DEPARTMENT OF CIVIL ENGINEERING: IIT DELHI
CEL 777: BUILDING SCIENCE. **MAJOR TEST.** DURATION: **2 hours.**
FIRST SEMESTER:. 2008-2009 Maximum marks. : **50.**
DATE:- 22-11-2008 TIME:- 1.0 P.M -3.0 P.M. Venue: VI LT2

ASSUME MISSING DATA SUITABLY IF REQUIRED
Draw neat sketches wherever necessary

1. A cooling tower of an air conditioning system situated at a distance of 90 m from a noise sensitive building. Manufacturer has provided the following data for pre-dominant frequency 500 Hz. Power level 95 dB and pressure level at 15m distance from the source center is 63 dB. A long 6 m high barrier is proposed at a distance of 10 m from the barrier. Height of the source is 2m above base and normal level of the receiver is 0.9m above base level of the wall. What is the noise level at the receiver? 9

2. A room of dimension 20X10X4 m^3 is used as laboratory room. A 90 dB (PWL) equipment which is a non-directional source is placed close to 10 m wall at 1 m away from it. Average absorption in the room is 0.2. Calculate the noise level at a location 8.5m away from the source. Determine the average absorption value required to reduce this dB level by 15dB. What will be the change in reverberation time of the room due change in absorption. 10

3. Calculate the distance of last row not requiring elevation in an auditorium given that height of the source above normal head level in front seat is 2m. Row spacing is 0.9m. What is the elevation of the third elevated row beyond the above distance? Head clearance is 12 cm. Calculate the above elevations using two methods 1) IS code formula 2) logarithmic spiral formula. 10

4. Calculate IRC of daylight factor in a room of size 5×4×3.5 m^3 with height is 3.5 m, and window on its complete north wall with no external obstruction Sill height is 0.90m and the window height is 1.5 m. The average reflectivity of glass, walls, ceiling and the floor can be taken as 0.15, 0.6, 0.3 and 0.2 respectively. Assume any other data necessary. 6

5. Calculate the sol air temperature and U value of a brick masonry wall with a cavity at the center having plastered finish on either side, of area 10 m^2 given the following data:Thermal conductivity of plaster: 0.725 W/m°C, that of brick masonry = 0.890 W/m°C; Surface conductances out side=12.5 W/m^2°C and that inside is 8.25 W/m^2°C; Thickness of the plaster on either side=15 mm, thickness of the masonry= 225 mm.. Mean solar radiation intensity incident on the outside surface= 125 W/m^2, The short wave absorbtivity for outside surface is 0.4. The cavity resistance can be assumed to be 0.05 m^2 °C/W Assume any other data if necessary. 7

6. Calculate the quantity of air flow when the outdoor wind velocity is 6 km/hour and the wind is incident at 45° to the walls having window area of 6 m^2 which is half as that in the walls on the leeward sides. How does sill height affect the indoor air velocity? Calculate the sill height correction for a sill height of 0.7m? 7

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