MOST IMP QUESTION OF HEAT TRANSFER (3151909) FOR GTU EXAM

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1. Fundamental of Heat Transfer

1. Derive general heat conduction equation in **Cartesian co-ordinates**. Also deduce the equation for (1) steady state conduction(2) no heat source (3) no Heat source and steady state condition (4) one dimensional heat conduction equation without heat generation under steady state
2. Derive general heat conduction equation in **cylindrical coordinate system**
3. Derive general heat conduction equation in **spherical co-ordinates**

1. CONDUCTION (Steady state conduction)

4. Derive the one dimensional radial steady state heat conduction through **hollow sphere** without heat generation.
5. Derive the one dimensional radial steady state heat conduction through **hollow cylinder** without heat generation.
6. Explain **thermal Contact resistance**. How contact pressure effects thermal contact resistance?
7. Explain **electrical analogy** for heat conduction
8. What is the **“critical radius”** of insulation on a small diameter wire and a steam pipe? Explain its physical significance in both the cases & derive an expression for the same.

1. CONDUCTION (Unsteady state/ Transient conduction)

9. What is **lumped system analysis**? What are the assumption made in the lumped system analysis and when it is applicable?

10. What are **Fourier and Biot Number**? What is the physical significance of these number?

1. CONDUCTION (Fin)

11. Derive equations of temperature distribution and heat dissipation for **infinite long fin**.

12. Derive equations of temperature distribution and heat dissipation for **fin insulated** at tip.

13. Define and Explain significance of **fin effectiveness & fin efficiency**.

2. CONVECTION

14. For **forced convection** heat transfer, prove that $Nu = f(Re, Pr)$
15. By dimensional analysis show that in **free convection** the Nusselt number can be expressed as a function of Prandtl number and Grashof number.
16. Explain the concept of **thermal and hydrodynamic** boundary layers.

3.RADIATION

17. State & Explain the **Wien Displacement Law**. Show that Eb will be maximum when λmax. T = 2900 μmk
18. State & explain **Kirchhoff's law**. What are conditions under which it is applicable?
19. Define **Radiation Intensity**? Prove that the intensity of radiation is given by **Ib = Eb / π**
20. Define **shape factor**. Discuss salient features of shape factor.
21. What is **radiation shield**? Show that presence of n number of radiation shields reduces the Radiation heat transfer by a factor of (n+1).
22. What is **Radiosity** (J)? Show that the net radiant energy leaving the surface is given by **Q = AƐ * (Eb – J)/(1-Ɛ)**

4. HEAT EXCHANGER

23. Define and **classify** heat exchangers.
24. What are the **fouling factors**? Explain their effect in Heat Exchanger design.
25. Derive an expression for **log mean temperature difference** of **counter flow** heat exchanger.
26. Derive an expression for **log mean temperature difference** of **parallel flow** heat exchanger.
27. Define Effectiveness. Derive an **expression for the effectiveness** of **parallel flow** heat exchanger.
28. Define Effectiveness. Derive an **expression for the effectiveness** of counter flow heat exchanger.

5. TWO PHASE HEAT TRANSFER

29. Draw **Boiling Curve** and Discuss in details the various regimes in boiling
30. Explain **drop wise and film wise** condensation.

THANK YOU

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