

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2015-16& thereafter)

SUBJECT CODE: 15CH/PE/RM14
M.Sc. DEGREE EXAMINATION, NOVEMBER 2016
BRANCH IV- CHEMISTRY
FIRST SEMESTER

COURSE : ELECTIVE

PAPER : RESEARCH METHODOLOGY (THEORY)

TIME : 1½ HOURS

MAX.MARKS :50

SECTION-A

Answer any ten of the following:

(10x2=20 Marks)

1. Give abbreviations for the following journals:
(i) ActaCrystallographica Section B: Structural Science (ii) Bulletin of Materials Science
2. What is an impact factor? Give two examples.
3. Distinguish between graphical abstract and the abstract in chemical science journals.
4. Give any two web sources to find out structure of the compound.
5. What is chemical index? Give an example.
6. How a scientific data table is represented in a research report.
7. Explain the use of Chemical Titles for literature search in chemistry.
8. Expand the Journal abbreviations of the following:
(i) Aust. J. Chem. (ii) Electrochem. Commun.
9. Give the Microsoft Word Shortcut keys for the following.
(i) Super script (ii) to select a word
10. Define (i) plagiarism (ii) copyright
11. What are the conditions to be followed for usage of footnotes in a thesis?
12. Expand and explain: (i) viz. (ii) et.al. (iii) e.g. (iv) id.

SECTION-B

Answer any five of the following:

(5x6=30 Marks)

13. What are force fields in molecular mechanics? Explain in detail.
14. Describe patents, conditions for patenting and patent laws.
15. Explain the format used for reaction schemes and figures in thesis writing with suitable examples.
16. Write short notes on (i) ISBN (ii) CAS (iii) Beilstein (2+2+2)
17. Distinguish between research paper and communications. Give examples
18. What are Chemical Abstracts? Describe briefly the format of an abstract and the different types of indexes used for chemical abstract search.
19. a. Name any two secondary sources used for chemical literature search. (2)
b. What is APA and MLA writing format? Explain? (4)

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BRANCH IV- CHEMISTRY
FIRST SEMESTER

COURSE : ELECTIVE

PAPER : RESEARCH METHODOLOGY (PRACTICAL)

TIME : 1½ HOURS

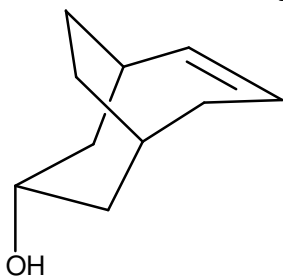
MAX.MARKS : 50

SECTION-A

Answer any ten of the following:

(10x2=20 Marks)

1. Find the name of the compound given below using chemdraw.



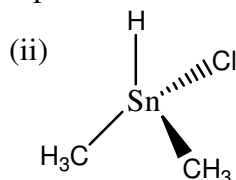
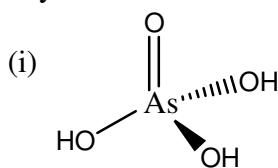
2. The following data were obtained on the osmotic pressure of solutions of γ -globulin in 0.15M NaCl at 37°C. Determine Π/c (mm H₂O dm³ g⁻¹) using Excel sheet.

c (g.dm ⁻³)	Π (mm H ₂ O)	Π/c (mm H ₂ O dm ³ g ⁻¹)
19.27	453	
12.53	253	
5.81	112	

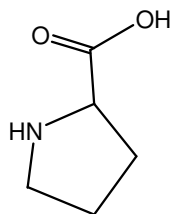
3. The enthalpy of different solutions is given below. Find out the (i) average (ii) median (iii) standard deviation (iv) variance

Substances	Enthalpy of solution kJ mol ⁻¹
KCl	18.6
NaCl	5.3
KNO ₃	35.4
Na ₂ SO ₄	23.1
Na ₂ SO ₄ .10H ₂ O	79.1
NH ₄ NO ₃	26.5
K ₂ SO ₄	27.4

4. Identify the name of the following compounds from chem office soft ware:



5. Draw labeled ball and stick model of the compound.

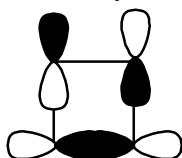


ind close contacts of N,O and H,O in

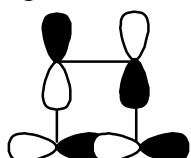
6. Find the thermal properties of diphenylamine using chemdraw.
7. Draw the pie chart for the following data

Sample	Amount of Nickel (%)
I.	45
II.	68
III.	80
IV.	16
V.	20

8. The orbital symmetry of bonding and antibonding of cyclobutene is given below.



Conrotatory
(bonding)



Disrotatory
(antibonding)

Draw the above using chemdraw.

9. Find the dipole moment of methyl fluoride and phenyl cyanide.
10. Calculate the height to which water will rise in a glass capillary if the radius of the tube is 0.02 cm. The surface tension of water is 0.0728 N/m.

Formula :

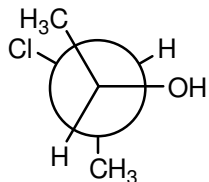
$$h = \frac{2\gamma}{r\rho g}$$

Where, $\gamma = 0.0728 \text{ N/m}$; $\rho = 1000 \text{ kg/m}^3$; $r = 0.02 \times 10^{-2}$; $g = 9.81 \text{ m/s}^2$

11. Find the specified bond lengths of the following compounds:

Compounds	Specified bond length of bond
Benzamide	C-N
Tetrahydrofuran	C-O

12. Find dihedral angles of Cl-C-C-H, H-C-C-C, O-C-C-H and C-C-C-H in the given compound:

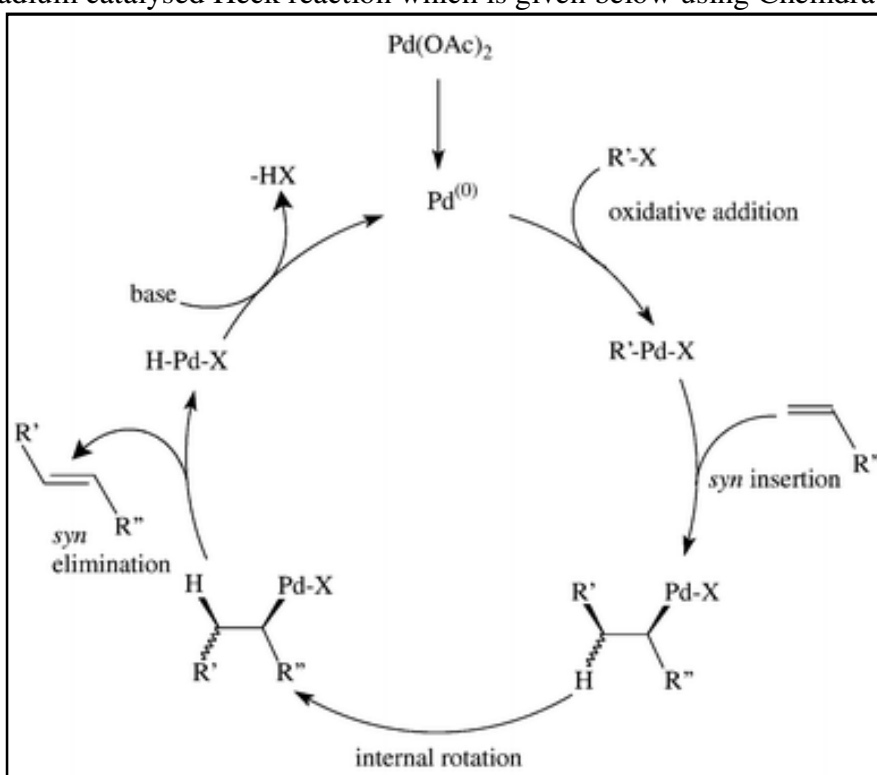


SECTION-B

Answer any five of the following:

(5x6=30 Marks)

13. Draw the palladium catalysed Heck reaction which is given below using Chemdraw:



14. Calculate the activation energy (E_a) for the decomposition of acetaldehyde from the following data:

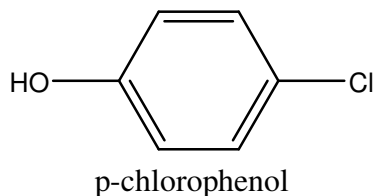
k	0.011	0.035	0.105	0.343	0.789
T(K)	700	730	760	790	810

a. Plot $\ln k$ vs $1/T \times 1000$ and add the trend line to find the slope. (4)

b. Find $E_a = -(\text{slope} \times R)$, where $R = 8.315 \text{ J/K mol}$. (2)

15. From chem draw obtain the ^1H and ^{13}C NMR spectrum of ethylacetoacetate. (3+3)

16. Using chem office find (i) wire mesh solvated structure (ii) heat of formation (iii) steric energy (iv) m/e values of



17. The wave function for the particle in 1D- box is given as

Formula

$$\psi_n = \sqrt{\frac{2}{a}} \sin \frac{n_x \pi x}{a}$$

$$\psi_n = \sqrt{\frac{2}{a}} \cos \frac{n_x \pi x}{a}$$

Where $a = 1$; $n_x = 1$; $\pi_x = 0, 5, 10, 15, 20, 25, 30$ & 35 . Calculate ψ for sine wave and cosine wave. Draw sine wave and cosine wave graph by plotting π_x vs ψ . (3+3)

18. Phthalic anhydride has been prepared by four different methods. Calculate the % yield of the product in each method and draw a Bar diagram by plotting different methods vs % yield of the product.

Formula % yield of the product = $\left(\frac{\text{Actual yield}}{\text{Theoretical yield}} \right) \times 100$

Yield of the product	A	B	C	D
Theoretical Yield	52	37	85	76
Actual yield	30	50	65	40
% yield of the product				

19. Equal numbers of molecules with $M_1 = 10,000$ and $M_2 = 100,000$ are mixed. Calculate \bar{M}_N and \bar{M}_M . (3+3)

Formula

$$\bar{M}_N = \frac{n_1 M_1 + n_2 M_2}{n_1 + n_2}$$

$$\bar{M}_M = \frac{n_1 M_1^2 + n_2 M_2^2}{n_1 M_1 + n_2 M_2}$$
