

# 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

- Explain frequency and wavelength of a sound wave. (04 Marks)
  - Explain intensity and intensity-level of a sound wave. (08 Marks)
  - A car horn outdoors produces a sound intensity of  $10^{-3} \text{ W/m}^2$  at 1.0m away. Find the corresponding intensity of a distance of 10.0m away from the source. (08 Marks)

OR

- Explain how to calculate Reverberation Time. (06 Marks)
  - 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  $\alpha$ '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)

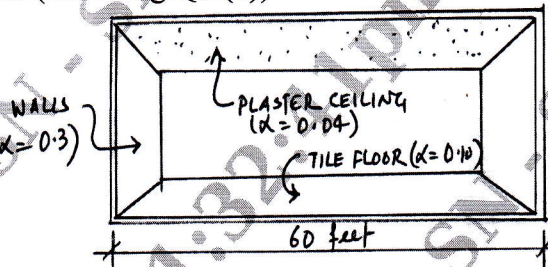


Fig.Q.2(b)

### Module-2

- What is speech intelligibility? How is it assessed by Articulation Index (AI)? (10 Marks)
  - 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

- Elaborate on 3 types of sound absorbers with sketches. (12 Marks)
  - Explain the necessity for having adjustable sound absorbers. Draw neat sketches of at least 3 types of adjustable absorbers. (08 Marks)

### Module-3

- 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:
  - Sound absorbers and reflection treatment (08 Marks)
  - How to avoid echoes and sound resonance? (08 Marks)
  - 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  $100\text{ft}^2$  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  $\log 2 = 0.3010$ ]. (Ref.Fig.Q.7(b)) (10 Marks)

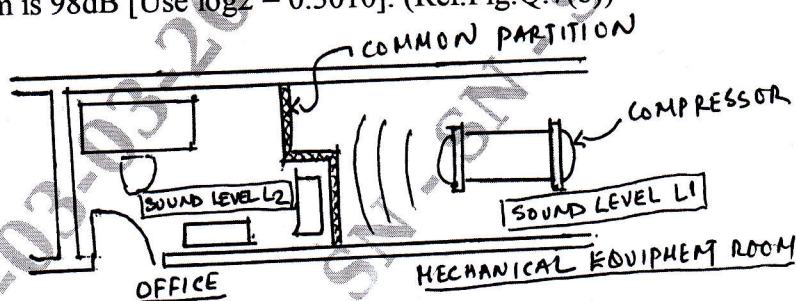


Fig.Q.7(b)

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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