Q.8) (CO2) For a collector with a top loss coefficient of 3.79 W/m2-K. Calculate overall loss coefficient using following data:
Back insulation thickness = 8 cm
Insulation conductivity = 0.05 W/m-K
Side insulation thickness = 4 cm
Size absorber plate = 1.90 m x 0.9 m
Height of collector casing = 0.16 m

Q.9) (CO1) An inclined surface, facing due south, tilted at 30° with horizontal, is location is at location 28° $51^{'} N$ on January 1 at 12 noon (solar time). The reflection coefficient of ground, ρ is 0.2. Calculate the values of R_b, R_r and R_d.

Section C [20 marks x 2 = 40]

Q.10) (CO3) Describe followings for a thermochemical storage for a solar application

(i) Criteria used for judging the suitability of a thermochemical reaction
(ii) Schematic representation of a thermochemical reaction
(iii) Thermochemical storage reactions, temperatures of forward and reverse reaction and energy stored

Q.11) (CO5) A residential house has a power requirement of 400 W for4 hours every night. It is proposed to meet the requirement by using a PV array, a battery storage system and an inverter. The whole system is over designed so that it can meet one extra night's requirement even if there has been no sunshine during the day. Draw block diagram and calculate the number of PV modules and batteries required.
Given:
(i) Solar radiation is available for an average of six hours daily and the average hourly global radiation flux incident on the array is 650 W/m2.
(ii) Battery rating = 12 V; 120 Ah. Depth of discharge = 0.7, Charging and discharging efficiency = 0.9
(iii) Inverter efficiency at full load = 0.85
(iv) Module size = 1.191m x 0.533m, conversion efficiency under operating conditions = 10 %

OR

Q.11) (CO1) With the help of diagram, discuss basic features of pyrheliometer.