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Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

M.Tech. (First Semester – Regular/Supplementary) Examination, January – 2026

24MTEPC11002 – Conductive and Radiative Heat Transfer
(Heat Power and Thermal Engineering)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. What is an isotropic solid?	CO1	K1
b. Explain why fins are used in heat transfer.	CO1	K2
c. Define periodic boundary conditions.	CO2	K1
d. What is meant by an infinitely long fin?	CO3	K1
e. Define radiosity.	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. State the assumptions involved in: (i) Lumped parameter analysis (ii) Semi-infinite solid approximation	5	CO1	K1
b. Explain why these assumptions are important in solving heat conduction problems as mentioned in the above question	5	CO1	K2
(OR)			
c. Explain three-dimensional heat conduction without heat generation.	5	CO1	K1
d. Discuss the differences in heat transfer behavior among isotropic, orthotropic, and anisotropic solids	5	CO1	K2
3.a. List and explain different types of fins based on tip conditions (e.g., insulated, or prescribed temperature).	5	CO3	K1
b. Explain the concept of heat conduction in a fin equal to heat convection.	5	CO3	K2
(OR)			
c. Discuss how this condition affects the temperature distribution for fins	5	CO3	K2
d. State Planck's law of blackbody radiation.	5	CO4	K1
4.a. State the laws of radiation for black and grey surfaces. Explain the difference between a blackbody and a graybody.	5	CO4	K1
b. Explain the concept of radiosity and net radiative heat flux. How are they used in calculating radiation heat transfer between surfaces?	5	CO4	K2
(OR)			
c. Define radiosity and intensity in thermal radiation.	5	CO4	K1
d. Explain how emissivity affects the radiative heat transfer from a surface.	5	CO4	K2
5.a. Describe the mechanism of radiation transfer between surfaces and the factors affecting it.	5	CO5	K2

b.	Explain the radiative heat exchange between grey and diffuse surfaces .	5	CO5	K2
	(OR)			
c.	How surface emissivity influences grey and diffuse surfaces?	5	CO3	K2
d.	Explain the directional and spectral variation of radiation from a real surface.	5	CO4	K2
6.a.	Describe how radiation passes through semi-transparent materials and how transmissivity affects heat transfer.	5	CO5	K2
b.	Discuss the techniques to estimate configuration factors between surfaces and give an example calculation for two parallel plates.	5	CO5	K2
	(OR)			
c.	Describe the process of radiation heat transfer between two surfaces and explain the factors affecting it.	5	CO5	K2
d.	Explain one technique used to estimate configuration (view) factors between surfaces and describe its importance in radiative heat exchange.	5	CO5	K2

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