

**Department of Physics**  
**Aliah University**  
**PhD Course Work Examination- 2024 (June)**

**Paper Code:** PHD/RM-01  
**Full Marks:** 40 (+10)

**Paper Name:** Research Methodology  
**Time:** 2 hrs

***[Use Separate Answer Scripts for Group A, B & C]***

**Group-A**

***Answer Any One Question (10 X 1 = 10)***

1. (a) What do you mean by a *scientific article*? Discuss with examples.  
(b) Write down the basic outline of a *thesis* with a *brief description* of each component.  
(c) Name four different Government Organizations that fund for basic scientific research being carried out in different Indian academic institutions.  
(d) Discuss about the typical *timeframe* of a funded scientific project. [(1+2)+(2+3)+1+1]
2. (a) What are the different types of presentation of scientific research output? How one can efficiently use Computers and Information Technology for this purpose.  
(b) Discuss about the basic protocol of writing the *abstract* and *conclusion* sections of a manuscript designed to be submitted for publication as a *regular article*.  
(c) Name two journals that support only *review articles* and two journals that support only *letter-like articles*. [(1+3)+(2+2)+(1+1)]

**Group-B**

***Answer Any One Question (6 X 1 = 6)***

1. Explain the difference between qualitative and quantitative research methods. Provide examples of when each method would be appropriate to use in a research study.
2. Describe the main components of a well-structured research proposal and their importance.

**Group-C**

***Answer Any Four Questions (4 X 4 = 16)***

1. Define ‘research methods’ and ‘research methodology’ with examples.
2. (a) The citation of an article in Harvard style is written by,  
Fleischhauer, M., Imamoglu, A. and Marangos, J. P., 2005. Electromagnetically induced transparency: Optics in coherent media. *Reviews of Modern Physics*, 77(2), p.633.  
Write this citation in APA and Chicago styles.  
(b) What is the difference between Reference and Bibliography? [2+2]
3. What do you mean by literature review? Why it is very important for a researcher? Write the names of different sources of literature.
4. Discuss briefly about ‘the formulation of hypotheses and ‘research design’ in research.
5. Distinguish between ‘fundamental or basic research’ and ‘applied research’ with examples.
6. (a) Write the names of a few software for writing a research paper or thesis.  
(b) Write about the component of a research paper (i) Statement of data availability (ii) Keywords (iii) Statement of credit authorship contribution.

**Group-D**

Write and execute the given document (Annexure-I) in LaTeX and submit it in .tex and .pdf **(F.M. = 8)**

**Group-E [Assignment on Fortran Language] (F.M.=10)**

Write and execute the program in Fortran language to find (i) the Solution of first- and second-order differential equations, (ii) the Roots of a given polynomial, (iii) Numerical integration and (iv) Sum, difference, product, etc of matrices.