- 52.5
- 47.5
- 42.5

No, the answer is incorrect.
Score: 0

Accepted Answers:
42.5

7) Consider flow of a viscous lubricant between two horizontal surfaces. Top surface is moving at a velocity 500cm/s and is maintained under constant heat flux conditions, whereas the bottom surface is stationary and maintained at T_0 = 30°C. The temperature profile for this case can be obtained as: ***15 points***

where μ is viscosity of the lubricant (2g/cm.s) and k is the thermal conductivity of the fluid (4×10^{-4} cal/s.cm°C). what is the maximum temperature (in °C) for this confined slit flow geometry?

- 51.2
- 31.2
- 41.2
- 21.2

No, the answer is incorrect.
Score: 0

Accepted Answers:
41.2

8) Temperature due to viscous heating situation for fully developed laminar Newtonian flow in an infinitely long circular tube of radius R (=10cm) under adiabatic wall conditions can be approximated by: ***15 points***

where T_1 = 30°C is inlet temperature, viscosity of fluid μ = 1.923×10^{-4} g/cm.s, maximum velocity v_{zmax} = 2.73 cm/s, density of fluid ρ = 1g/cc, specific heat capacity of fluid C_p = 0.2407 cal/g/K, and thermal conductivity of fluid k = 6.60×10^{-5} cal/s.cm.k. What is the temperature at z = 100cm and at mid-point between centre of tube and wall of the tube in °C?

- 34.76
- 44.25
- 54.32
- 43.67

No, the answer is incorrect.
Score: 0

Accepted Answers:
34.76

Previous Page End