

16U215

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Name.....

Reg. No.....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, MAY-2017

(Regular/Supplementary/Improvement)

(CUCBCSS – UG)

CC15U PH2 B02 – PROPERTIES OF MATTER, WAVES & ACOUSTICS

(Core Course: Physics)

(2015 Admission Onwards)

Time: Three Hours

Maximum: 80 Marks

SECTION A (Answer all questions, each question carries 1 mark)

- The young's modulus of a perfectly plastic material is
 - zero
 - infinite
 - one
 - none of these
- The maximum intensity which an ear can tolerate without sensation of pain is 1 W/m^2 .
The corresponding intensity level is
 - 60 dB
 - 100dB
 - 120 dB
 - 40 dB
- The length of a simple pendulum is increased by 44%. What is the % increase in its time period?
 - 60%
 - 40%
 - 20%
 - 15%
- A wave of frequency 500 Hz has a velocity of 360 ms^{-1} . What is the distance between two nearest points 60° out of phase
 - 6.6 Cm
 - 12 Cm
 - 60 Cm
 - 120Cm
- When the amplitude of a particle executing SHM increases, the time period
 - Decreases
 - remains unchanged
 - increases
 - may increase or decrease depending upon the phase
- The Sound waves of frequency greater than 10^9 Hz is called
 - Infrasonic
 - Ultrasonic
 - Supersonic
 - Hypersonic
- The first overtone of a stretched string is of given length is 320 Hz . The first harmonic is
 - 320 Hz
 - 640 Hz
 - 160 Hz
 - 480 Hz
- When the length of the cantilever is doubled, the depression becomes
 - doubled
 - 3 times
 - 4times
 - 8 times
- The velocity with which a plane harmonic wave moves is called
 - phase velocity
 - group velocity
 - wave velocity
 - both a and c
- A uniform spring of force constant k is cut into two pieces whose lengths are in the ratio of 1:2. What is the force constant of the longer piece of the spring
 - k
 - 2k
 - k/2
 - 3k/2

(10x1=10 marks)

SECTION B (Answer all questions, each question carries 2 marks)

11. What is the advantage of Γ form of girders?
12. Define piezoelectric effect.
13. Compare stress and strain.
14. What are forced harmonic oscillations?
15. Briefly explain acoustic grating.
16. What is the limiting value of Poisson ratio?
17. What are spherical waves?

(7x2=14 marks)

SECTION C (Answer any 5 questions, each question carries 4 marks)

18. Discuss the mode of transverse vibration of a string.
19. Derive the expression for average power dissipation for damped harmonic oscillator.
20. Write a brief note on acoustics of buildings.
21. Differentiate phase velocity and group velocity.
22. Explain Lissajous figure and give its applications.
23. Show that Isothermal elasticity is equal to its pressure.
24. Show that in twisting a cylindrical rod, the shear is maximum on the surface. (5x4=20 marks)

SECTION D (Answer any 4 questions, each question carries 4 marks)

25. A Cantilever of length 50 Cm is depressed by 15 mm at the loaded end. Calculate the depression at a distance 30 cm from the fixed end.
26. For a particle vibrating simple harmonically, the displacement is 6 cm, at the instant the velocity is 8 cm/sec and the displacement is 6 cm/sec. Calculate the a) amplitude b) frequency c) time period.
27. Find the stress to be applied on a steel wire to stretch it by 0.25% of its original length. Young's modulus for steel is 90 GPa
28. Spherical waves are emitted from a 1.0 Watt source in an isotropic non-absorbing medium. What is the wave intensity 1.0m from the source?
29. The volume of a room is $12 \times 10 \times 5 \text{ m}^3$. The average sound absorption coefficient for wall is 0.03, for the floor is 0.06 and for ceiling is 0.80. Calculate the reverberation time.
30. The frequency of tuning fork is 300Hz. If the Quality factor is 5×10^4 . Find the time after which its energy becomes 1/10 of its initial value.
31. A steel wire of 0.72 m long has a mass of $5 \times 10^{-3} \text{ kg}$. If the wire is under a tension of 60 N. What is the speed of transverse waves on the wire?

(4x4=16 marks)

SECTION E (Answer any 2 questions, each question carries 10 marks)

32. Define periodic motion, SHM and derive equations for velocity and displacement of SHM.
33. Discuss any one method of production of ultrasonic waves. Describe an experiment to determine velocity of ultrasonic waves in a liquid?
34. What are torsional oscillations? Explain the experimental determination of the rigidity modulus of a wire using torsion pendulum.
35. Derive the expression for a plane progressive harmonic wave. Derive the expression for energy density and energy current for such a wave.

(2x10=20 marks)
