

BACHELOR OF ARCHITECTURE
FIFTH YEAR FIRST SEMESTER EXAM 2024
ARCHITECTURAL ACOUSTICS

Time: 3 hours

Full Marks: 100

Answer all the questions of a unit in the same place. Also, answer all the sub-parts of a question together

Unit - 1: Marks: $2 \times 15 = 30$		Marks
1.	Enlist in details the steps to be followed during an Acoustical Design Process starting from the requirements of the client to selection of the raw materials, developing the design and implementation of the same.	15
2.	Generate a flowchart for a successful Digital Recording and Playback Process in a controlled acoustical system.	8 + 7 = 15
Unit - 2: Marks: $2 \times 10 = 20$ (Answer any two questions)		
3.	What are the fundamental requirements in designing rooms for speech? Briefly discuss the acoustical planning for a lecture room with a seating capacity of 65 students.	10
4.	From the perspective of room acoustics differentiate <ul style="list-style-type: none"> i. Early & Late Reflection ii. Specular & Scattered Reflection iii. Specular & Diffuse Reflection 	3 + 3 + 4 = 10
5.	What are the different types of absorbers available? Comment on the choice of the absorbers based on their performance. Discuss the working principle of any of the absorbers.	3 + 3 + 4 = 10
Unit - 3: Marks: $2 \times 15 = 30$ (Answer any two questions)		
6.	Classify and compare the characteristics and behavior of sound in an enclosed space. How do the boundary conditions play a role in the determination of the phenomena of absorption and reflection with reference to the airborne and structure-borne sound transmission. Give examples of surfaces and materials which help in reflection and absorption.	5 + 6 + 4 = 15
7.	Discuss the various categories of ambient noise. What are the major considerations on site design that can have a major impact on acoustics in health-care environments? Mention two situations highlighting how acoustical environment can impact the physiological and psychological well-being of a patient.	7 + 4 + 4 = 15
8.	How can we define speech intelligibility? Cite the reasons for decreased intelligibility. Deduce an expression for the Sabine's formula. Discuss the change of Reverberation Time, in case of (i) A change in Room Volume (ii) Total Surface Absorption (iii) Amount of Surface opening (iv) More Occupancy and furniture density.	2 + 2 + 3 + 8 = 15
Unit - 4: Marks: $2 \times 10 = 20$		
9.	Define Noise Reduction Coefficient (NRC) of an acoustic material with its mathematical form. Find the NRC value of a sound absorptive panel from the following data: Frequency level sound absorption coefficients are 0.26, 0.28, 0.32 & 0.37 for 250, 500, 1000 & 2000 Hz respectively.	3 + 7 = 10
10.	(a) Calculate the RT of a room in empty condition and having following data: Dimension: $10m \times 20m \times 5m$ (Height). All surfaces are having a sound absorption coefficient 0.1. (b) If a sound having intensity 0.5 W/m ² is successive reflected in a room by 50 times on the surfaces having sound absorption coefficient 0.2, then what will be the final intensity of sound?	6 + 4 = 10