

9210-205 Level 7 Post Graduate Diploma in Engineering Built Environment 1

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You should have the following for this examination

No additional data is attached

- one answer booknon-programmable calculator
- pen, pencil, ruler
- peri, perien, ru

General instructions

- This paper consists of **seven** questions.
- Answer **five** questions.
- Use large, clearly labelled diagrams or sketches where these will help your answer.
- The maximum marks for each section within a question are shown.

1	Heat transfer depending o a) Explain a non-d eaves o Conside area, in b) Explain more gl	r in a building can take place from outside to inside or from inside to outside on the microclimatic conditions around the building. 'indoor overheating' and 'indoor under heating' potential with respect to lomestic building having a two storey square plan form with 4 foot wide on the east facade. er that building having a middle court yard and it is situated in an urban a warm humid climate. Prevailing wind direction is from the south west. three disadvantages of having a square plan form for a building with lazing towards east and west in warm humid climates with to indoor	(14 marks)
2	Climatic elen indoor enviro promotes int impacts of cl a) Explain climatic b) State tw describ	nents will have favourable and unfavourable environmental effects on onments and thus on thermal comfort conditions. Bioclimatic design terplay of human – climate relationships and minimises the negative limate on indoor thermal comfort. three characteristics and effects [favourable and unfavourable] of three c elements with respect to indoor thermal comfort. vo reasons why the climatic function of a building envelope can be red as a 'third skin'.	(6 marks) (8 marks)
	c) Explain can be u indoor o	used to minimize heat transfer into the building interior and prevent overheating.	(6 marks)
3	The manner by several er comfort in na a) Name th thermal each pa b) Discuss Bioclima c) Assume hot hun comfort	in which human beings experience their thermal environment is influenced nvironmental and personal parameters. The effects of ventilation for thermal aturally ventilated buildings can be twofold. hree environmental and subjective parameters that influence human I comfort. Your answer should indicate the relationship between arameter and thermal comfort. Is two beneficial effects of ventilation for thermal comfort using Olgay's atic chart. Is that you have been requested to design a factory building in a sub urban nid climate. What in your opinion, will be the most important thermal t parameter/s in the said building?	(6 marks) (6 marks) (8 marks)
4	Using dayligh into your bui architecture, in building in a) State fiv building b) Give fou c) Conside in a prin keeper'	ht in your building is a key strategy for passive design. Letting sunlight ilding impacts visual comfort, as well as thermal comfort. In terms of , building facades can be designed to optimise the use of natural light iteriors. we passive strategies, which could be used to take natural light into the g interior. Explain your answer with sketches. ur benefits to the users, of letting controlled natural light into the building? er that you need to check the lighting design of a proposed library building nary school. The building consist mainly of a lobby, reception/ book 's area, reading area, book store/shelves. Explain six lighting design erations when checking the lighting layouts of the proposed	(10 marks) (4 marks)
	library k	building.	(6 marks)

- 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 a) illuminance for the above show room area. (6 marks) Give six recommendations for the horizontal and vertical illuminances in the b) showroom area? Illustrate your answer with appropriate sketches. (6 marks) Explain two design strategies to optimise the day-lighting levels while minimising C) the heat gain to reduce the operational energy cost of the above narrow deep plan building in a hot humid climate. (8 marks) The sound level observed at a distance of 3.5 m from a noisy factor located in a rural 6 area is 81 dB. What is the expected sound level at a point on the perimeter of the factory a) 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. b) 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) C)
- 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 is absorption by 40% at 500 Hz. Absorption per unoccupied seat as 0.28 sq.m sabin.

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