

TB221370V

Reg. No : .....

Name : .....

**B.Sc. DEGREE (C.B.C.S.) EXAMINATION, NOVEMBER 2022**  
**(2022 Admissions (regular) 2021 Admissions (Improvement /**  
**Supplementary), 2020, 2019, 2018, Admissions Supplementary)**  
**SEMESTER I - CORE COURSE**

Time : 3 Hours **PH1B01B18 - METHODOLOGY AND PERSPECTIVES OF PHYSICS** Maximum Marks : 60

**Part A**

**I. Answer any Ten questions. Each question carries 1 marks (10x1=10)**

1. Give Einstein's Mass Energy relation.
2. Does de Broglie hypothesis have any relevance to macroscopic matter? Justify.
3. Enlist any three properties of alpha, beta and gamma radiations.
4. Expand the acronym ASCII and explain.
5. Find 1's complement and 2's complement of the binary numbers (a) 10010 and (b) 101010
6. Differentiate between scalar triple product and vector triple product.
7. If  $\vec{C} = \vec{A} - \vec{B}$ , compute the dot product of  $\vec{C}$  with itself.
8. Illustrate the fundamental plots in spherical polar coordinates
9. Determine the polar coordinate for the point whose cartesian coordinate is (2,-6).
10. Explain parallax error.
11. Discuss the methods to minimize random errors.
12. Estimate the uncertainty in the area of a circle, if the error in the radius is 3%.

**Part B**

**II. Answer any Six questions. Each question carries 5 marks (6x5=30)**

13. Distinguish between inertial and non inertial frames of reference.
14. Define de Broglie wave. Calculate the de Broglie wavelength associated with a proton moving with  $1/10^{\text{th}}$  of velocity of light. Mass of proton is  $1.673 \times 10^{-27}$  kg.
15. Solve the following using 1's complement method: (a) 11000-1011 (b) 11000-100011
16. Show that curl of a gradient of a scalar function always vanishes.
17. Estimate the area of one leaf of rose  $r = \sin 5\theta$ .
18. A galvanometer of  $15 \Omega$  resistance shows full-scale deflection for a current of 1 mA. (a) How will you convert this into an ammeter of range 0 - 5 A (b) a voltmeter of 0-15 V. Calculate the net resistance in each case.
19. Distinguish between random error and systematic error.
20. Define relative error and percentage error. The length of a rod measured in an experiment is recorded as 3.87m, 3.75 m, 3.65 m, 3.82 m and 3.79 m respectively. Find the percentage error.
21. Find the mean value and standard deviation for the given data series 12, 6, 7, 3, 15, 10, 18, 5.

**Part C**

**III. Answer any Two questions. Each question carries 10 marks (2x10=20)**

22. Discuss the scientific contributions of H.J.Bhabha, S.Chandrashekhhar and M.N.Saha.

23. Explain the different methods to represent signed binary numbers in digital electronics. Explain arithmetic operations with suitable examples.
24. (a) Define line integral, surface integral and volume integral (b) State and explain the Stokes theorem and the fundamental theorem for gradient.
25. Discuss any five measuring instruments used for estimating time.