



K17U 2551

Reg. No. : .....

Name : .....

I Semester B.Sc. Degree (CBCSS.-Reg./Supple./Improv.) Examination,  
November 2017

Core Course in Physics  
(2014 Admn. Onwards)

1B01 PHY : 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. (1×4=4)

1. A wave which requires a medium for their propagation is called \_\_\_\_\_.
2. A vector divided by its magnitude is called \_\_\_\_\_.
3. Heliocentric theory was put forward by \_\_\_\_\_.
4. The differential equation representing Simple Harmonic Motion \_\_\_\_\_.

SECTION – B

Answer **any seven**. Short answer type. **Each** question carries **two** marks. (2×7=14)

5. What is Gauss's divergence theorem ?
6. State Plank's quantum hypothesis.
7. Represent graphically the variation of kinetic energy, potential energy and total energy with displacement of a particle executing simple harmonic motion.
8. Define null vector and give 2 properties of it.
9. Distinguish between longitudinal and transverse wave.

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10. What are Lissajous figures ?
11. What is Del operator ?
12. Write an expression for kinetic energy of a particle executing simple harmonic motion.
13. What is Fourier theorem ?
14. Write a note on contributions of Indian physicists in twentieth century.

### SECTION - C

Answer **any four**. Short essay/problem type. **Each** question carries **three** marks. (3×4=12)

15. Prove that  $\text{div curl } (F) = 0$ .
16. A tuning fork of frequency 512 Hz produced a plane wave in air having amplitude  $0.5 \times 10^{-3}$  mm. Calculate the energy density and intensity of the wave. (Velocity of sound in air 332 m/s and density of air =  $1.29 \text{ kg/m}^3$ )
17. The equation of a simple harmonic oscillator is given by  $d^2x/dt^2 + 625x = 0$ . Find the period and frequency of oscillation.
18. Express  $v^2$  in spherical polar coordinates.
19. Derive the differential equation of wave motion in one dimension.
20. Prove that the given vectors  $\vec{A} = i + 4j + 3k$  and  $\vec{B} = 4i + 2j - 4k$  are perpendicular to each other.

### SECTION - D

Answer **any two**. Long essay type. **Each** question carries **five** marks. (5×2=10)

21. Obtain the transformation and reverse transformation equations between Cartesian coordinates and Spherical Polar coordinates.
22. Derive an expression for the velocity of longitudinal wave in a rod.
23. What is meant by standard model in high energy physics ? What are the various particle families in the standard model ? Explain Higgs mechanism.
24. Discuss in detail the two simple harmonic motions of equal periods in a straight line.