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22/11/23 (M)

(95)

Roll no.:

NATIONAL INSTITUTE OF TECHNOLOGY, HAMIRPUR, H.P.

Department of Material science and Engineering

End-Term Examinations (2023-24)

Transport Phenomena (MS-212)

Duration: *3 hours* ***Maximum Marks:*** *50 .*

Attempt all the questions. Explain with suitable diagram wherever necessary.

Q1: What is diffusion? What are the driving forces for diffusion? **[4]**

Q2: What are the different types of diffusion mechanism in solids? **[4]**

Q3: What is the analogy between the heat and mass transfer? **[4]**

Q4: Explain the applications of heat and mass transfer in metallurgical engineering with examples **[8]**

Q5: What is self-diffusion? What are the factors affect the self-diffusion? **[2]**

Q6: How diffusion of gasses take place through porous solids **[4]**

Q7: If the grain size of the Silver has increased four times, by what factor would the net diffusion by grain boundary diffusivity change? (assume that all grains rectangle in nature) **[4]**

Q8: Explain the difference between conduction, convection and radiation? **[4]**

Q9: What is Newton's law of viscosity and explain Newtonian and non- Newtonian fluids with examples. **[3]**

Q10: Derive the Navier-stokes equation and explain the use of Navier-stokes **[3]**

Q11: a) What is steady state flow? **[3+3]**

b) What is boundary layer phenomena?

Q12: What is thermal conductivity? What are the factors effect the thermal conductivity and how thermal conductivity changes with increasing alloying elements in Fe? **[4]**