



K18U 2193

Reg. No. :

Name :

I Semester B.Sc. Degree (CBCSS – Reg./Supple./Improv.)
Examination, November 2018
CORE COURSE IN PHYSICS
1B01PHY : Physics Primers
(2014 Admn. Onwards)

Time : 3 Hours

Max. Marks : 40

Note : Write answers in English only.

SECTION – A

(Answer **all** very short answer type-**each** question carries **one** mark)

1. Chandrashekhar an Indian scientist was awarded Nobel prize in _____
2. If $C = A - B$. The dot product of C with itself is _____
3. The energy density of a plane progressive harmonic wave is directly proportional to _____
4. The total energy of a particle executing S.H.M. is proportional to _____

SECTION – B

(Answer **any seven** – short answer type - **each** question carries **two** marks)

5. State the postulates of special theory of relativity.
6. What is the importance of Higgs boson in the history of physics ?
7. Define vector triple product and write down an expression for it.
8. Define solenoidal and irrotational vectors. Give examples.
9. Write down the relation between Cartesian coordinate system and spherical polar coordinate system.
10. State the Gauss's divergence theorem.
11. Represent graphically the variation of
 - i) kinetic energy
 - ii) potential energy and
 - iii) total energy with displacement of a particle executing S.H.M.

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12. Explain what is Lissajous figures.
13. Distinguish between longitudinal and transverse wave.
14. What are the conditions for applicability of Fourier theorem.

SECTION – C

(Answer any four – short essay/problem type – each question carries 3 marks)

15. Plane harmonic waves of frequency 500 Hz are produced in air with amplitude 10^3 cm. Calculate the pressure amplitude. Speed of sound in air 340 m/s. Density of air = 1.29 Kg m^{-3} .
16. Find a unit vector perpendicular to the surface $X^2 + Y^2 + Z^2 = 3$ at the point (1, 1, 1).
17. A particle in S.H.M. makes 300 vibrations per minute with amplitude of 5 cm. Calculate its kinetic energy and potential energy when the displacement is 1 cm. Mass of the particle is 10g.
18. Prove that $a \times (b \times c) + b \times (c \times a) + c \times (a \times b) = 0$.
19. If $F = 2xz^2\hat{i} - yz\hat{j} + 3xz^3\hat{k}$. Find curl (curl F) at the point (1, 1, 1).
20. Briefly explain the quantum theory of radiation put forward by Planck.

SECTION – D

(Answer any two – long essay type – each question carries 5 marks)

21. What is a progressive wave? Derive an expression for average energy density in a wave.
22. Derive an expression for kinetic energy, potential energy and total energy and represent the variation of these with displacement for a particle executing S.H.M.
23. What are spherical polar coordinates? Explain in detail.
24. What is meant by standard model in high energy Physics? Also explain the various particle families in the standard model.