**ME6502 HEAT AND MASS TRANSFER DAILY TEST-1 (13-07-18) III MECH**

01)A furnace wall is made up of three layers thickness 25 cm,10cm and 15 cm with thermal conductivities of 1.65 w/mk,K,9.22 w/mK respectively. The inside is exposed to gases at 1250 0C.A convection coefficient of 25 w/m2k and the inside surface is at 11000c,the outside surface exposed to air at 250c,with convection coefficient of 12 w/m2k.Determine (i)the unknown thermal conductivity (ii) the overall heat transfer coefficient(iii)all the surface temperatures**.(15MARKS)**

02)A pipe consists of 100 mm internal diameter and 8 mm thickness carries steam at 170°C. The convective heat transfer coefficient on the inner surface of pipe is 75 W/m2 ⁰C. The pipe is insulated by two layers of insulation. The first layer of insulation is 46 mm in thickness having thermal conductivity of 0.14 W/m⁰C. The second layer of insulation is also 46 mm in thickness having thermal conductivity of 0.46 W/m⁰C. Ambient air temperature = 33°C. The convective heat transfer coefficient from the outer surface of pipe = 12 W/m2C. Thermal conductivity of steam pipe = 46 W/m⁰C. Calculate the heat loss per unit length of pipe and determine the interface temperatures. Suggest the materials used for insulation. **(15MARKS)**

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