Lectures
8th Semester B. Tech. - Mechanical Engineering
Mechanical Engineering Department
Subject: Internal Combustion Engines
I/C Prof M Marouf Wani
Chapter: Heat Transfer in I C Engines
Dated: 13-04-2021
Topic: Numerical

Q1. Given that the average heat flux through a particular zone in a cast iron liner 1 cm thick is 0.2 MW/m^2, the coolant temperature is 85 C, and the coolant side heat transfer coefficient is 7500 $W/m^2.K$, find the average surface temperature on the combustion chamber and coolant sides of the liner at that zone.
Note: Use of Table 12.2 - Thermal properties of wall materials is allowed.

ASSIGNMENT:

Q2. With respect to the above written numerical, Q1
Assume that we want to design a semi-adiabatic engine with insulating materials as follows for the walls of the engine cylinders:
(i) Silicon Nitride
(ii) Zirconium

Calculate the percentage drop in the heat transfer across the system with each of the above mentioned insulating materials with respect to cast iron as the cylinder liner material.

Note: submit the hand written and scanned copy of the assignment on the e mail ID.
E mail: maroufwani@nitsri.net

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I/C : Prof M Marouf Wani
Mechanical Engineering Department
National Institute of Technology
Srinagar, J&K
India – 190006

Text Book:
Internal Combustion Engine Fundamentals
By John B Heywood
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TABLE 12.2
Thermal properties of wall materials

Material	Thermal conductivity k, W/m·K	Density ρ, kg/m^3	Specific heat c, J/kg·K	Thermal diffusivity α, m^2/s
Cast iron	54	7.2×10^3	480	1.57×10^{-5}
Aluminum	155	2.75×10^3	915	6.2×10^{-5}
Reaction-bonded silicon nitride	5–10	2.5×10^3	710	2.8×10^{-6}
Sprayed zirconia	1.2	5.2×10^3	732	3.2×10^{-7}