# **PHYSICS (NM)**

# 3-2-117

# **Paper II: Waves & Oscillations** (For Non-Maths Combinations)

# **II SEMESTER – W.E.F. 2015-16**

#### Work load:60 hrs per semester

4 hrs/week

# UNIT-I: 15 hrs.

## **1. Oscillatory Motion**

Simple harmonic motion-Equation of motion and solution-Simple harmonic motion from the standpoint of energy-The rotor diagram representation of simple harmonic motion-Compound pendulum-determination of g and k, torsional pendulum-determination of n, Combination of Simple harmonic motions along a line and perpendicular to each other-Lissajous figures-

## UNIT II: 14 hrs

## **2.Damped Oscillators**

Damped Vibrations- examples, damped harmonic oscillator-Equation of motion-Assumption of solution for various boundary conditions- Over damping under damping and critical damping-The harmonic oscillator-Equation of motion –Resonance-Sharpness of resonance-Q-factor.

# UNIT-III: 11 hrs

## 3. Wave Motion

Progressive waves-Equation of a progressive wave-sinusoidal waves-Velocity of waves in elastic media-Standing waves-Transverse vibrations of stretched strings, overtones and harmonics. Sonometer verification of laws of transverse vibrations in a stretched string, beats ( qualitative analysis Only).

# UNIT-IV: 10 hrs

### **4.Acoustics**

Classification of sound, Characteristics of musical sound, Acoustics of Buildings, Reverberation, Sabine's formula (without derivation) Absorption coefficient, Factors affecting acoustics of buildings, Intensity of sound, Sound distribution in an auditorium.

## UNIT V: 10 hrs.

#### 5. Ultrasonics

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, determination of wavelength of ultrasonic waves. Applications of ultrasonic waves.

#### **REFERENCE BOOKS:**

- 1. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
- 2. BSc Physics -Telugu Akademy, Hyderabad
- **3.** Waves and Oscillations. S. Badami, V. Balasubramanian and K. Rama Reddy Orient Longman.
- **4.** Waves and Oscillations. N. Subramaniyam and Brijlal Vikas Publishing House Private Limited.
- 5. Unified Physics Vol.I Mechanics, Waves and Oscillations Jai Prakash Nath & Co.Ltd., Meerut.
- 6. Properties of Matter and Acoustics R Murugeshan and K. Shivaprasath, S Chand & Co.Ltd. (2005-Ed)
- 7. Acoustics Waves and Oscillations S. N. Sen Wiley Estern Ltd
- 8. Text Book of Sound-S.R.Shankara Narayana, Sultan Chand & Sons, New Delhi

#### THREE YEAR DEGREE EXAMINATION, MAY 2016

#### CHOICE BASED CREDIT SYSTEM

#### SECOND SEMISTER

#### PAPER – II – PHYSICS

PAPER – III Waves and oscillations

#### (Non-Mathematics combination)

(New syllabus w.e.f.2015-16)

Time : 3 hours-

Max.marks: 75

#### SECTION -A

#### (Marks : 5x5 = 25M)

Answer any five of the following :

1. Explain briefly about compound pendulum.

2. Explain briefly about Lissajous figures.

3. Define the Q-factor of a damped oscillator and explain its importance.

- 4. Explain briefly about resonance.
- 5. State the laws of transverse vibrations of stretched strings.
- 6. Explain harmonics and overtones.
- 7. What are the characteristics of musical sound?
- 8. Write any four applications of ultrasonics.

SECTION – B

#### (Marks 5x10 = 50M)

Answer all questions :

9. (a) What is torsional pendulum ? How do you measure rigidity modulus of a wire by using torsional pendulum?

Or

- (b) Define S.H.M. Derive equation of motion of S.H.M and solve it.
- 10. (a) What are damped vibrations and forces vibrations. Explain them with two examples each.

Or

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(b) What is a volume resonator ? How do you determine the frequency of given tuning fork using volume resonator?

11. (a) What are progressive waves ? Derive the equation of a progressive wave ?

Or

(b) What are sinusoidal waves ? Explain about velocity of waves in elastic media.

12. (a) Explain about accoustics of buildings and reverberation.

Or

- (b) Explain about the factors affecting accoustics of buildings.
- 13. (a) What is magnetostriction ? Explain how it is used to produce ultrasonic waves.

Or

(b) Describe how ultrasonics are produced by piezoelectric method.

The velocity of sound in piezoelectric crystal of thickness 0.003m is 5750m/sec. Calculate the fundamental frequency of ultrasonic waves produced.

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