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Name:.....

Reg.No:.....

SECOND SEMESTER B.Sc DEGREE EXTERNAL EXAMINATION JUNE 2016

(CUCBCSS-UG)

(Core Course:Physics)

**CC15U PH2 B03:- Properties of matter, Waves and Acoustics
(2015 Admissions)**

Time: Three Hours

Max. Marks: 80

Section A (Answer all, each has a mark of 1)

If the density of a material increases, the value of Young's modulus is -----

For a given material Y is 2.4 times that of rigidity modulus, its Poisson ratio is -----

A cantilever of uniform cross section is more likely to break at -----

$x = \sin \omega t + \cos 2\omega t + \sin 3\omega t$ is

a) simple harmonic b) periodic not simple harmonic c) not periodic d) periodic and simple harmonic

Write an example for oscillatory motion.

The wavelength range of audible sound is -----

The unit of loudness is -----

The sound wave of frequency greater than 10^9 Hz is called -----

The equation which represents a stationary wave is -----

The first overtone of a stretched string of a given length is 320 Hz. The first harmonic is -----

[10 x 1 = 10]

Section B (Answer all, each has a mark of 2)

State Hook's law of elasticity.

Write down the differential equation of motion for Electrical L.C circuit

Define Young's modulus, Bulk Modulus and Rigidity modulus.

Distinguish between transverse and longitudinal waves.

What is a plane progressive wave? Why it is called plane?

Write a note on noise pollution.

Define threshold of audibility.

[7 x 2 = 14]

Section C (Answer any 5, each has a mark of 4)

Explain Elastic Hysteresis

Derive an expression for potential energy and kinetic energy of a particle executing S.H.M

Derive the expression for the time period of a torsion pendulum.

Show that in the presence of damping force, velocity of an oscillating particle decreases exponentially.

What is meant by acoustics of buildings? What are the main factors it deals with?

Write an note on ultrasonic waves.

Give the Sabine's formula for reverberation time

[5 x 4 = 20]

Section D (Answer any 4, each has a mark of 4)

25. The breaking stress of aluminium is $7.5 \times 10^7 \text{ N/m}^2$. Calculate the greatest length of aluminium wire that could hang vertically without breaking. Density of aluminium is 2700 Kg/m^3 .
26. A bar of length 1.2 m, breadth 3cm and thickness 4mm is used as a cantilever. When a load of 0.25Kg is attached to the free end, the depression at the free end is 1cm. Calculate the Young modulus of the material ?
27. A particle executes S.H.M given by the equation $x=10\sin(\pi t + \pi/2)$. Calculate the
i)amplitude ii)frequency iii)phase iv)time period
28. A hall of volume 6000 m^3 is found to have a reverberation time of 2.5 seconds. The sound absorbing surface in the hall has an area of 800 m^2 . Calculate the absorbing coefficient.
29. Calculate the velocity of longitudinal waves through a metal rod of Young's modulus $2 \times 10^{11} \text{ Pa}$ and density 8000 kgm^{-3}
30. Spherical waves are emitted from a 1.0 watt source in an isotropic non-absorbing medium. What is the wave intensity 1.0 metre from the source
31. In an experiment to obtain Lissajous figures one tuning fork is of frequency 250Hz and a circular figure occurs after every 5 seconds. Find the frequency of other tuning fork

[4 x 4 = 16]

Section D (Answer any 2, each has a mark of 10)

32. Deduce the relation for depression at the middle of a uniform beam supported between two knife edges and loaded at the middle.
33. Set up differential equation for S.H.M and obtain two solutions.
34. Set up the differential equation for transverse waves in a stretched string and hence the expression for velocity
35. What is Piezo-electric effect? Explain its application in the production of ultra sonic waves.

[2 x 10 = 20]
