***QUESTION 1**:*
In you own words (which means in your own words) write a summary of the topics about radiative heat transfer we went through including the definitions of emissivity, absorptivity and reflectivity, the view factor, the heat exchange between two black surfaces ,the heat exchange between the two gray surface and finally the definition of radiative resistances

Influencing Factors
Reflectivity
Reflectivity is the degree of how much a surface can reflect incoming radiations.
Reflectivity (ρ) is the ratio of the total radiations reflected by the surface at a given temperature divided by the quantity of incident radiations on the same surface Reflectivity is a number between 0 and 1. It is comparison between the selected object and the perfect reflector Black Object, So it is as well a measure of how closely a surface approximates a blackbody with a ρ = 1

Emissivity
The emissivity(ε) of the surface of a material refers to the effectiveness of the surface in emitting energy as thermal radiation, it is mathematically defined as the ratio of the thermal radiation from the surface to the radiation from an ideal black surface at the same temperature; the value varies from 0 to 1. The greater the value of emissivity is, the closer the surface to a blackbody (ε= 1).

View factor
The view factor is the fraction of radiation leaving one surface which is intercepted by the second surface. It is the degree to which heat carried by radiation can be passed between two surfaces

Absorptivity
Absorptivity refers to the ratio of the absorbed heat to the total energy of the projected heat onto the object. The object that can absorb all the rays is a black body, and its absorption rate is 1. The absorption rate of the actual object is less than 1, depending on the material, roughness and temperature of the surface of the object

The heat exchange between two black body surfaces
Considering two black body objects 1 and 2 with their areas A1 and A2 respectively are radiating heat energy and the energy leaving the first object is E1A1 and for the second object E2A2. Hence, the energy leaving the first object to the second object will be E1A1F12 and the energy leaving the second object to the second will be

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E2A2F21. The net energy interchange from object 1 to object 2 is E1A1F12 - E2A2F21 = Q(dot) 12.

Net Heat exchange between the two gray surfaces

Compared to black bodies, gray surfaces have reflectivity. So in addition to the emitted radiations/absorbed radiations, we have the reflective radiations. We calculate the difference between the radiations leaving S1 and captured by S2, called J, and the radiations incident on S1, called G1.

J = Radiation emitted by the surface + Radiation reflected by the surface

J = ε . σ . T4 + ρ . G

Q=A . (J – G)

Radiative resistances

Radiative resistance is a degree to measure of how much energy is converted to heat radiation.

It is calculated by the following:

QUESTION 2

Solve the last example you solved in the class (radiative heat exchange between two parallel plates) awhile considering the two emissivity to be 0.1, what can you conclude from the result?

K, T2=308 k

ϵ_1=0.1

ϵ_2=0.1

σ=5.67 × 10 – 8 $\frac{w}{m^2\ k\ 4}$

$\dot{Q}_{1\to2} = \frac{A_1\sigma(T_1^4-T_2^4)}{\frac{1}{\epsilon_1}+\frac{1}{\epsilon_2}-1} = \frac{1.5\times5.67\times10^{-8}\times(308^4-298^4)}{\frac{1}{0.1}+\frac{1}{0.1}-1}$ = 4.98 w

$F_{12} = \frac{1}{\frac{1}{\epsilon_1}+\frac{1}{\epsilon_2}-1} = \frac{1}{\frac{1}{0.1}+\frac{1}{0.1}-1}$ = 0.0526

Example:

$F_{12} = 0.01$

$\dot{Q}_{1\to2} = A_1 \times F_{12} \times \sigma\,(T_1^4 - T_2^4) = 1.5 \times 0.01 \times 5.67 \times 10 - 8 \times (2984 - 3084) = -0.9466\ w$

$\dot{Q}_{2\to1} = -\dot{Q}_{1\to2} = 0.09466\ w$