

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: CE365

Course Name: FUNCTIONAL DESIGN OF BUILDINGS (CE)

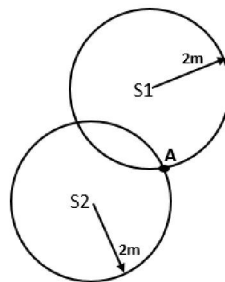
Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

- 1 a) What is the meaning of sound level measurements in dBA? (4)
- b) List the various types of sound absorption materials and fixings. (5)
- c) Let S1 and S2 be two sound sources within a room having sound power level 40 dB and 50 dB respectively. Point A within the room is at 2m distance from both the sources. Calculate the sound intensity level at point A. (6)



- 2 a) List any five harmful effects of noise on human. (5)
- b) Differentiate the behaviour of sound in free field and reverberant field. (5)
- c) A 1m by 2.1m louvered door which has a TL of 10 Db is located in one wall of a conference room. The 5.5m x 2.4 m wall has a TL of 45 Db. Find the composite TL for this wall construction. (5)
- 3 a) Elaborate on any five acoustical defects (5)
- b) Find the reverberation time for a hall of 12m x 9m x 6m having average absorption coefficient 0.15. Also, how much area we should treat with a material having absorption coefficient 0.20 to reduce its reverberation time to 1.2s. (5)
- c) List and elaborate on basic steps involved in acoustical design of an auditorium (5)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Define luminous flux, luminous intensity, illuminance and luminance (5)
- b) What are the different types of luminaires? What is their flux distribution characteristics? (5)
- c) Define daylight factor and determine the required indoor lux level of a room if the recommended Daylight factor is 1.2% (5)
- 5 a) What is ambient lighting and task lighting? (5)
- b) Define the different components of daylight factor (5)

- c) What are the types of Lux grids used for design of side lit windows? Discuss their suitability. (5)
- 6 a) Illustrate a method for determining the SC of Daylight factor. (5)
- b) Determine the number and arrangement of twin lamp luminaires for a 5m x 3m x 3m room, for providing 150 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 2440 lumen lamp as 0.30 and the maintenance factor as 0.70. (5)
- c) What are polar distribution curves? What is its use? (5)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) What is a bioclimatic chart? What is its application? (5)
- b) What is Corrected Effective Temperature? What is its modification over ET? (5)
- c) What are the three modes of heat transmission? Give the basic equations introducing the parameters involved. (5)
- d) Determine the solar radiation incident on a vertical surface, given the following angles ; solar altitude angle = 50° , wall azimuth angle = 0° , solar azimuth angle = 30° and direct solar radiation of 2800 W/m^2 (5)
- 8 a) What is a solar chart? What are its applications? (5)
- b) Differentiate thermal conductivity and thermal conductance (5)
- c) Using a diagram, illustrate the solar azimuth – altitude coordinate system used to locate sun's position by an observer on earth (5)
- d) U value for 19 cm thick plain brick wall is estimated to be $2.371 \text{ W/m}^2\text{°C}$. What would be the change in its U value if the wall is plastered on both sides by 1 cm thick plaster of k value $0.721 \text{ W/m}^2\text{°C}$. Assume inside and outside surface conductance values as $8 \text{ W/m}^2\text{°C}$ and $16 \text{ W/m}^2\text{°C}$ respectively. (5)
- 9 a) What are equinoxes? Illustrate with a sketch. (5)
- b) Define time lag and decrement factor. Illustrate with a sketch. Comment on the indoor temperature range within a room having wall thermal properties of 6 hrs time lag and 0.5 decrement factor located in a place with a daily temperature change between 32 to 42°C . (5)
- c) Define sol air temperature. Give the concerned equation and introduce the parameters involved. (5)
- d) Differentiate passive and active methods for thermal comfort in buildings (5)
