

**B.SC. CHEMISTRY  
SIXTH SEMESTER  
RESEARCH METHODOLOGY FOR CHEMISTRY  
BSC - 605A**

**SET  
A**

[USE OMR FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

Time: 30 min.


( Objective )

Marks: 20

*Choose the correct answer from the following:*

*1×20=20*

- Product moment method is used for the determination of
  - ANOVA
  - Correlation Coefficient
  - Regression
  - None of these
- A device that converts incident photons into an electrical signal is called
  - Photodiode
  - Photomultiplier
  - Phototube
  - Photovoltaic cell
- What does the standard deviation measure?
  - The average value of a dataset
  - The spread of data points around the mean
  - The middle value of a dataset
  - The most frequently occurring value
- In ANOVA, what is the null hypothesis?
  - All group means are equal
  - All group variances are equal
  - There is a correlation between variables
  - The data follows a normal distribution
- What is the range of values for the correlation coefficient (r)
  - 2 to 2
  - 0 to 1
  - 1 to 1
  - 0 to 100
- The correct way of presenting the numbers 2.035 & 2.065 with three significant figures will be
  - 2.04 & 2.07
  - 2.03 & 2.07
  - 2.03 & 2.06
  - 2.04 & 2.06.
- Which one of the followings is the correct way of writing the measurements?
  - 5 mol% catalyst resulted 95% product
  - 5 mol% catalyst resulted 95 % product
  - 5mol% catalyst resulted 95% product
  - 5mol % catalyst yielded 95 % product
- The total number of significant figures for  $1.02 \times 1.046$  will be
  - 4
  - 3
  - 2
  - 1

9. The example of a pyrophoric chemical is
- $\text{PhN}_3$
  - $\text{EtNO}_3$
  - $\text{tBuLi}$
  - $\text{Et}_2\text{O}$
10. Which one of the following chemicals is shock sensitive?
- diethyl ether
  - alkylnitrate
  - organolithium
  - organoazide
11. Which one of the followings is not the correct way in technical scientific writing?
- The reaction has been carried out with Palladium nanoparticles as the catalyst
  - The catalyst of the reaction is palladium nanoparticles
  - The catalyst has been used in the reaction is palladium nanoparticles
  - Palladium nanoparticles have been used as the catalyst in the reaction
12. The following GHS is for
- 
- Oxidizing
  - Explosive
  - Flammable
  - Extremely flammable
13. The total number of significant figures in 0.00500 will be
- 1
  - 5
  - 3
  - 6
14. Which of the scientific way of research discussion is generally found in a conference
- Writing a review article
  - Writing a research article
  - Writing a research communication
  - Poster presentation
15. The scientific mistake in the following sentence is
- 'The reagent,  $\text{VO}(\text{OPr})_3$  (227  $\mu\text{L}$ , 1.0 mmol) was added drop wise to a stirred solution of ligand-1 (0.2575g, 1.0mmol) in methanol ( $\text{MeOH}$ , 20 mL), resulting a dark red mixture'.
- 227  $\mu\text{L}$ , 1.0 mmol
  - 0.2575g, 1.0mmol
  - $\text{MeOH}$ , 20 mL
  - $\text{VO}(\text{OPr})_3$
16. What do you mean by H-index 10?
- Their research is ranked 10th in their field.
  - They have been cited 10 times.
  - They have published 10 papers.
  - At least 10 of their papers have been cited 10 times each.
17. Preprint is a
- Peer-reviewed research article
  - Not peer-reviewed research article
  - Review article
  - All of these

18. 'Textbooks', a source of information for literature survey, can be considered as
- a primary source
  - a secondary source
  - a tertiary source
  - both secondary and tertiary source
19. Title of an article should be
- concise in nature
  - elaborative in nature
  - narrative in nature
  - all of these
20. "Journal of American Chemical Society" can be abbreviated as
- J. Am. Chem. Soc.
  - J. Am. Ch. Soc.
  - J. A. C. Soc.
  - All

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**Descriptive**

Time : 2 hrs. 30 min.

Marks : 50

*[ Answer question no.1 & any four (4) from the rest ]*

1. a. What is 'abstract' in research paper? How many types of 'abstract' are there? Name all of them and discuss. 3+2+2+3  
=10
- b. How many significant numbers are present in 1000.0? Express it by two significant numbers?
- c. What is meant by pyrophoric chemical? Give one example?
- d. What is ANOVA? What is this test used for and what this test do?
2. a. Write about the differences between Correlation and Regression? 3+2+5  
=10
- b. What are the types of statistics? How to describe descriptive statistics?
- c. Find the equation of linear curve fitting using the following data:
- |     |   |   |   |    |    |    |    |
|-----|---|---|---|----|----|----|----|
| X = | 1 | 2 | 4 | 5  | 6  | 8  | 9  |
| Y = | 2 | 5 | 7 | 10 | 12 | 15 | 19 |

3. a. The table represents the analysis of 300 families according to their eye and skin color. Test the hypothesis that there is an association between eye color and skin color at 4% level of significance ( $\chi^2_{0.04} = 9.75$ ) using Chi-Square test. 5+1+2+2=10

		Eye Color		
		Blue	Grey	Brown
Skin Color	Fair	30	10	40
	Brown	40	20	40
	Black	50	30	40

- b. What is Chi-square test?
- c. What do you mean by Chemometrics? Explain.
- d. Write the sequence inside the spectrophotometer and its principle.
4. a. Rewrite the following paragraph considering the technical scientific writing. 5+5=10  
 A mixture of benzil (2g, 10 mili mole), KOH solution (2.500 g in 5 ml water) and 15 ml of rectified spirit was refluxed in a round bottomed flask for 60 minutes. The hot reaction mixture was poured into crushed ice and then conc. HCl (10 ml) was added into it. The solid as crude product was separated by filtration and washed well with cold water until free from chloride. The crude product was recrystallized from hot water and the pure crystallized product was isolated (1.8567g, 80 %).
- b. What are the major points a scientific review article should consist of? Discuss briefly
5. a. Write a short note on GHS hazard pictogram. 5+5=10
- b. Discuss about the safety rating of chemicals with regards to flammability.

6. a. Discuss the technical points on scientific writing of research article. 5+5=10  
b. Write a few points on the effective slides for the oral presentation of scientific research.
7. a. What are the three different sources of information for literature review? Discuss about the three sources of information. 4+2+4  
=10  
b. What is Monograph? Explain.  
c. What is Impact Factor? How it is calculated-explain with an example?
8. a. Write down the differences between literature review and academic research report. 3+4+3  
=10  
b. What do you mean by title of an article? Mention the specific points that an effective title should have.  
c. Write down the differences between Chemical Abstract and Beilstein database.

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