F–2117	Sub. Code
	7PPH1C1

M.Phil. DEGREE EXAMINATION, APRIL 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. Bring out the importance of literature survey.

2. What is chi-square test? What are limiting values of chi-square?

3. Describe the Trapezoidal method of computing integrals.

4. Explain poisson distribution and its properties.

5. What do you understand by a regression model? What are its uses?

6. Define the following and give one appropriate example of your own for the use of each.

   (a) Mean

   (b) Median

   (c) Mode.

7. Prove that the Newton-Raphson method is said to have quadratic convergence.

8. Enumerate the impact and usefulness of Internet tools for research problems.

Part B (5 × 10 = 50)

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

9. (a) Explain the various steps involved in the research process.

Or

(b) Describe the steps involved in preparation of synopsis and thesis.

10. (a) Explain in detail t-distribution and its applications.

Or

(b) Out of 8000 graduates in a town 800 are females, out of 1600 graduate employees 120 are females. Use χ^2 to determine if any distinction is made in appointment in the basis of sex. Value of χ^2 at 5% level for one degree of freedom is 3.84.

11. (a) Solve by using Newton' Raphson method, find the real root of $x \log_{10} x = 1.2$ correct to four decimal places.

Or

(b) Apply Gauss elimination method to find the solution of the following system

$x + y + z = 9$

$2x - 3y + 4z = 13$

$3x - 4y + 5z = 40$.

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12. (a) Explain t and F tests for small and Large data. How these measures are useful in research?

Or

(b) Discuss in detail the correlation analysis in empirical works and in decision making.

13. (a) Enumerate simple linear regression with basic model.

Or

(b) Explain the coefficient of determination of R^2 in multiple regression model.

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M.Phil. DEGREE EXAMINATION, APRIL 2019

First Semester

Physics

ADVANCED INSTRUMENTATION TECHNIQUES

(CBCS – 2017 onwards)

Time : 3 Hours　　　　　　　　　　Maximum : 75 Marks

Part A　　　　　　$(5 \times 5 = 25)$

Answer any **five** questions.

1. What is coherent scattering of x-rays? Explain.

2. Describe the principle of NMR.

3. How electrical resistivity and conductivity are measured using four probe method?

4. Explain the principle of STEM.

5. Distinguish between DTA and DSC.

6. What is meant by flame photometry? How does the flame photometer work?

7. What is pump down time? Derive the equation to calculate pump down time.

8. What is ideal gas? Derive the equation for an ideal gas.

Part B (5 × 10 = 50)

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

9. (a) Explain the principle, construction and working of Raman spectroscopy.

Or

(b) Describe the working principle of FTIR with a neat sketch and state the applications.

10. (a) Explain the following :

(i) Dielectric constant measurement.

(ii) Micro hardness measurement.

Or

(b) Describe the principle, construction and working of AFM.

11. (a) Explain the principle and instrumentation system of TGA.

Or

(b) Describe the principle and construction of DTA.

12. (a) Enumerate the principle and the experimental setup of energy dispersive analysis of X-rays.

Or

(b) Describe the principle, construction and operation of ICP AES.

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13. (a) Explain the following :

     (i) Mean free path

     (ii) resistance and conductance of arbitrary vaccum pipes.

Or

  (b) Explain the principle, construction and operation of turbo molecular pumps and also mention their salient features.

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F–2119	Sub. Code
	7PPH2C2

M.Phil. DEGREE EXAMINATION, APRIL 2019

Second Semester

Physics

THIN FILM TECHNOLOGY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

Part A   (5 × 5 = 25)

Answer any **five** questions.

1. Give the theory of thin film nucleation.

2. Briefly explain defect during thin film.

3. Using chemical method determine the thickness of thin film. Write advantage and disadvantage of this method.

4. Explain temperature co-efficient of resistance.

5. Explain the photoconduction properties of semiconducting film.

6. Describe the dielectric properties of thin film. Give the uses of this properties in application.

7. Write the theory of thin film optics. Calculate the optical constant of thin film.

8. Briefly explain bulk silicon solar cells.

Part B (5 × 10 = 50)

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

9. (a) How to prepare thin film using spray pyrolytic process? Give the feature of the spray pyrolytic process?

Or

(b) Using RF sputtering method prepare the thin film. What are advantage of using RF sputtering method?

10. (a) To determine thickness of thin film using optical interference method.

Or

(b) Give the principle, construction and working of quartz crystal thickness monitor.

11. (a) What is Hall effect? Calculate Hall co-efficient of P type or N type thin film.

Or

(b) Define annealing. Briefly explain thin film are annealing. Give the outline of Agglometation.

12. (a) Describe the field effect thin films.

Or

(b) Briefly explain DC and AC conduction mechanism of thin films.

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13. (a) Explain multilayer optical system and antireflection coating of thin film optics.

Or

(b) What are solar cells? Explain GaAS and Culnse solar cells.

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F–2121	Sub. Code
	7PPH2C5

M.Phil. DEGREE EXAMINATION, APRIL 2019

Second Semester

Physics

PRINCIPLES OF NANOMATERIALS AND TECHNOLOGY

(CBCS – 2017 onwards)

Time : 3 Hours   Maximum : 75 Marks

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

Answer any **FIVE** questions.

1. What is top down and bottom up process.

2. What are the different types of forces exist in an atom.

3. Write down the principles of spray pyrolysis technique.

4. Briefly explain the formation and characters of composites materials.

5. State and explain: Hydrothermal method.

6. Describe the working/functioning of solar cells.

7. Explain the applications of nanotechnology in industries.

8. Define the different types of nano sensors and its applications.

Part B (5 × 10 = 50)

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

9. (a) State and explain: Electrostatic and Vander Waals forces.

Or

(b) What are the different types of Nanotechnology.

10. (a) Describe the working principles of spray pyrolysis.

Or

(b) How nanomaterials are synthesized using sol-gel technique.

11. (a) How solvothermal technique was used for manufacture of nanomaterials.

Or

(b) Explain the synthesis of different nanomaterials from Ball mining method.

12. (a) Explain the working principles of light emitting diode.

Or

(b) State and explain: Quantum well Lasers.

13. (a) Explain the important role of nanotechnology in environment.

Or

(b) Describe the applications of nanoparticles systems in drugs delivery technology.

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