



Reg. No. :

Name :

Fifth Semester B.Sc. Degree Examination, November 2016
First Degree Programme Under CBCSS
PHYSICS

Core Course – V

PY 1541 : Methodology in Physics and Relativistic Mechanics
(2014 Admission)

Time: 3 Hours

Max. Marks: 80

SECTION – A

Answer all questions in one or two sentences. Each question carries 1 mark :

1. Write a short note on design of experiments.
2. Explain the purpose of literature survey.
3. What are the four qualities of good research ?
4. What are the different steps in the documentation of experiment ?
5. Voltage drop across the terminals of resistance is measured using a voltmeter whose pointer is displaced from zero. What type of error is present here ?
6. What is a cyclic co-ordinate ?
7. What is twin paradox ?
8. Write down the Hamiltonian dynamics of a simple harmonic oscillator.
9. Give the equation showing the variation of mass with velocity.
10. What do you mean by Coriolis force ?

(10×1=10 Marks)

P.T.O.



SECTION - B

Answer **any eight** questions not exceeding a paragraph. **Each** question carries **two** marks :

11. Explain the various methods involved in the research process.
12. Explain different types of data analysis.
13. What are the important parts of a research report ?
14. Define standard deviation.
15. It is expected that the percentage of error of the final result is 0.6%, how many significant figures should be used in expressing the result ?
16. Show that length is invariant under Galilean transformation.
17. Is the centrifugal force fictitious one ? Explain.
18. Show that Lorentz transformations reduce to Galilean transformations at low velocities.
19. Explain the significance of the results of Michelson-Morley experiment.
20. Show that generalized momentum conjugate to a cyclic co-ordinate is conserved.
21. What is the physical significance of conservation of energy ?
22. Write a short note on conservation theorem for angular momentum. **(8x2=16 Marks)**

SECTION - C

Answer **any six** questions. **Each** question carries **4** marks :

23. What are the precautions to be taken while writing a report ?
24. Write a note on statistical testing of hypothesis.
25. Write a short note on the characteristics of a good research report.
26. Explain the methods for estimating errors.
27. List and explain the different ways of data collection.



28. In an experiment to find the Young's modulus of a material, the formula used is $Y = mgL^3/4bd^3l$. A student when measuring the values reports errors as 1% in m, 1% in L, 1% in b, 0.5% in d and 2% in l. How much would be the error in reporting the Young's modulus ?
29. Obtain the Hamilton's equation of motion of two-dimensional harmonic oscillator in Cartesian coordinates.
30. Compare between Lagrangian and Hamiltonian formalisms with necessary equations.
31. Calculate the speed of an electron which has kinetic energy 2 MeV. **(6x4=24 Marks)**

SECTION - D

Answer **any two** questions. Each question carries **15** marks :

32. Discuss the different area a of scientific research programmes in India.
33. Explain the significance of a research report and narrate the various steps involved in writing such a report.
34. Derive the Lorentz transformation equations and explain length contraction and time dilation.
35. Discuss the Lagrangian formalism and obtain Lagrangian's equations of motion. **(2x15=30 Marks)**