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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S, FE) Examination December 2023 (2015 Scheme)



Course Code: CE365

Course Name: FUNCTIONAL DESIGN OF BUILDINGS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Depict about the relationship of sound intensity in W/m^2 with sound intensity in dB. (4)
- b) TL value of a partition wall varies with its mass and thickness. Discuss. (4)
- c) Firing of a cracker produces a sound level of 90 dB at a reference point. How many crackers can simultaneously be fired such that the sound level at the spot does not exceed 115 dB? (7)
- 2 a) Write short note on any three acoustical defects observed in buildings. (6)
- b) Discuss the reverberation time in acoustics of an auditorium. (5)
- c) Distinguish between air born and structure born noises (4)
- 3 a) A class room of 18m X 10m X 4.5m has 5 windows of $2m^2$ each and one door of $3m^2$, all kept open. The absorption coefficients of ceiling and wall are 0.04 and that of the floor is 0.02. Find out the total sound absorption in metric Sabin. If 50% of the wall and 50 % of the ceiling are treated with sound absorbing materials having absorption coefficient 0.50 and the floor is laid with carpet of absorption coefficient 0.65, Find out the reverberation time (use Sabine's formula). Assume that the hall is occupied with 60 people having average absorption of 0.75 including that of the seat. (10)
- b) Explain the source-path-receiving end concept of noise control (5)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) List the advantages and disadvantages of day-lighting. (4)
- b) Explain daylight factor and its components. (5)
- c) Describe the concept of design sky. (6)
- 5 a) With the help of a neat sketch explain skylight in buildings (5)
- b) Define luminous flux, luminous intensity, illuminance and luminance using a figure. (5)
- c) Using a figure, discuss about polar distribution diagram. (5)

- 6 a) Determine the number and arrangement of twin lamp luminaires for a 5m x 3m x 3m room, for providing 225 lux on the work plane 0.75m above the floor. It is proposed to mount the luminaires at a height of 2.25m above the floor. Given, coefficient of utilization of a 1000 lumen lamp as 0.30 and the maintenance factor as 0.75. Assume SHR = 15:1. (6)
- b) Explain Lumen method of lighting calculation. (4)
- c) Discuss about Maintenance Factor stating its components. (5)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Discuss on the thermal comfort indices and their significance. (7)
- b) Give short description on Psychrometry and Psychrometric chart. (6)
- c) Explain how to calculate the total solar radiation on any surface. (7)
- 8 a) What is a solar path diagram? What are its uses? Draw a rough sketch of a solar path diagram applicable to our region. (7)
- b) Using a diagram, illustrate the solar azimuth – altitude coordinate system used to locate sun's position by an observer on earth (8)
- c) Comment on the concept of comfort zone based on bio-climatic chart. (5)
- 9 a) Differentiate between active and passive solar designs (8)
- b) Find the U – value of the following composite wall. (6)
- 20cm brick work ($k=1.2 \text{ W/m } ^\circ\text{C}$)
- 50 mm cavity ($R_k = 0.176 \text{ m}^2 \text{ } ^\circ\text{C/W}$)
- 25 mm wood wool slab ($k = 0.093 \text{ W/m } ^\circ\text{C}$)
- 12 mm plastering ($k = 0.461 \text{ W/m } ^\circ\text{C}$)
- Surface conductance, $f_o = 13.17 \text{ W/ m}^2 \text{ } ^\circ\text{C}$ & $f_i = 8.13 \text{ W/ m}^2 \text{ } ^\circ\text{C}$
- c) Explain the concepts of Green buildings. (6)
