Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2171911 Date:28/04/2018

Subject Name:Advance Heat Transfer(Department Elective - I)

Time:02.30 PM to 05.00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	With suitable examples, differentiate between free convection and forced convection.	**03**
	(b)	What do you mean by extended surfaces? Give some applications of extended surfaces in the field of engineering.	**04**
	(c)	A thermocouple (ε=0.6) is used to measure the temperature of flue gases in a large duct. The temperature of the duct wall is 20^0C and the temperature measured by the thermocouple is 500^0C. The convective heat transfer coefficient is 200 W/m^2 ^{0}C. Determine the true gas temperature. A thin radiation shield (ε=0.3) is enveloped to minimize the error. Estimate the error for the above case.	**07**
Q.2	**(a)**	What is heat generation? What do you mean by uniform heat generation? Give some examples of uniform heat generation.	**03**
	(b)	Explain in brief about heat transfer in high velocity flow with neat sketch.	**04**
	(c)	Define these terms used in the finite difference formulation: node, nodal network, volume element, nodal spacing, and difference equation.	**07**
		OR	
	(c)	Derive an expression for temperature distribution during steady state heat conduction with internal heat generation and exposed to convection environment in hollow cylinder.	**07**
Q.3	**(a)**	What do you mean by transient heat transfer? Give suitable examples of it.	**03**
	(b)	How does clothing affect heat loss from the body by convection, radiation, and evaporation? How does clothing affect heat gain from the sun?	**04**
	(c)	Derive Nusselt theory of laminar condensation on vertical plate.	**07**
		OR	
Q.3	**(a)**	Differentiate between pool boiling and nucleate boiling.	**03**
	(b)	'The insulated-tip solution important for the fin problems'. Justify.	**04**
	(c)	Explain radial fins of rectangular and parabolic profiles.	**07**
Q.4	**(a)**	Write a basic laws related to radiation heat transfer.	**03**
	(b)	Differentiate between boiling and condensation.	**04**
	(c)	Write a short note on Emissivity and absorptivity of gases and gas mixtures.	**07**
		OR	
Q.4	**(a)**	Write a short note on heat transfer from human body.	**03**
	(b)	Write a short note on radiation properties of a participating medium.	**04**
	(c)	Draw the boiling curve and identify the burnout point on the curve. Explain how burnout is caused. Why is the burnout point avoided in the design of boilers?	**07**
Q.5	**(a)**	Define: Nusselt Number, Reynolds Number, Prandtl Number.	**03**
	(b)	Differentiate between film-wise condensation and drop-wise condensation.	**04**
	(c)	What is latent heat? How is the latent heat loss from the human body affected by (a) skin wetness and (b) relative humidity of the environment? How is the rate of evaporation from the body related to the rate of latent heat loss?	**07**
		OR	

Q.5	**(a)**	What do you mean by lump? What is lumped system analysis?	**03**
	(b)	Explain in detail about radiation exchange and overall heat transfer in furnaces.	**04**
	(c)	What is Beer's law? Why do surfaces absorb differently for solar or earthbound radiation?	**07**

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