F–3115

Sub. Code
7PPH1C1

M.Phil. DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Physics

RESEARCH METHODOLOGY AND DATA ANALYSIS

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A $(5 \times 5 = 25)$

Answer any **five** questions.

1. How will you identify a research topic and problem? Explain.

2. Explain the meaning and significance of the concept of correlations.

3. Using Newton's method, find the roof between 0 and 1 of $x^3 = 6x - 4$ correct to 5 decimal places.

4. Give the application of correlation in Empirical works and in Decision making.

5. Define regression co-efficient. What do they signify?

6. Explain the role of internet, email and web-browsing in the literative survery.

7. Evaluate $\int_{-3}^{3} x^4 dx$ by using Simpson's rule.

8. Interpret of R in analyses.

Part B (5 × 10 = 50)

Answer **all** questions, choosing either (a) or (b).

9. (a) Discuss the method of preparation and presentation of results of the research in a report.

Or

(b) Enumerate the principles of scientific research. Also elucide the ethics/plagarism that we follow in reporting the scientific paper.

10. (a) Define Poisson distribution. Find its mean and variance. Describe a situation where this distribution is applicable.

Or

(b) What is X^2-test of goodness of fit? What cautions are necessary while applying this test? Explain them with an exmaple.

11. (a) Find all the eigen values of $A = \begin{pmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{pmatrix}$.

Or

(b) Using Runge-Kutta method of fourth order, find (0.8) correct to 4 decimal places if $\dfrac{dy}{dx} = y - x^2$, given $y(0.6) = 1.7379$.

2 | **F–3115**

12. (a) Explain student t-test for testing the significance of the difference between two sampled mean. State the assumptions involved.

Or

(b) What is rank correlation? Find the expression of its co-efficients.

13. (a) Explain linear and multiple regression. Give atleast one model in each case.

Or

(b) Describe methods estimation regression co-efficients.

————————

3

F–3115

F–3116

M.Phil DEGREE EXAMINATION, NOVEMBER 2019

First Semester

Physics

ADVANCED INSTRUMENTATION TECHNIQUES

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (5 × 5 = 25)

Answer any **five** questions.

1.   Write a note on Coherent Scattering of X-rays.

2.   How to calculate conductivity by two probe method? Explain.

3.   Explain the working principle of Atomic Force Microscopy.

4.   Describe the working principle of Differential scanning Calorimetry.

5.   Explain the major components of a flame Photometer with a neat block diagram.

6.   Explain the concept of FTIR.

7.   What is mean free path? What is the relation between pressure and mean free path of a molecule?

8.   Derive an expression for regions of gas flow in Pipes.

Part B (5 × 10 = 50)

Answer **all** questions, choosing either (a) or (b).

9. (a) With the help of a neat diagram, describe the construction and principle of FTIR.

Or

(b) Explain the working principles and construction of NMR Spectrosceopy with block diagram and mention the applications.

10. (a) Explain the working principle and construction of STEM.

Or

(b) With a neat sketch, explain the construction and working principle of AFM.

11. (a) Describe the principle construction and operation of DTA.

Or

(b) Explain the principle, construction and operation of TGA.

12. (a) Describe the principle, construction and operation of ICP – AES system.

Or

(b) Enumerate the principle, construction and operation of Atomic Emission spectroscopy.

13. (a) Derive an equation of state of ideal and real gases.

Or

(b) With a neat sketch, describe the operation of diffusion pump and its salient features.

————————

F–3116