CBCS SCHEME

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15ARC73

Seventh Semester B.Arch. Degree Examination, Jan./Feb. 2021
Building Services – IV

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain frequency and wavelength of a sound wave. **(04 Marks)**

b. Explain intensity and intensity-level of a sound wave. **(08 Marks)**

c. A car horn outdoors produces a sound intensity of $10^{-3}W/m^2$ at 1.0m away. Find the corresponding intensity of a distance of 10.0m away from the source. **(08 Marks)**

OR

2 a. Explain how to calculate Reverberation Time. **(06 Marks)**

b. A room 60ft long by 35 ft wide by 15ft height has a sound absorption coefficients of 0.30 for walls, 0.040 for ceiling and 0.10 for floor. (All α's are at 500 Hz).
Find the Reverberation Time (RT) at 500Hz in the above space with no occupants and no sound absorbing treatment. (Refer Fig.Q.2(b)) **(14 Marks)**

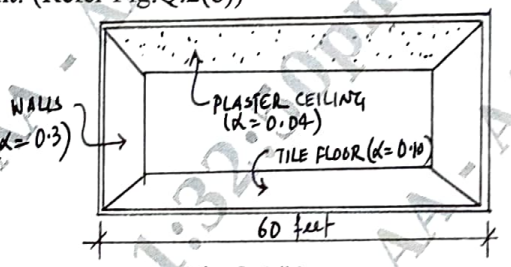

Fig.Q.2(b)

Module-2

3 a. What is speech intelligibility? How is it assessed by Articulation Index (AI)? **(10 Marks)**

b. Find the Noise Reduction Coefficient (NRC) value for a carpet with the following sound absorption coefficients:
0.20 at 250Hz, 0.35 at 500Hz, 0.45 at 1000Hz, 0.55 at 2000Hz. **(10 Marks)**

OR

4 a. Elaborate on 3 types of sound absorbers with sketches. **(12 Marks)**

b. Explain the necessity for having adjustable sound absorbers. Draw neat sketches of atleast 3 types of adjustable absorbers. **(08 Marks)**

Module-3

5 As a part of a competition team, propose a multifunctional auditorium for 500 delegates for your college campus. Provide the following through sketches and notes:

i) Sound absorbers and reflection treatment **(08 Marks)**

ii) How to avoid echoes and sound resonance? **(08 Marks)**

iii) Advantages of providing a balcony. **(04 Marks)**

OR

6 a. What are the design considerations while locating and designing an Open Air Theatre? **(10 Marks)**

b. What is Speech Privacy? Suggest three strategies to achieve speech privacy in an open office plan. **(10 Marks)**

Module-4

7 a. What is Transmission Loss (TL)? Suggest methods for treating the fenestrations (doors and windows) to achieve effective Transmission Loss (TL) for an office building. **(10 Marks)**

b. A common partition between a private office and a mechanical equipment room has a surface area of $100ft^2$ and a Transmission Loss (TL) of 35dB. The office has 200 sabin of absorption. Find the sound level L_2 in the office if the sound level L_1 in the mechanical equipment room is 98dB [Use log2 = 0.3010]. (Ref.Fig.Q.7(b)) **(10 Marks)**

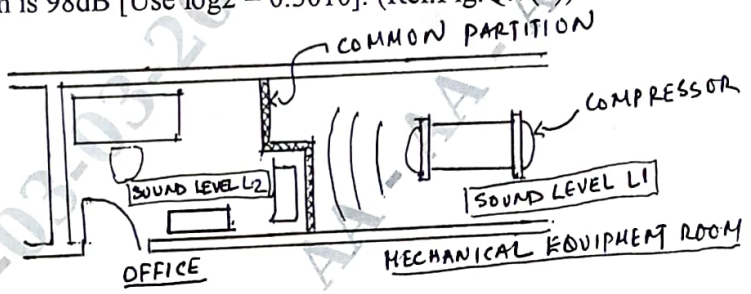

Fig.Q.7(b)

OR

8 a. Suggest atleast 4 methods to reduce air turbulence noise in an air conditioning duct. **(10 Marks)**

b. A gym located on the fourth floor of a building needs to be acoustically isolated from the office building on the third floor. Suggest suitable detailing for the third floor ceiling and fourth floor flooring. **(10 Marks)**

Module-5

9 a. Explain how industrial noise can be controlled. **(10 Marks)**

b. Identify sources of sound in a railway station building and suggest suitable measures for the same. **(10 Marks)**

OR

10 a. Suggest strategies at an Urban district level to achieve acceptable noise levels in the surroundings. **(10 Marks)**

b. A school building needs to be located on a site abutting a busy arterial road. Suggest site plan strategies and methods to prevent noise from the road entering the building. **(10 Marks)**

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