

E 2448

(Pages : 3)

Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, NOVEMBER 2015

First Semester

Core Course—METHODOLOGY IN PHYSICS

(Common for B.Sc. Physics (Model I), (Model II), B.Sc. Physics Instrumentation and B.Sc. EEM)

(2013 Admission onwards)

Time : Three Hours

Maximum : 60 Marks

Candidates can use clark's tables and scientific non-programmable calculators.

Part A (Short Answer Questions)

Answer all questions briefly.

1 mark each.

1. State Kepler's laws.
2. Discuss the contributions of M.N. Saha towards physics.
3. Is universe deterministic ? Justify your answer.
4. How standard deviation can be used in error reporting ?
5. What are the limitations of water clocks in measuring time ?
6. Discuss the working principle of a galvanometer.
7. What are active and passive sonars ?
8. How will you measure angle using telescope ?

(8 × 1 = 8)

Part B (Brief Answer Questions)

Answer any six questions.

Each carries 2 marks.

9. Explain the theory of relativity.
10. Explain the corroboration and falsification in Physics.
11. What are the key features of Quantum Mechanics ?
12. Explain the working principle of a travelling microscope.

Turn over

13. Discuss the significance of peer review in publications.
14. Explain the applications of screw gauges.
15. Compare and contrast analog and digital multimeters.
16. Discuss the importance of estimating errors.
17. Distinguish between static and dynamic calibration.
18. Explain the statistic treatment of errors.

(6 × 2 = 12)

Part C (Problems / Derivations / Short Essays)

Answer any four questions.

Each carries 4 marks.

19. Give the mass-energy relation. Discuss its significance and practical effects.
20. At what speed should a clock be moved so that it may appear to lose 1 minute in each hour?
21. With a neat circuit diagram, explain how a galvanometer having $R = 15 \Omega$ and $I_{gh} = 6 \text{ mA}$ can be converted into a 100 volt voltmeter. Calculate the value of resistance to be used.
22. Describe the principle of working of the atomic clock. Compare its performance with digital clock.
23. The following readings were obtained when a resistance was measured : 1.34Ω , 1.38Ω , 1.56Ω , 1.47Ω , 1.42Ω , 1.44Ω , 1.53Ω , 1.48Ω , 1.40Ω and 1.59Ω . Assuming that only random errors are present calculate the following :—
 - (i) Arithmetic mean.
 - (ii) Average deviation.
 - (iii) Standard deviation ; and
 - (iv) Variance.
24. With neat sketches describe the error bars and their important parameters ? Discuss the various errors in digital instruments.

(4 × 4 = 16)

Part D (Long Essays)

*Answer any two questions.
Each question carries 12 marks.*

25. Discuss the development of Physics from Newtonian Mechanics to the modern nanotechnology.
26. With the help of examples, discuss how hypotheses, theories and laws are established, verified and falsified?
27. Explain any *four* different types of length / distance measuring techniques, bringing out the merits and demerits of each method.
28. (a) Explain the uncertainties in measurement and different ways of estimation of errors.
(b) Describe the different techniques of calibration of instruments.

(2 × 12 = 24)