

- 5 A commercial proprietor consults you on required illuminance for his showroom area located on the ground floor of a four storey development. Consider it as a narrow, deep plan building facing the road with north, south blind walls located in a highly urbanised area. Consider the prevailing sea breeze from the east side of the building.
- Explain three aspects you need to consider when designing the required illuminance for the above show room area. (6 marks)
 - Give six recommendations for the horizontal and vertical illuminances in the showroom area? Illustrate your answer with appropriate sketches. (6 marks)
 - Explain two design strategies to optimise the day-lighting levels while minimising the heat gain to reduce the operational energy cost of the above narrow deep plan building in a hot humid climate. (8 marks)
- 6 The sound level observed at a distance of 3.5 m from a noisy factor located in a rural area is 81 dB.
- What is the expected sound level at a point on the perimeter of the factory premises which is at a distance of 2.5 m from the 1st measurement point? (10 marks)
 - If the maximum permissible daytime sound level for rural residential areas is 55 dB, does this industrial establishment violate the environmental noise criteria? (2 marks)
 - Describe four design strategies to minimise noise pollution in the above situation. (8 marks)
- 7 An auditorium designed to hold 300 people has a length of 35 m, a width 30 m and a height of 8 m. The areas of the surfaces available in the room and their coefficient of absorption at 500 Hz are as follows.

Surface	Area [sq.m]	Co-efficient of absorption [α] at 500 Hz
Floor(carpeted)	1050	0.30
Ceiling (fibreboard)	1050	0.10
Walls, Plaster on brick	1040	0.02
Glass	100	0.04
Stage (Wooden)	250	0.10

Assume that the absorption per person is 0.43 sq.m sabin and shading of floors by the audience effectively reduces its absorption by 40% at 500 Hz. Absorption per unoccupied seat as 0.28 sq.m sabin.

- What is the reverberation time of the auditorium when it is fully occupied? (8 marks)
- Comment on the clarity of a stage drama in the above auditorium. (4 marks)
- Give four design considerations in order to optimise acoustics inside the above auditorium layout. Illustrate your answer with appropriate sketches. (8 marks)