

KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg) 2012 Admission
IInd Semester Final Examination- July -2013

Cat. No: Fden.1202
Title: Heat and Mass Transfer (1+1)

Marks: 80
Time: 3 hours

I. **Fill up the blanks:** (10x1=10)

1. Radiator of an automobile engine is a _____ flow type of heat exchanger.
2. Prandtl number is the ratio of molecular momentum diffusivity to _____
3. A body that allows all the incident radiations to pass through is called _____
4. Hot gases escaping from a chimney rise by convection and then diffuse to air above the chimney is an example of _____ transfer by change of phase.
5. During heat exchanger in the evaporation of water in to steam ,the cold fluid evaporates at constant temperature whilst the temperature of hot gases continuously _____ from outlet to inlet
6. Thermal conductivity of ice is nearly _____ times the thermal conductivity of water
7. Unit of thermal diffusivity is _____

Match the following:

- | | | |
|--------------------|-------|-----------------------|
| 8. Stanton number | ----- | (a) hd/K |
| 9. Grushof number | ----- | (b) Forced Convection |
| 10. Nusselt number | ----- | (c) Free Convection |

II. **Write short notes / answers on ANY TEN** (10x3=30)

1. State Kirchhoff's law of radiation
2. What is mean by transient heat conditions?

3. What is heat exchanger effectiveness?
4. What is Newton's law of cooling?
5. State Wien's displacement Law
6. What is intensity of radiation?
7. What is the significance of heat transfer?
8. What do you mean by fouling in heat exchangers?
9. What are the limitations of Ficks law of diffusion?
10. State some essential features of Fourier law
11. What is the difference between Heat and heat transfer?
12. Enumerate the application of mass transfer

III. Write short essays on ANY SIX of the following: (6x5=30)

1. A small black body has a total emissive power of 6.5KW/M^2 . Determine its surface temperature.
2. Briefly explain different modes of Heat transfer
3. Explain about parallel, cross flow and counter flow heat exchangers.
4. Define and explain Ficks Law of diffusion.
5. What is a black body radiation? Deduce Stefan's law from thermodynamic considerations.
6. Write the common failures in heat exchangers .
7. Write on

(a) Total emissive power	(b) Opaque body
(c) Emissivity	(d) Grey body
8. How are Heat exchangers classified?

IV. Write essay on ANY ONE (1x10=10)

1. Explain in detail about the application of mass transfer phenomena in food processing
2. Derive an expression for Logarithmic mean temperature difference (LMTD) in the case of (i) Parallel flow and (ii) Counter flow heat exchangers.