

B. Architecture Examination 2017 (old)

(4th Year, 2nd Semester)

ARCHITECTURAL ACOUSTICS

Fullmarks:100

Time : Three hours

Answer any **five** questions and carry equal marks.

The answers should be exact and precise.

The figures in the margin indicate full marks.

Q.1 (a) Explain the usefulness of Octave bands in detail and the centre frequency of one third Octave bands. What are sound velocity and particle velocity? Describe the perception of change in sound intensity levels. 8

(b) What is sound pressure level(SPL)? What is its significance? What is the resultant sound level of two noise sources, which are 80dB each? 4

(c) The existing noise level in a place 90dB. It is decided to add ten machines each producing 80dB. What will be resultant noise level? 4

(d)What are the sound pressure levels (dB) for human breathing and threshold of audibility? 4

Q.2 (a) What are point and line sources? Give the sound level variation sketch for near field, far field, free field and reverberant

- field in a room. Clearly illustrate inverse square law in anechoic space . 8
- (b) Explain the human ear sensitivity. What is equal loudness contours? What is real time analysis? 12
- Q.3(a) Discuss Haas Effect in detail. Explain the integration and echo zone for a delayed sound. How Haas effect can be used to design an auditorium? 10
- (b) Explain the following 5 + 5
- (i) Adding different sound levels and (ii) Absorption
- Q.4 (a) Discuss the effect of frequency on the reflection of sound from an irregular surface. Elaborate your answers with examples. What is quadratic residue diffuser? 10
- (b) Discuss the acoustical and optical shadows produced by a source. Explain the frequency dependence of sound diffraction. 10
- Q.5(a) Discuss how sound diffusion is an advantage or a disadvantage for sound reception. Discuss the effect of sound absorption on sound diffusion and how is it connected with the quality of sounds? 8
- (b) Discuss the acoustical transparency for differently perforated panel screens having same visual transparency. 6
- (c) What is flutter echo? How does it degrade the sound quality? 4+2
- Q.6(a) The sound absorption coefficients of the various surfaces of a room measuring 25m x 25m x 25m are $A(\text{Ceiling})=0.6$, $A(\text{wall})=0.5$, $A(\text{floor})=0.1$. Calculate total sound absorption. What is NRC? 10
- (b) Discuss the different sound absorbing materials. How do porous and volume absorbers work? 10

Q.7 (a) What is the condition for not observing echo? Explain Flutter echo and discuss its effect on sound reception. 8

(b) What is reverberation time? What is Sabine equation? Define the unit Sabine and limitation of Sabine equation. 8

(c) Discuss the reverberation time and speech intelligibility. 4

Q.8 Write the short notes on any two 2x10=20

(i) Function of sound level meter

(ii) Sound masking

(iii) Binaural hearing