

16U116

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Name :

Reg. No.....

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(Regular/Supplementary/Improvement)

(CUCBCSS-UG)

CC15UPH1B01- METHODOLOGY OF SCIENCE AND PHYSICS

(Physics - Core Course)

(2015 Admission Onwards)

Time: 3 Hours

Max marks: 80

Section A (Answer all questions)

10 x 1 = 10

1. Who discovered X-rays?
2. What is Laser?
3. The number of atoms per unit volume that occupy a given energy level is called.....
4. The main source of energy in the Sun is.....
5. The derivative of a vector of fixed direction is -----.
6. Father of experimental physics is
7. A square matrix A is said to be singular, if
State whether the statement is true or false
8. The dot product of two vectors does not obey commutative law.
9. The matrix (-A) is the additive inverse of matrix (A)
10. The laws of physics are same in all frames.

Section B – (Answer all questions in two or three sentences.)

7 x 2 = 14

11. State Gauss's divergence theorem.
12. Express in vector form, the force on a charged particle in a magnetic field.
13. What is photo electric effect?
14. What are unitary matrices?
15. Explain a solenoidal field?
16. What is Green revolution?
17. State Stokes theorem.

Section C. (Answer any five questions in one paragraph)

5 x 4 = 20

18. What are the characteristics of scientific statement?
19. What is the role of population inversion in lasing?
20. Discuss the role of mathematics in physics.
21. What is a resultant vector?
22. Explain positivism in scientific method?
23. Explain the geometrical meaning of scalar triple product.
24. What is a skew Hermitian matrix?

Section D. (Answer any four problems.)

4 x 4 = 16

25. Find the length of the rod observed by a man at rest, if the rod is moving with a speed of 300×10^6 m/sec. The length of the rod at rest is 50cm.
26. Show that the area of an isosceles triangle is $\frac{1}{2} \vec{A} \times \vec{B}$, where \vec{A} and \vec{B} are two sides of the triangle.
27. Prove that $\vec{A} \times (\vec{B} \times \vec{C}) + \vec{B} \times (\vec{C} \times \vec{A}) + \vec{C} \times (\vec{A} \times \vec{B}) = 0$, where A,B,C are vectors.
28. Show that vectors $\vec{A} = 2\hat{i} - 3\hat{j} + 4\hat{k}$ and $\vec{B} = 6\hat{i} - 9\hat{j} - 12\hat{k}$ are parallel to each other.
29. Show that $(\vec{A} \times \vec{B}) \cdot (\vec{A} \times \vec{B}) = A^2 B^2 - \vec{A} \cdot \vec{B}$
30. Show that
$$\begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ b+c & c+a & a+b \end{bmatrix} = 0$$
31. What are the predictions of General theory of relativity?

Section E (Answer any two)

2 x 10 = 20

32. Discuss briefly the history of physics during 20th century.
33. Explain the model making in physics with one example.
34. Discuss the transformation of vectors under coordinate rotation.
35. What are Eigen values and Eigen vectors? Explain the important theorems on Eigen values and Eigen vectors and prove them.
