

TKN/KS/16/5825

Bachelor of Science (B.Sc.) Semester-III (C.B.S.)

Examination

PHYSICS-301

Paper—I

**(Sound Waves, Applied Acoustics, Ultrasonics &
Power Supply)**

Time—Three Hours]

[Maximum Marks—50

N.B. :— (1) **ALL** questions are compulsory.

(2) Draw neat diagrams wherever
necessary.

EITHER

1. (A) What is musical scale ? What are the types of
musical scale ? Explain the diatonic scale with
its important characteristics. 5
- (B) (i) Explain the construction and working of
musical instrument Harmonium. 3

- (ii) The frequency of fundamental note from closed pipe is 200 Hz. What will be the frequency of fundamental note for an open organ pipe of same length ? 2

OR

- (C) Explain Hebb's method for the measurement of velocity of sound. 2½
- (D) Distinguish between the intensity and loudness of sound. 2½
- (E) If the tension on the string is increased by 2%, what will be the percentage variation in its frequency ? 2½
- (F) Explain the limit of audibility by human ear. 2½

EITHER

2. (A) (i) What are the different methods for recording of sound waves.
- (ii) Explain the recording and reproduction of sound on cine-film. 5

- (B) (i) What is reverberation ?

Explain the important requirements for good acoustics of Hall. 3

- (ii) A Hall of a volume 5500 m³ is found to have a reverberation time of 2.3 seconds. The sound absorbing surface area is 750 m². Calculate the average absorbing coefficients. 2

OR

- (C) Explain method of recording and reproduction of sound on magnetic tape. 2½
- (D) Describe the construction of moving coil loudspeaker with neat diagram. 2½
- (E) Explain the important characteristics of transducers. 2½
- (F) A cinema hall of volume 2500 m³ has an average absorption coefficient of 0.125. Calculate the reverberation time if surface area of Hall is 1660 m². 2½

EITHER

3. (A) What is SONAR system ? Explain its working with neat diagram. State its important applications.

5

- (B) (i) Explain the construction and working of magnetostriction oscillator.

3

- (ii) Calculate the natural frequency of ferromagnetic rod of length 40 mm.

(density = $7.25 \times 10^3 \text{ kg/m}^3$, $\gamma = 115 \times 10^9 \text{ N/m}^2$)

2

OR

- (C) Explain the terms :

(i) Piezoelectric effect

(ii) Inverse Piezoelectric effect.

2½

- (D) Describe any two applications of Ultrasonic waves in medical science.

2½

- (E) In a SONAR system, echo pulse of Ultrasonic wave is detected after 0.1 second. Calculate the depth of the seq. (speed of Ultrasonic wave in sea water is 1440 m/s)

2½

- (F) Describe the detection of Ultrasonic waves by Kundt's tube method and sensitive flame method.

2½

EITHER

4. (A) What is rectifier ?

Explain the working of Half wave rectifier with circuit diagram and input-output waveform. 5

- (B) (i) What is the necessity of filters in power supply ?

Describe the working of L-section filter. 3

- (ii) A halfwave rectifier is used to supply 50 V dc to a load of 800Ω . The forward resistance of diode is 25Ω . Calculate the ac voltage required.

2

OR

- (C) Explain the line regulation and load regulation.

2½

- (D) Describe the working zener diode as a voltage regulator.

2½

- (E) A power supply is delivering 100 watts to a load of $10\text{ k}\Omega$. Find the voltage present across the load if ripple factor is 0.1%. 2½
- (F) Explain the voltage regulation with IC-317. 2½
5. Solve any **TEN** (1 mark each) :
- (i) What is group velocity ?
 - (ii) How the stationary waves are formed ?
 - (iii) If the distance between two points is 20 cm and wavelength $\lambda = 100\text{ cm}$. Find the corresponding phase difference.
 - (iv) Name the factors which affect architectural acoustics of a hall.
 - (v) State the important drawback of crystal microphone.
 - (vi) Define the active transducer.
 - (vii) What is the advantage of piezo-electric method in production of ultrasonic waves ?
 - (viii) Calculate the frequency of ultrasonic waves produced by quartz crystal of thickness 5 mm.
($\gamma = 7.7 \times 10^{11}\text{ dynes/cm}$ $\gamma = 2.65\text{ g/cm}^3$)

- (ix) What is acoustic grating ?
- (x) Draw the block diagram of regulated power supply.
- (xi) A power supply has no load voltage is 30 V and full load voltage is 29 V. Calculate the percentage of voltage regulation.
- (xii) Define avalanche breakdown. 1×10