Representative examples of Problem solving strategies adopted in Teaching Learning

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AISSMS
COLLEGE OF PHARMACY
IMPARTING EXCELLENCE IN EDUCATION & RESEARCH

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2F,12B recognition by UGC, Affiliated to Savitribai Phule Pune University
Accredited by NAAC with A Grade

Report on Industry Defined Problem Solving Competition

Event Name: Department of Pharmaceutics and Pharmacognosy in association with IIPC and AISSMSCOP-I Connect Organized Industry Defined Problem Solving Competition.

Start Day and Date: 11/04/2022 (Monday) to 13/04/2022 (Wednesday)

Time: 11:00am- 2:00pm

Organized for: Students from All Pharmacy Colleges (B.Pharm and M.Pharm)

No of participating teams: 31

Details of Mentors:

1. Dr Hitendra Mahajan
2. Dr Namdeo Jadhav
3. Dr Suresh Sudke
4. Dr Sanjeevani Deshkar
5. Dr Smita Pimple

Details of Industry Panel: (Zuventus Healthcare Ltd)

1. Dr Mukesh Shinde
2. Dr Krishna Kinage
3. Mr. Anil Gadhe

Inauguration was held at 11:30am on 11th April. Problem statement was be disclosed by the industry panel during inauguration. A panel of mentors was introduced to the participants so that participants could approach any of these mentors for guidance. They were allowed to refer any literature available to them. Participants were asked to submit a power point presentation of maximum 7 slides till 12 noon on 12th April as their solution to the assigned problem. On 12th April submitted solutions by participants were screened to select nine finalists. On 13th April at 11:00am the finalists presented their solution online which was evaluated by the industry panel. Time allotted to each team was 7 minutes followed by questions-answers. The finalist were provided with team code and had to deliver their solution without disclosing their identity.

Problem statement: How can the solubility/dissolution of BCS class-IV drug be increased. rovide the techniques to increases the dissolution of hydrochlorothiazide12.5 mg (HCTZ) tablet

Evaluation criteria :
Scientific principles (25marks)
Feasibility of commercial scale manufacturing (25marks)
Cost effectiveness (25marks)
Presentation skills (25 marks) with the total of 100 marks

Winning Team :
Aditi Parde, Mayuri Gawate, Reshma Mate and Suraj Gurav
Runner Teams
1. Shriram Thorat and Sanika Meghal
2. Shaunak Paithankar, Jidnyasa Jain and Adnan Tamboli

The winning team was given a cash prize of Rs 10,000/- and Runner up prize of Rs 5,000/- was divided in two teams.

Co-ordinators :

Dr Rahul B. Padalkar Mrs Amruta N. Avalaskar

Dr Ashwini Madgulkar
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AISSMS College of Pharmacy
Pune-1

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Representative example of Participation in Competitions

STUDENTS ACHIEVEMENTS 2021-22

Students of our college has participated in various State and National Level Competitions and shown excellent performance to bag various prizes. A summary of the same is listed herewith.
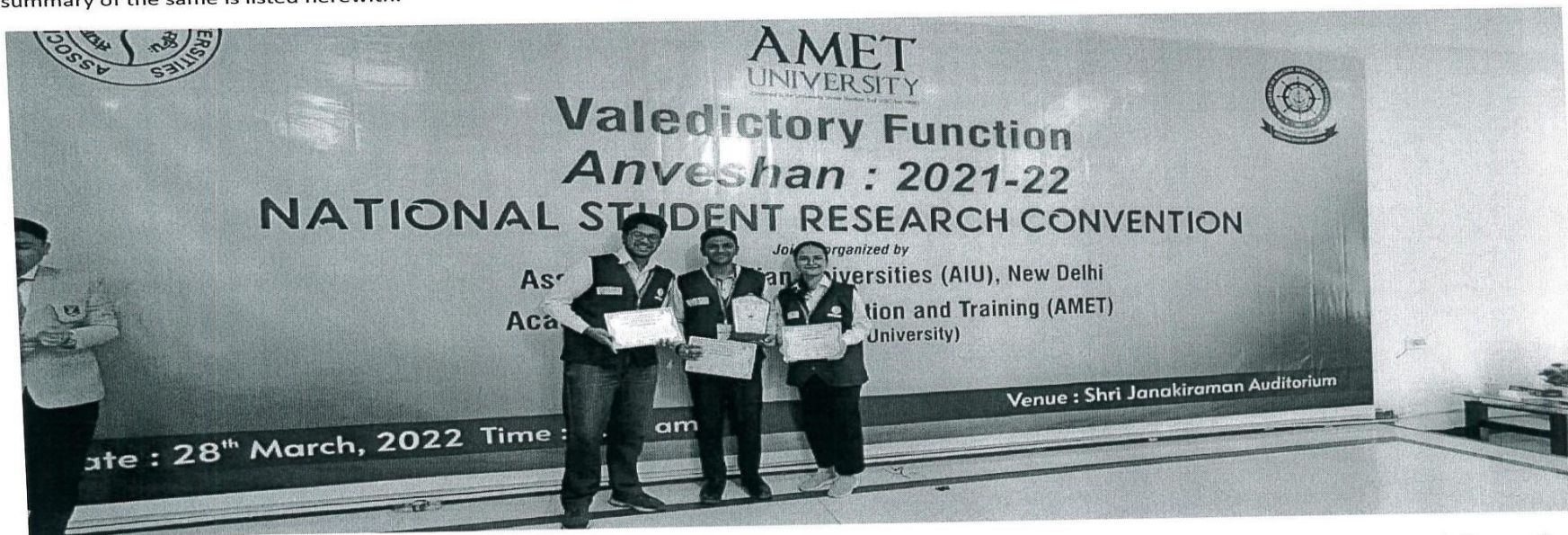
Amey Gavaskar, Faizan Mujawar and Gargi Nikam won the FIRST cash prize of Rs. 50,000/- at National Level Inter University Students Research Convention, Anveshan 2021-22.

Problem based learning included in Curriculum

SEMESTER – VIII

BP801T	**BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)**	**45 Hours**

Scope:

To understand the applications of Biostatics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Objectives:

Upon completion of the course the student shall be able to

1. Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of
2. Experiment)
3. Know the various statistical techniques to solve statistical problems
4. Appreciate statistical techniques in solving the problems.

Course content:

UNIT-I   10 Hours

Introduction:

Statistics, Biostatistics, Frequency distribution

Measures of central tendency:

Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion:

Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation:

Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

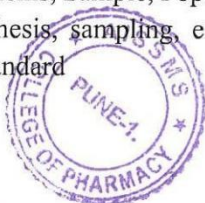**UNIT-II**   10 Hours

Regression:

Curve fitting by the method of least squares, fitting the lines y= a + bx and x = a + by, Multiple regression, standard error of regression– Pharmaceutical Examples

Probability:

Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties – problems, Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard

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error of mean (SEM) - Pharmaceutical examples

Parametric test:

t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

UNIT-III   10 Hours

Non Parametric tests:

Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research:

Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs:

Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology:

Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

UNIT-IV   08 Hours

Blocking and confounding system for Two-level factorials

Regression modeling:

Hypothesis testing in Simple and Multiple regressionmodels

Introduction to Practical components of Industrial and Clinical Trials Problems:

Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

UNIT-V   07 Hours

Design and Analysis of experiments:

Factorial Design:

Definition, 2^2, 2^3 design. Advantage of factorial design

Response Surface methodology:

Central composite design, Historical design, Optimization Techniques

Recommended Books (Latest edition):

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. New York.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
3. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
4. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery

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Subject: Pharm Practice
Class: Final Year B.Pharm. Sem 7
Staff Dr. Tina Saldanha

For CA2, The class was divided into teams. Each team was assigned a statistical test/topic as below. The students had to read on it and present to the class, if applicable, a research article in which the given test was employed was also explained.

Instructions to the class was as follows

Dear all, please note the following for CA2

It is a group assignment

Only one person will present for a max of 15mins but all will submit a write up of the activity

Roll no 1-10 will prepare topic 1 on the CA 2 list and so on.

Feedback will be taken to ensure that all members participated in the activity

1) Pharma example of ANOVA using minitab

2) Pharma example of t test using excel sheet

3) Pharma example of positive negative and no using excel sheet or minitab

4) Pharma example of Creating and analysing factorial design using minitab

5) SPSS brief introduction to the software and features

6) Use of various types of bar graphs, pie charts histograms, scatter plots etc using excel

7) Pharma example of a non parametric test using minitab/SPSS

Saldanha

Dr. Tina Saldanha

Learn by doing.
Topics were already done in class.. Students ability to create material understand and express (team work) was evaluated.

BP705P   **INSTRUMENTAL METHODS OF ANALYSIS (Practical)**   **04 Hours/ Week**

1. Weights and measures and pharmacopoeia in analysis
2. Determination of absorption maxima and effect of solvent on absorption maxima of organic compounds
3. Assay of Drug product as per IP (Assay of Paracetamol tablet by UV- Spectrophotometry)
4. Assay of Drug product by Calibration curve method
5. Assay of any drug/drug product by colorimetry.
6. Simultaneous estimation of multicomponent formulation by UV spectroscopy (SE/Q analysis)
7. Estimation of drug by fluorimetry
8. Study of quenching of fluorescence
9. Determination of sodium and potassium by flame photometry
10. Separation of amino acids by paper chromatography
11. Separation of sugars by thin layer chromatography
12. Separation of plant pigments by column chromatography
13. Demonstration of HPLC instrument
14. Demonstration of FTIR instrument
15. Interpretation of spectra of organic compounds by IR spectroscopy as per pharmacopoeia

Recommended Books (Latest Editions)
1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. HPLC by P.D.Sethi
11. HPTLC by P.D. Sethi
12. Spectrophotometric identification of Organic Compounds by Silverstein

EXPERIMENT NO 15

Page: 38
Date 25/11/2022

AIM - Interpretation of spectra of organic compounds by IR spectroscopy as per pharmacopoeia.

REQUIREMENTS-

INSTRUMENTS- IR spectrophotometer
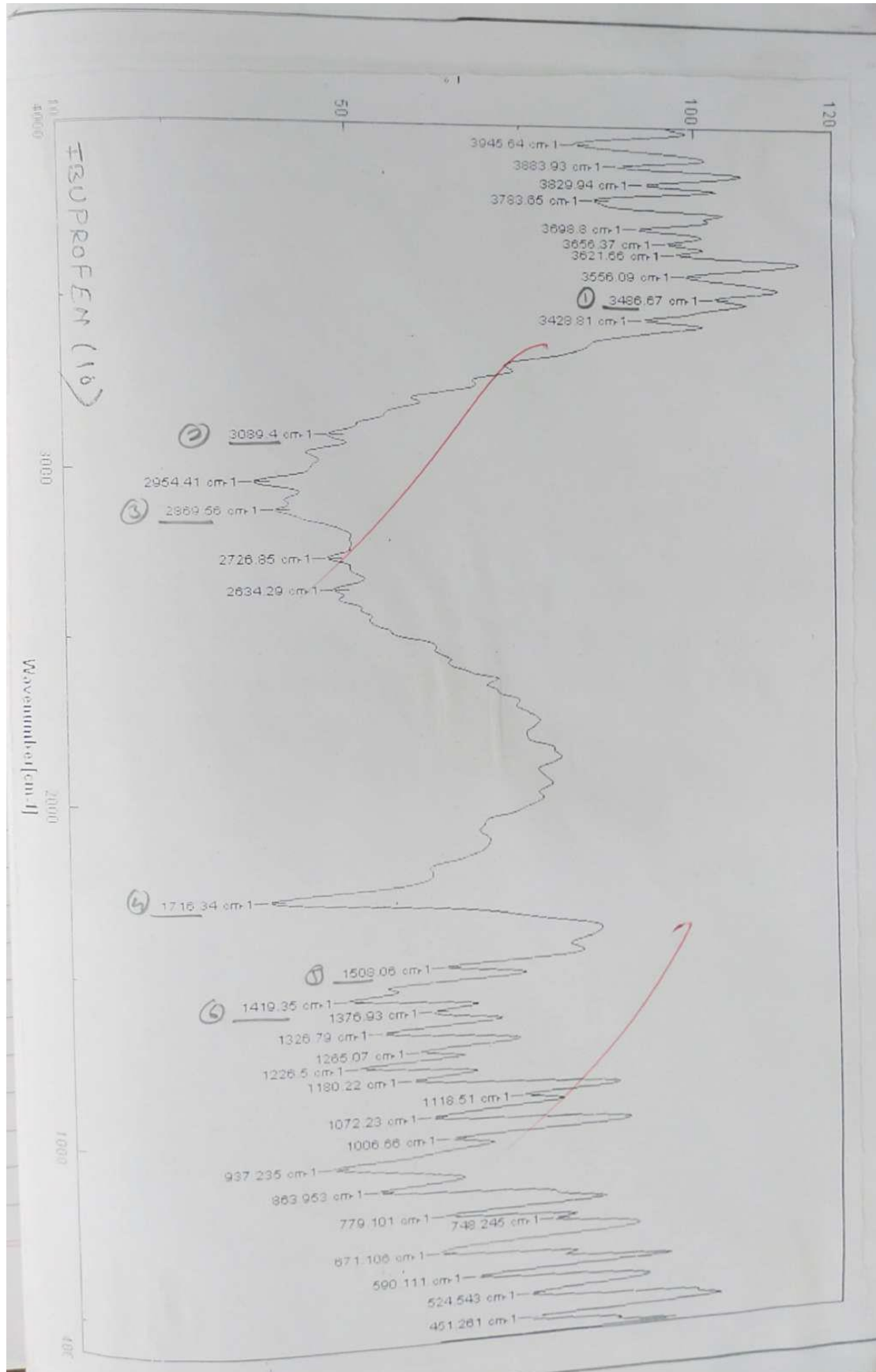Shimadzu 00344
Jasco FT

THEORY -

APPLICATION-
→ Identification of sample.
→ Confirming the identify
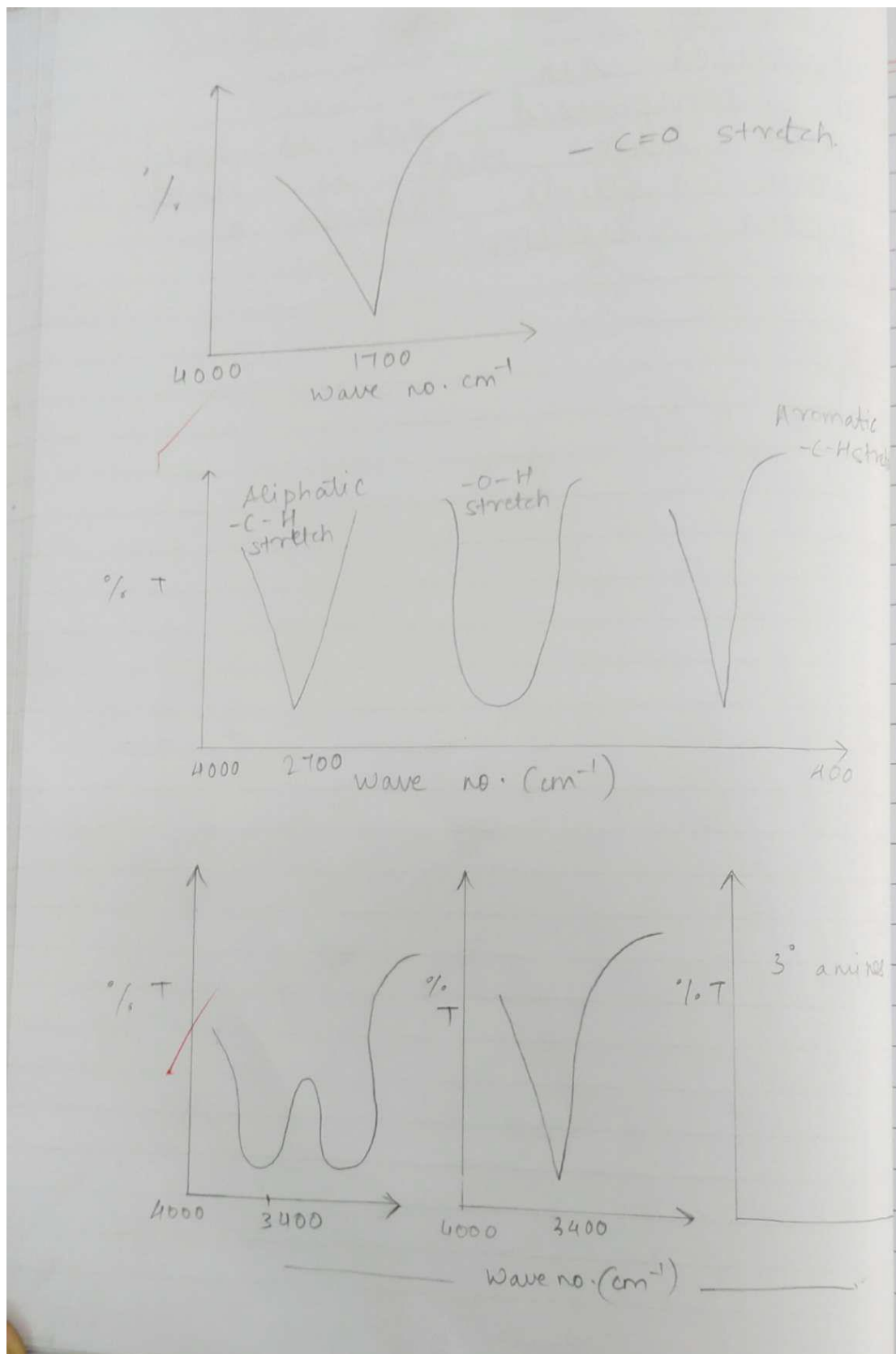It has major application in Quantitative analysis + minor quantitative appeication.

Guiding steps to interpret IR spectra + identify compound

HID/ IHD → Index of Hydrogen deficiency

$$HID = \frac{(2W - X + Y + O_2 + 2)}{2}$$

W = No. of carbon
X = No. of Hydrogen + Halogen
Y = No. of Nitrogens
Z = No. of oxygens.

IBUPROFEN (10)

① 3486.67 cm-1
3945.64 cm-1
3883.93 cm-1
3829.94 cm-1
3783.65 cm-1
3698.8 cm-1
3656.37 cm-1
3621.66 cm-1
3556.09 cm-1
3428.81 cm-1

② 3089.4 cm-1
2954.41 cm-1
③ 2869.66 cm-1
2726.85 cm-1
2634.29 cm-1

④ 1716.34 cm-1

⑤ 1508.06 cm-1
⑥ 1419.35 cm-1
1376.93 cm-1
1326.79 cm-1
1265.07 cm-1
1226.5 cm-1
1180.22 cm-1
1118.51 cm-1
1072.23 cm-1
1006.66 cm-1
937.235 cm-1
863.953 cm-1
779.101 cm-1
748.245 cm-1
671.106 cm-1
590.111 cm-1
524.543 cm-1
451.261 cm-1

Wavenumber[cm-1]

−C=O stretch

Aliphatic −C−H stretch

−O−H stretch

Aromatic −C−H stretch

% T

4000   2700   wave no. (cm⁻¹)   400

% T

% T

% T

3° amine

4000   3400

4000   3400

wave no. (cm⁻¹)

– C=O absent – OH present → – OH
indication.

→ Around 3400 cm⁻¹ any peak → amine
(peak of amine is different than
that for COOH & OH i.e. it
is not sharp & not broad)

→ Amide – at 1700 cm⁻¹
Sharp peak with a notch is
obtained which is characteristic
of amide.

→ Anhydride – – $\overset{O}{\overset{\|}{C}}$ – O – $\overset{O}{\overset{\|}{C}}$ –
2– – C=O ∴ 2 peaks at 1700 cm⁻¹
which is symmetrical & identical
to each other.

→ Peak similar to peaks of
anhydride obtained at 1350 cm⁻¹
& 1550 cm⁻¹ instead of at
1700 cm⁻¹ ⟶ Nitro may be
present.

→ Sharp peak at 2100 cm⁻¹ → nitrile

*only functional group region is
used for manual IR interpretation
*Fingerprinting region is compared
with spectra from spectral library
by software.
—x —x—

→ Look at 3000 cm^{-1} $\bar{v}$

Below 3000 cm^{-1} (towards → indicates
right)   aromatic

Above 3000 cm^{-1} (towards → indicates
left)   aliphatic

→ Look at area around 1700 cm^{-1}
sharp peak (deep peak) → -(=O may be
present)
No peak → -C=O is absent

→ 2100 - 2300 cm^{-1} -C≡C-
-C≡N - 90% chances
If in formula N is
there then -C≡N is present)

→ 2700 - towards left → H - stretch
-C-H ⎫   region
-O-H ⎬ may be
-N-H ⎭ present

-C-H aliphatic → more than 3000 cm^{-1}
-C-H aromatic → less than 3000 cm^{-1}

Inverted Hill / Tongue shaped → O-H stretch
sharp peak → C-H stretch.   (around 3000 cm^{-1})

→ -C=O & -OH peaks → indicate -COOH

AY 2021-22

[Problem solving / Structure Elucidation]

Sub: Instrumental methods of Analysis.

sessional II Practical Examinatⁿ

Name: Kshitija Ghanasham Abhang
Roll No: 1
Date: 29/11/2021
Year: FNYr B·pharm
BATCH: A

major experiment:
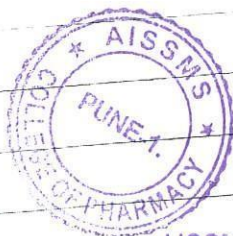
Name: Kshitija Ghanasham Abhang
Roll No: 1

29/11/21
②

peaks at

prediction

$3500 - 3300\ cm^{-1}$ → N-H strech → primary amine
2 Bands

$2850 - 3000\ cm^{-1}$ → aliphatic
- C-H strech

$3000 - 3100\ cm^{-1}$ → = C-H strech

$1200 - 1350\ cm^{-1}$ → C-N strech

$700 - 800\ cm^{-1}$ → single peak → 1,2-disubstituted compound.
single peak

C_7H_9N
- C_6H_4 → assuming disubstituted aromatic ring
_____

CH_5N
- H_2N → assuming 1° amine
_____

- CH_3

∴ The HDT value and molecular formula is satisfied & single peak at $700-800\ cm^{-1}$ in fingerprint region. The probable structure could be:
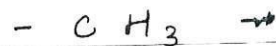
NH₂
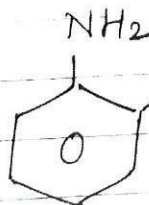
CH₃ → 2-Methylaniline

Probable compound ~~might~~ **must** contain:

     — ~~COCl~~ ?   — CH_3
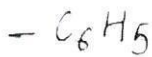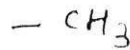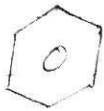
— C_6H_5 considering, IR spectra and HDI:

1,2-Dimethylbenzene

$C_8H_{10} \rightarrow m.F$
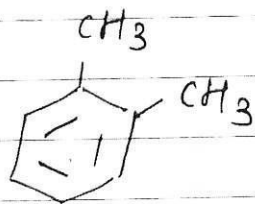— $C_6H_4 \Rightarrow$ aromatic
— $CH_3 \rightarrow$
— CH_3
_____
0
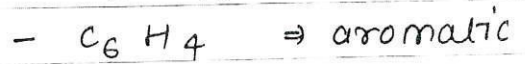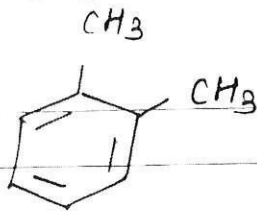
Result & conclusion

∴ The HDI value is satisfied as well as molecular formula is satisfied.
The most probable structure would be 1,2 - Dimethylbenzene.

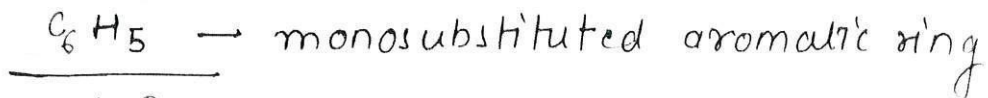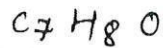ortho substituted since fingerprint region shows peak (single) at 700 - 800 cm^{-1}

probable structure

$C_7 H_8 O$

$\dfrac{C_6 H_5}{CH_2 O} \longrightarrow$ monosubstituted aromatic ring
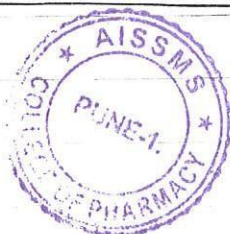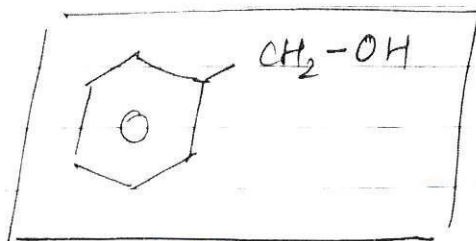
$\dfrac{HO}{-CH_2} \longrightarrow$ OH Functional group

∵ There are no characteristic doublet peak at $2750 - 2850 cm^{-1} \longrightarrow$ aldehydes ruled out.

∵ The OH strech extends upto $3600 cm^{-1}$ -OH group is an alcohol group rather than -OH being directly attached to aromatic ring (phenol)

∵ from, The HDI and molecular formula it could be stated that the probable structure would be·

Benxyl alcohol:

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PHARMACEUTICAL ANALYSIS V SEM VII

Experiment No: 15   Date: 05-10-2018

Aim: To interpret the given FTIR spectrum.

Procedure:-

The given IR spectrum was observed in Figure print region and Group frequency region. The peaks in this region were assigned for corresponding vibrations and with the help of molecular formula probable structure of compound was derived.

Calculation of HID Number:

$HID = 1/2 (2W - X + Y + OZ + 2)$

Where,   W = No. of tetravalent atoms (Carbon)

X = No. of monovalent atoms (Hydrogen, Halogen)

Y = No. of trivalent atom (Nitrogen)

Z = No. of divalent atom (Oxygen)

Observation Table Format:-

SN	Frequency observed (cm^{-1})	General Frequency Range	Vibration Assigned	Functional Group Derived	Peak number in spectrum
1.	3200	3200 – 3000	NH_2 Stretch	NH_2 group	A
2.	2850	2800 – 3100	Ali C-H Stretch	Ali C-H Stretch	B
3.	1650	1600 – 1800	C=O stretch	C=O Stretch	C

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