HEAT TRANSFER
SUBJECT STRATEGY FOR GTU EXAM
3151909

Prof. Krunal B. Khiraiya

Schedule of Exam

- Subject Code : 3151905
- Subject Name : Heat Transfer
- Date of Exam : 27th January 2021
- Sem : 5th
- Time : 10:30 am to 12:30 pm
- Total Mark : 56

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code:3151909
Semester –V
Subject Name:Heat Transfer

Type of course: Professional Core Course

Prerequisite: Nil

Rationale: The course is prepared to provide the detailed understating of various modes of heat transfer andits applications in Mechanical Engineering. The course also provides the basic technical knowledge related to heat exchangers.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Course Content

Content:

Sr. No.	Course Content
1	**Conduction:** Fourier's law, effect of temperature on thermal conductivity of different solids, liquids and gases,generalized equation in Cartesian, cylindrical and spherical coordinates and its reduction to specific cases,One dimensional steady state conduction, heat conduction through plane and composite walls, cylinders and spheres, electrical analogy, critical radius of insulation for cylinder and sphere, overall heat transfer coefficient **Heat transfer from extended surface:** Types of fin, heat flow through uniform cross-sectional area fin for various cases like infinitely long fin, fin insulated at the tip and fin losing heat at the tip, efficiency and effectiveness of fin, Estimation of error in temperature measurement in a thermometer well **Transient heat conduction:** lumped capacitance method for bodies of infinite thermal conductivity, time constant, one dimensional transient heat conduction in plane wall with finite conduction and convective resistances

Course Content

2	**Convection:** Newton's law of cooling, dimensional analysis applied to forced and free convection, dimensionless numbers and their physical significance, empirical correlations for free and forced convection, Continuity, momentum and energy equations, thermal and hydrodynamic boundary layer, Blasius solution for laminar boundary layer, General solution for Von-Karman integral momentum equation
3	**Radiation:** Absorptivity, reflectivity and transmissivity, black, white and grey body, emissive power, emissivity, Kirchhoff's law, Planck's law, Rayleigh-Jeans' law, Wien's law, Wien's displacement law, Stefan-Boltzmann law, intensity of radiation, radiation heat exchange between black bodies, shape factor, electrical analogy, radiation heat exchange between gray bodies, radiosity, irradiation, radiation shields
4	**Heat exchanger:** Classification, heat exchanger analysis, LMTD for parallel and counter flow exchanger, condenser and evaporator, overall heat transfer coefficient, fouling factor, correction factors for multi pass arrangement, effectiveness-NTU method for parallel and counter flow heat exchanger, introduction of heat pipe and compact heat exchanger

Course Content

5	**Two-phase heat transfer:** Boiling of liquids, Pool boiling curve, modes of pool boiling, correlation for pool boiling, condensation of vapor, film wise and drop wise condensation, condensation on flat surfaces and horizontal tubes

Specification Table

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	60	10	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Selection of Chapter

1. GTU Previous paper weightage

2. Student Perception

3. Based on Preparation and time available

Syllabus Unit

1. To get Passing Mark

2. For Average Score

3. For Excellent Performance

Passing Mark

1. Unit 4 Heat Exchanger Theory

2. Unit 4 Numerical

3. Unit 3 Heat Transfer by Radiation theory only

4. Theory and Numerical of Unsteady state conduction

Average Score

1. Numerical of Heat Transfer by Radiation
2. Theory and numerical based on Conduction
3. Dimensionless Number
4. Dimensional Analysis
5. Numerical based on correlation
6. Theory of Two Phase Heat Transfer only boiling

Excellent Performance

1. Theory and Numerical of Fin
2. Theory of Convection
3. Numerical based on boundary layer
4. Theory of Two Phase Heat Transfer
5. Two Phase Heat transfer Numerical

THANK YOU

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