



K21U 6566

Reg. No. : .....

Name : .....

I Semester B.Sc. Degree (C.B.C.S.S. – Supplementary)  
Examination, November 2021  
(2015-2018 Admissions)  
CORE COURSE IN PHYSICS  
1B01PHY : Physics Primers

Time : 3 Hours

Max. Marks : 40

*Instruction : Write answers in English only.*

SECTION – A

(Answer **all** – Very short answer type – **Each** question carries **one** mark.)

1. Quantum theory of radiation was proposed by \_\_\_\_\_
2. A vector  $B$  which satisfies the condition divergence of  $B = 0$  is called \_\_\_\_\_
3. If in a stretched string arrangement the area of cross section of the wire is halved and the tension is doubled, the frequency becomes \_\_\_\_\_
4. The length of a simple pendulum is increased by 44%. What is the percentage increase in its time period ?

SECTION – B

(Answer **any seven** – Short answer type – **Each** question carries **two** marks.)

5. State the quantum theory of radiation put forward by Planck.
6. Discuss the importance of standard model in Physics.
7. Define the gradient of a scalar field.

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8. Define scalar triple product and obtain an expression for it.
9. Derive an expression for the volume element in spherical polar coordinates.
10. State the law of parallelogram of vector addition.
11. What is a harmonic oscillator ? Write down the differential equation of motion of a simple harmonic oscillator.
12. Give three applications of Lissajous figures.
13. Write down an expression for a plane progressive wave and explain the symbols.
14. Prove that the intensity of a wave is proportional to the square of the amplitude.

#### SECTION – C

(Answer **any four** – Short essay/problem type – **Each** question carries **3** marks.)

15. A longitudinal disturbance generated by an earthquake travels 1000 km in 3 minutes. If the average density of the rock is assumed to be  $2700 \text{ kgm}^{-3}$ . Calculate the bulk modulus for the rock.
16. A spring stores 5 J of energy when stretched by 25 cm. It is kept vertical with the lower end fixed. A block fastened to its other end is made to undergo small oscillations. If the block makes 5 oscillations in each second, what is the mass of the block ?
17. The edge of a parallelepiped are given by the vectors  $\hat{i} + 2\hat{j} + 3\hat{k}$ ,  $5\hat{j}$  and  $4\hat{j} + m\hat{k}$ . What should be the value of m in order that the volume of the parallelepiped be 20 units ?



18. Prove that  $\text{div}(\text{curl } F) = 0$ .
19. Show that the vectors  $A = 2\hat{i} - 3\hat{j} + 4\hat{k}$  and  $B = 6\hat{i} + 9\hat{j} - 12\hat{k}$  are parallel to each other.
20. What is the importance of Higgs Boson in the history of physics ?

SECTION – D

(Answer **any two** – Long essay type – **Each** question carries **5** marks.)

21. Derive an expression for the velocity of a transverse wave in a stretched string.
  22. Explain the composition of two rectangular simple harmonic motions of equal periods but with different amplitudes and phases in detail.
  23. What are curvilinear coordinates ? Write down the relation between Cartesian coordinates and cylindrical coordinates. Explain in detail.
  24. Briefly explain the major contributions in Physics.
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