

Date: 26.11.2014

Time: 2.00 to 5.00 pm.

Max. Marks: 100

Instructions:

1. Figures to right indicate full marks.
2. Draw neat figures wherever required.
3. Use of non-programmable calculator is allowed
4. Answers to both the sections should be written in two separate Answer sheet.

SECTION I

(50)

SOLVE ANY FIVE QUESTIONS OUT OF SIX FROM SECTION I

Q.1 A). Select the correct option for the below questions

(04)

1. For measuring sound pressures in open areas or anechoic chambers where accurate estimation of the noise generated by the source is needed _____ microphone is most suitable.
a) Free field Microphones b) Pressure field Microphones c) Random Incidence Microphones
d) None of the above
2. Addition of 60 dB + 60 dB is
a) 120 dB b) 12 dB c) 0 dB d) 63 dB
3. In vibration analysis, the initial conditions for a vibratory system can not be found by using
a. Time domain analysis b. frequency domain analysis c. numerical analysis
d. None of the above
4. For a Simple Harmonic Motion if value of displacement is X and ω as the circular frequency in (rad/sec), then the value of acceleration will be given by :
a. $\omega^2 X$ b. $-\omega^2 X$ c. $-\omega X$ d. ωX

B. Answer the following (Any 3)

(06)

- i. What is the difference between a discrete and a continuous system?
- ii. What is the difference between deterministic and random vibration? Give two practical examples of each.
- iii. Explain Gibb's phenomenon.
- iv. Explain hysteresis damping and explain with the help of figure
- v. Explain the following terms with example:
i) Harmonic motion ii) Coulomb damping iii) Phenomenon of beats

Q.2 A) What is Stability of Systems. Explain in detail asymptotically stable system, unstable systems and stable systems. (4)

B) Explain different methods to reduce the Flow-Induced Vibration. (2)

C) Explain the following (Any 2) (4)

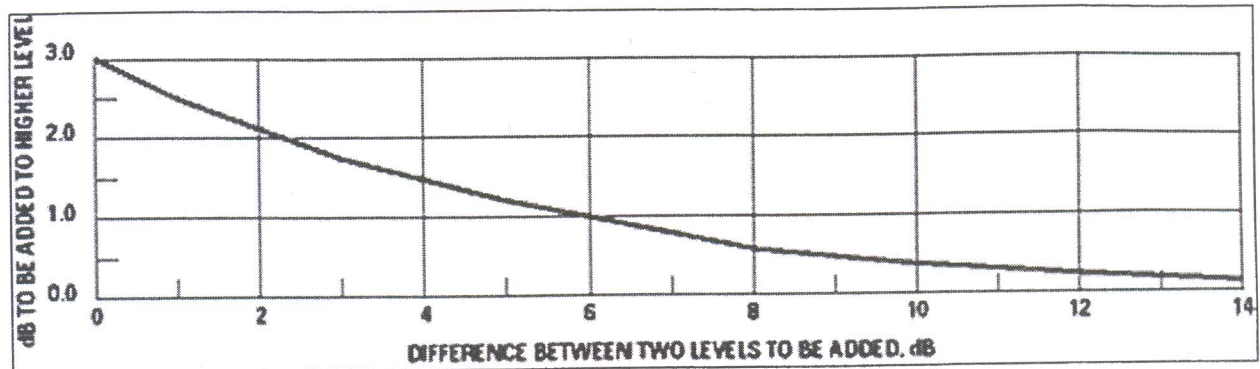
- i) Center of Percussion
- ii) Frequency spectrum
- iii) Rayleigh's Energy Method

Q.3 A) Explain in detail the procedure to add & subtract more than two dB sound source values. (4)

B) Using the below chart find out the total value of these noise sources. (6)

i) If two sound sources of 45 dB and 48 dB are present

ii) If two sound sources 40 dB are present



Q.4 A. Explain different types of Windowing techniques used in signal processing. (05)

B. Explain working of Impulse hammer and Impedance head in detail. (05)

Q.5 A. What is Aliasing? Give brief information. (02)

B. What is Peak Hold Averaging? Give brief information. (02)

C. Explain working of Impulse hammer and Impedance head in detail. (06)

Q.6 A. Explain exponential averaging. Give brief information. (02)

B. Explain the following (any 4) (08)

a. Microphone types

b. A-weighted sound pressure level

c. 1/3rd Octave scale

d. FFT

e. Sampling

SECTION II (50)

SOLVE ANY FIVE QUESTIONS OUT OF SIX FROM SECTION II

Q.7. A door with a transmission loss of 40 dB at 1000 Hz separates rooms. A window with a transmission loss of 15 dB at 1000 Hz is to be installed which occupies 12% of the wall. Calculate the resultant composite transmission loss of the wall at 1000 Hz. (10)

Q.8. A. What are the different performance evaluation parameters for Silencer Explain with neat sketches? (05)

B. Draw the flowchart showing the steps to optimize the natural frequency of a component using CAE and experimental modal correlation method. (05)

Q.9. Explain the following for modal testing in brief: (10)

a. SIMO

b. methods of fixing accelerometer to structure

c. types of boundary conditions

d. hammer size

e. Resonance and Mode shape

Q.10. A. The average sound pressure level (SPL) computed during ISO 3744 testing for 9 locations was 72dB(A). If the average SPL for 7 locations was found to be 67dB(A). What was the SPL of the remaining two locations. Considering for last two locations **a)** both locations with same level **b)** one location had SPL 2dB more than the other. Indicate formula used. (05)

B. Explain sound power measurement by sound intensity method and sound pressure level method. What are the significant differences. (05)

Q.11. What are the different methods and standards used for measuring the normal and random sound absorption coefficients? Also write advantages and limitations of each method. (10)

Q.12. Explain the Mass Law, Resonant frequency and Critical frequency of barrier made of steel sheet. Also calculate the transmission loss of 1 mm thick steel sheet using mass law at 250 Hz, 500 Hz, 1000 Hz and 2000 Hz. (10)

Q.13 Explain the membrane absorber and Helmholtz absorber. Calculate the resonant frequency for Helmholtz resonator for given data. $L_{neck} = 23$, $D_{neck} = 25$ and dimensions of the volume cavity are 70 mm X 80 mm X 60 mm. (10)