

D 53492

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Name.....

Reg. No.....

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, JANUARY 2014

(UG-CCSS)

Core Course—Physics

PH IB 01—METHODOLOGY OF SCIENCE AND PHYSICS

(2013 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer all questions.

Each question carries $\frac{1}{4}$ weightage.

Choose the correct answer :

- _____ is the knowledge derived from study experience.
(a) Information. (b) Theoretical knowledge.
(c) Practical knowledge. (d) Scientific knowledge.
- Theoretical knowledge obtained from demonstration and deductive reasoning is called _____.
- In Rutherford scattering experiment the particle used for scattering is :
(a) α -particle. (b) β -particle.
(c) γ -particle. (d) Neutron.
- _____ was introduced to explain the black body spectrum.
- To bodies radiate maximum energy at wavelength 3.6×10^{-7} m and 4.8×10^{-7} m respectively. Then the ratio of their temperature is :
(a) $\frac{2}{3}$. (b) $\frac{1}{2}$.
(c) $\frac{3}{5}$. (d) $\frac{4}{3}$.
- The main source of energy in the sun is _____ reaction.
(a) Fusion. (b) Fission.
(c) Both (a) and (b). (d) None of these.

Turn over.

7. How many kV potential is to be applied on X-ray tube so that minimum wavelength of emitted X-ray may be 1 \AA :
- (a) 12.40 kV. (b) 12.84 kV.
(c) 11.98 kV. (d) 1078 kV.
8. The energy that should be added to an electron to reduce its de Broglie wavelength from 10^{-10} m to $0.5 \times 10^{-10} \text{ m}$ will be :
- (a) Equal to initial energy.
(b) Four times the initial energy.
(c) Thrice the initial energy.
(d) Twice the initial energy.
9. If $A(t)$ be a vector function of the scalar variable 't' and be a constant length, then the vector $\frac{d}{dt} A(t)$ is :
- (a) Parallel to $A(t)$.
(b) Perpendicular to $A(t)$.
(c) Zero.
(d) Antiparallel to $A(t)$.
10. If 'r' is position vector and 'e' is a unit vector then the curl of which of the following is non-vanishing :
- (a) r. (b) $\frac{r}{r^3}$.
(c) $e \times r$. (d) $(e \times r) \times e$.
11. If $AX = \lambda X$, $AY = \mu Y$ and $\lambda \neq \mu$ what is $(A - \lambda Z) Y$?
- (a) 0. (b) μY .
(c) $(\mu - \lambda) Y$. (d) $(1 - \lambda) Y$.
12. At what velocity along its length will a rod contract 50% :
- (a) $\frac{c}{2}$. (b) $\frac{c}{\sqrt{2}}$.
(c) $\frac{v_3}{2} \cdot c$. (d) None of the above.

Part B

Answer all questions.

Each question carries 1 weightage.

13. What are the laws of science ?
14. Give a short note on science disciplines.
15. Explain why science doesn't draw conclusions about super natural explanations.
16. What are the basis for factual truths ?
17. Give the significance of peesview.
18. What is population inversion ?
19. What is de-Broglie Waves ?
20. List the fundamental theorem of Gradients.
21. What are the basic ideas of matrices ?

(9 × 1 = 9 weightage)

Part C

Answer any five questions.

Each question carries 2 weightage.

22. In the context of scientific knowledge analyse the Rutherford experiment.
23. What are the aspects on which scientific statements are made ? Illustrate with examples.
24. Discuss the scientific tempes as an important outcome of learning science.
25. What are auxiliary and ad-hoc hypothesis ?
26. Discuss the role of mathematics in scientific methods.
27. Explain coherent and incoherent light.
28. Explain spherical polar co-ordinate with a neat diagram.

(5 × 2 = 10 weightage)

Turn over

Part D

Answer any two questions.

Each question carries 4 weightage.

29. Discuss the factors to be considered in experimentation with relevant supports.
30. Elaborate the importance of models in scientific methods and explain why it has limitations ?
31. Explain eigen values and eigen vectors of matrices. What is Hermitian Matrix and Unitary Matrix ?

(2 × 4 = 8 weightage)

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