

19U205S (SP)

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Name.....

Reg. No.....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2020

(CUCBCSS – UG)

CC15U PH2 B02 – PROPERTIES OF MATTER, WAVES & ACOUSTICS

(Physics – Core Course)

(2015 to 2018 Admissions - Supplementary/Improvement)

Time: Three Hours

Maximum: 80 Marks

Section A

Answer *all* questions. Each question carries 1 mark

1. If the density of a material increases, the value of Young's modulus is -----
2. For a given material Y is 2.4 times that of rigidity modulus, its Poisson ratio is -----
3. A cantilever of uniform cross section is more likely to break at -----
4. $x = \sin cot + \cos 2cot + \sin 3cot$ is
 - a) Simple harmonic
 - b) Periodic not simple harmonic
 - c) Not periodic
 - d) Periodic and simple harmonic
5. Write an example for oscillatory motion.
6. The wavelength range of audible sound is -----
7. The unit of loudness is -----
8. The sound wave of frequency greater than 10^9 Hz is called -----
9. The equation which represents a stationary wave is -----
10. The first overtone of a stretched string of a given length is 320 Hz. The first harmonic is -----

(10 x 1 = 10 marks)

Section B

Answer *all* questions. Each question carries 2 marks.

11. State Hook's law of elasticity.
12. Define simple harmonic motion.
13. Define Young's modulus, Bulk Modulus and Rigidity modulus.
14. Distinguish between transverse and longitudinal waves.
15. What is a plane progressive wave? Why it is called plane?
16. Write a note on noise pollution.
17. Define threshold of audibility.

(7 x 2 = 14 marks)

Section C

Answer any *five* questions. Each question carries 4 mark

18. Explain Elastic Hysteresis
19. Derive the expression for the time period of a torsion pendulum.

20. How can we measure the rigidity modulus of given wire?
21. What is meant by acoustics of buildings? What are the main factors it deals with?
22. Write a note on ultrasonic waves.
23. Give the Sabine's formula for reverberation time
24. Obtain expression for longitudinal waves in Rods.

(5 x 4 = 20 marks)

Section C

Answer *four* questions. Each question carries 1 mark

25. The breaking stress of aluminum is $7.5 \times 10^7 \text{ N/m}^2$. Calculate the greatest length of aluminum wire that could hang vertically without breaking. Density of aluminum 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. Calculate the frequency of the fundamental note of a string 1m long and weighing 2 grams when stretched by a weight of 400 kg.
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 marks)

Section D

Answer any *two* questions. Each question carries 10 marks

32. Derive the relation between various elastic constants.
33. Set up differential equation for simple Harmonic Motion 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 marks)
