Ministry of Higher Education and Scientific Research
University of Babylon /College of Material's Engineering
Dept. of Eng. of Polymers and Petrochemical Industries
First month Examination (2016-2017)

Sub.: heat transfer **Date:12/ 12/2016**
Stage: Third **NOTE: Answer Three Questions** **Time:1.5Hrs.**

Q1) A double-pane window consists of two 3-mm thick layers of glass separated by a 12-mm wide stagnant air space. For specified indoors and outdoors temperatures, determine the rate of heat loss through the window and the inner surface temperature of the window? K glass= 0.78 W/m.°C and K air= 0.026 W/m.°C? figure(1)

Q2)Show that the critical thickness of insulation of a circular pipe given by r0=k/h

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Q3) A 3.0-cm-thick plate has heat generated uniformly at the rate of $5\times10^{5}W/m^{3}$. One side of the plate is maintained at 200◦C and the other side at 45◦C. Calculate the temperature at the center of the plate fork=16 W/m·◦C?

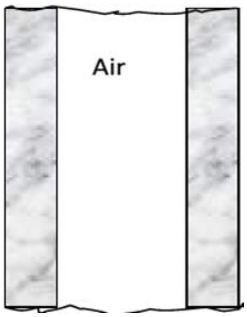
Q4) The figure below shows part of a set of radial aluminum fins(k=180W/m.K)that are to be fitted to a small air compressor .The device dissipates 1 Kw by convection to surrounding air which is at 20 ^{0}C .each fin is 100mm long ,30mm high and 5mm thick .The tip of each fin may be assumed to be adiabatic and heat transfer coefficient of h=15 $W/m^{2}.K$ acts over the remaining surfaces. Estimate the number of fins required to ensure the base temperature drop not exceed 120 ^{0}C? figure(2)

A=1.2mx2m

T∞1=24 oC

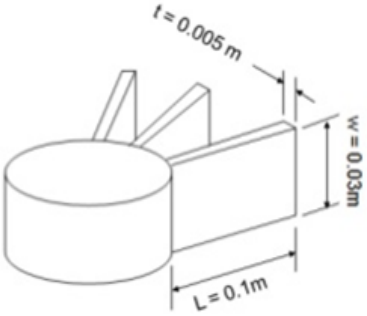
h1=10 W/m2·°C

figure(1)



T∞2=-5 oC
h2=25 W/m2·°C

figure(2)



Good luck

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