STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted from the academic year 2019-20 and thereafter)

M. Sc. DEGREE EXAMINATION, NOVEMBER 2023
BRANCH IV- CHEMISTRY
THIRD SEMESTER

COURSE   :   CORE
PAPER   :   RESEARCH METHODOLOGY (THEORY)
SUBJECT CODE :   19CH/PC/RM34

TIME: 90 MINUTES   MAX. MARKS: 50

SECTION A

Answer Any 10 Questions   **(2 X 10 = 20)**

1. Identify the type of literature source. (Research Topic- Soil pollution)

   a) Magazine report on land quality

   b) Data Book maintained at Agriculture institute.

   c) Handbook on types of soil

   d) Review article on fertilizers impact on soil

2. What are the advantages of providing a graphical abstract.

3. How are open access journals beneficial to the researcher?

4. Abbreviate for the following journals:

   International Journal of Hydrogen Energy, ACS Applied Materials & Interfaces

5. A journal introduced in the year 2021, would not have an impact factor for the year 2022. Why?

6. What is the difference between footnote and reference?

7. Given are the citations of 12 papers of a scholar. [28, 4, 6, 32, 7, 11, 2, 14, 11, 7, 15, 49] Calculate the i-10 index

8. How does a copyright help a researcher?

9. What is the full form of UGC CARE and give its significance.

10. Identify the indicators of a predatory journal?

11. Enumerate the main features of an abstract.

12. Sketch the role of scifinder in research?

SECTION – B   (5 x 6 =30)

Answer any five Questions

13. Using examples distinguish between fundamental research and applied research. (6)

14. Elucidate the steps involved in organizing a manuscript for a research article. (6)

15. A manuscript peer review process improves quality of the paper. Justify Give some suggestion for an effective peer review. (4+2)

16. What are patents? Explain the basic requirements for patentability in detail. (2+4)

17. What is Q index of a journal? Explain the advantage of Q index over H-index and i10 index. (3+3)

18. Enumerate the steps involved in the publication process of a scientific article in a journal. (6)

19. What are the rules to be followed while presenting figures and tables in a manuscript. (3+3)

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M. Sc. DEGREE EXAMINATION, NOVEMBER 2023
BRANCH IV- CHEMISTRY
THIRD SEMESTER

COURSE: **MAJOR CORE**
PAPER: **RESEARCH METHODOLOGY (PRACTICAL)**
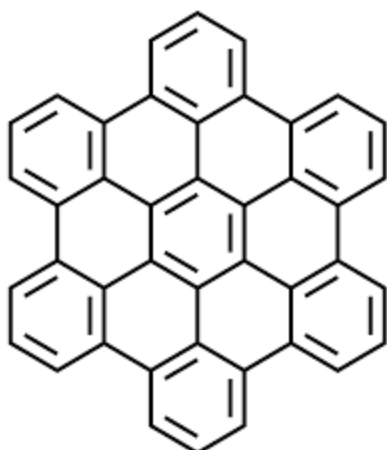TIME: **90 MINUTES**   **MAX. MARKS: 50**

## SECTION A

Answer any six questions (6X5=30)

1. Find the 'C=O' bond length and thermal properties of (a) Oxalic acid (b) Benzoic Acid using Chemdraw

2. Draw the following compounds using chemdraw

3. Represent the data given below as a (a) pie chart   (b) bar graph   (3+2)

   About 500 mg of a certain multivitamin tablet contains the following substituents.

Constituent	Amount (mg)
Vitamin A	92
Vitamin D3	124
Vitamin E	51
Vitamin K	28
Vitamin C	150
Vitamin B1	35
Vitamin B2	20

4. A concerted cyclisation process of a conjugated π electron system is shown below. Draw the reaction using chemdraw.   ..3
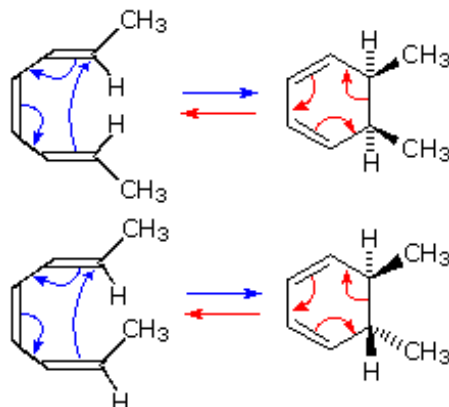
5. Find the ^1H and ^{13}C NMR spectrum for L- arginine using chem draw.

6. Draw and label ball and stick model of the given compound and name the compound using chemdraw. Find the minimization energy of the given compound.
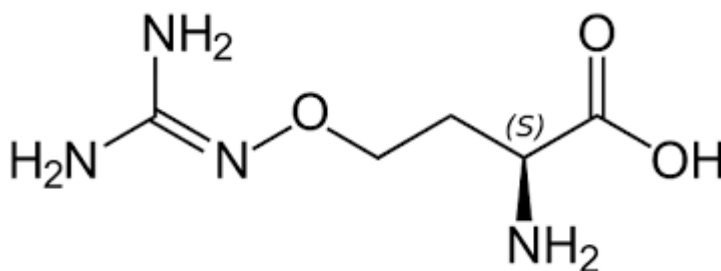
7. Anthocyanin was extracted from a certain species of red grapes and the data is given below, find Mean, median, mode, standard deviation and variance.   (5)

Sample of red grapes	Amount of anthocyanin (mg)
Australia	0.56
Spain	0.58
Argentina	0.74
South Africa	0.82
USA	0.55
Italy	0.56
Chile	0.43
India	0.48
France	0.65

8. A gaseous HCl molecule has an internuclear distance of 143 pm. The rotational spectrum of HCL is found to contain equally spaced lines. Calculate the spacing between the lines.

   Given atomic mass of 1H and 35Cl are 1.67 x 10^{-27} kg and 5.8 x 10^{-26} kg respectively.

   I= μr^2 and μ= $m_1 m_2 / m_1 + m_2$

   Spacing between lines = 2 B where B= $h/8\pi^2 Ic$

   (h=6.626x10^{-34}Js, π= 3.14, c= 3x10^8 m/s)

Section B

Answer any two of the following: (10x2=20)

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9. A N-Heterocyclic carbene-catalyzed dimerization reaction scheme is given below. Draw the mechanism which is given below using Chemdraw and save it in word document.
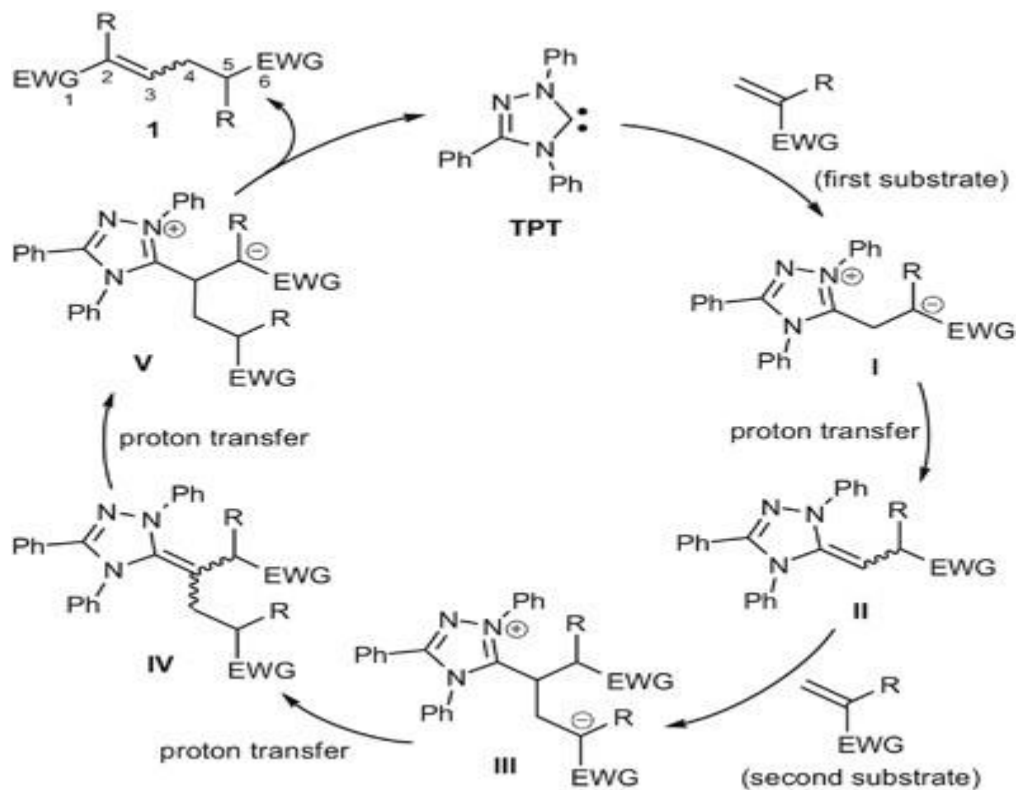
10. Consider the following data for the adsorption of CO on charcoal at 273 K. Plot a graph of p/V Vs p to show Langmuir isotherm and find the constant K and volume corresponding to total coverage. (2x5)

p/kPa	13.3	26.7	40	53.3	66.7	80	93.3
V/cm^3	10.2	18.6	25.5	31.5	36.9	41.6	46.1

(i) Find p/V

(ii) Plot a graph between p/V and P

(iii) Find the slope and intercept.

(iv) Given $p/V = p/V_\infty + 1/KV_\infty$, find K

(v) Find V_∞,

11. Six samples of turmeric was analysed for curcumin content. The table below shows the actual amount of curcumin in percentage and the analysis done by FTIR and HPLC. Calculate the percentage of curcumin determined by FTIR and HPLC and identify the most efficient method using graphical method.

Sample	Actual value %	FTIR Analysis		HPLC Analysis	
		Amount of sample (mg)	Amount of Curcumin (mg)	Amount of sample (mg)	Amount of Curcumin (mg)
A	8	20	1.55	33	2.72
B	8.35	23	1.91	38	2.80
C	7.95	19	1.52	29	2.32
D	6.83	22	1.52	31	2.41
E	8.28	21	1.76	27	2.31
F	7.65	25	1.91	32	2.88

Percentage of curcumin

% Curcumin = (Amount of Curcumin (mg)/ Amount of sample (mg)) x 100 (4)

Plot a graph to show correlation between actual percentage of curcumin and that found from FTIR and HPLC analysis (4)

Identify the most reliable method for this sample and justify (2)

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