



**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

**COMPLETE COURSE STRUCTURE (CBCS Pattern)  
SEMESTER-III (30 Credits)**

Course Code & type	Courses	No of hours per week	No of Credits	Marks			Duration of Exam In Hours
				Internal	Eternal	Total	
<b>Theory</b>							
ICY-301 (FC)	General English-III	4	4	20	80	100	3
ICY-302 (FC)	Telugu-III	4	4	20	80	100	3
ICY-303 (SEC)	Safety rules in chemistry Laboratory	2	2	10	40	50	2
ICY-304A	Mathematics-III	4	4	20	80	100	3
ICY-304B	Botany-III	4	4	20	80	100	3
ICY-305A	Mathematics-IV	4	4	20	80	100	3
ICY-305B	Botany-IV	4	4	20	80	100	3
ICY-306A	Physics-IV	4	4	20	80	100	3
ICY-306B	Zoology-IV	4	4	20	80	100	3
ICY-307	Chemistry-IV	4	4	20	80	100	3
<b>Practicals</b>							
ICY-351A	Mathematics-III(practicals)	3	1		50	50	4
ICY-351B	Botany-III(practicals)	3	1		50	50	4
ICY-352A	Mathematics-IV(practicals)	3	1		50	50	4
ICY-352B	Botany-IV(practicals)	3	1		50	50	4
ICY-353A	Physics-IV (practicals)	3	1		50	50	4
ICY-353B	Zoology-IV (practicals)	3	1		50	50	4
ICY-354	Chemistry-IV (practicals)	3	1		50	50	4
<b>Total</b>			30 for each stream			850	
<b>FC = Foundation Course; SEC = Skill Enhancement Course; DSC = Discipline Specific Course Note:</b> Except Foundation Courses and Skill Enhancement Course Remaining are Discipline Specific Courses							

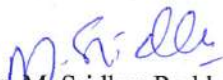
  
Dr. N. Chandra Kiran  
(BoS Chairperson)

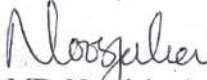
  
(Prof. C. Malla Reddy)

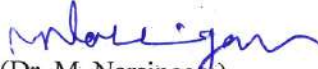
  
(Dr. K. Rajender Reddy)


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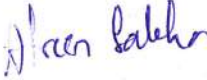
  
(Dr. M. Sridhar Reddy)

  
(Dr. MD. Noorjahan)

  
(Dr. M. Narsingam)

  
(Dr. B. Satyanarayana)

  
(Dr. S. Vijayalaxmi)

  
(Ms. Afreen Saleha)

(Head, Dept. of M.Sc.  
Integrated Chemistry)

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**Detailed Syllabus**  
**SEMESTER-III**

<b>Course Code: ICY-301</b>	<b>Number of Credits- 04</b>
<b>Title of the Course : General English-III</b>	<b>Total Instruction hours - 60 per Semester</b>

**UNIT I:** **12h**  
Poem: Charlotte Brontë "Life"; Short Story: Rabindranath Tagore "A Wrong Man in Workers' Paradise"; Vocabulary: Synonyms, Antonyms; Grammar: Prepositions (including Prepositional Phrases)

**UNIT II:** **12h**  
Poem: Kamala Das "Punishment in Kindergarten"; Essay: RK Narayan "Toasted English"; Vocabulary: British/American English Common Words; Grammar: Voice

**UNIT III:** **12h**  
Poem: Langston Hughes "As I Grew Older"; Speech: BR Ambedkar "Grammar of Anarchy" (Excerpt); Vocabulary: Phrasal Verbs; Grammar: Concord

**UNIT IV:** **12h**  
Writing-I (Essay Writing); Discursive Essay; Argumentative Essay; Vocabulary: Idioms  
Grammar: Connectives

**UNIT V:** **12h**  
Writing-II (Report Writing); Business Reports; Media Reports; Vocabulary: Technical; Vocabulary (Business, Media); Grammar: Reported Speech (Including Reporting Verbs)

**Reference:**

Prescribed Textbook for Semesters III & IV: *English in Use*. Eds. T Vijay Kumar,  
K DurgaBhavani, YL Srinivas. Published by Macmillan.

KR Reddy

Kiranee Neogale

S. Jayaraman

M. Sridhar

APJ

S. Sridhar

mbhavan  
A. Sreenivasulu

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Course Code: ICY-302	Number of Credits- 04
Title of the Course : Telugu-III	Total Instruction hours - 60 per Semester

**ప్రాచీన పద్యభాగం**

- |                          |     |                  |
|--------------------------|-----|------------------|
| 1. ధర్మజాని వాక్యాతుర్యం | ... | తిక్కన           |
| 2. విభీషణ శరణ శరణాగతి    | ... | గోన బుద్ధారెడ్డి |
| 3. గుణనిధి కథ            | ... | శ్రీనాథుడు       |

**అధునిక పద్యభాగం**

- |                          |     |                           |
|--------------------------|-----|---------------------------|
| 1. రైతు ప్రశస్తి         | ... | వానమామలై జగన్నాథాచార్యులు |
| 2. గురుదక్షిణ            | ... | అంబటి లక్ష్మీనరసింహరాజు   |
| 3. గుడిసెలు కాలిపోతున్నై | ... | డా॥ బోయి భీమన్న           |

**వచన విభాగం (నాటకం)**

- |                         |     |           |
|-------------------------|-----|-----------|
| చలిచీమలు (సాంఘిక నాటకం) | ... | పి.వి.రమణ |
|-------------------------|-----|-----------|

**అలంకారాలు**

శబ్దాలంకారాలు: వృత్త్యనుప్రాస, ఛేకానుప్రాస, లాటానుప్రాస, అంత్యానుప్రాస, యమకం

ముక్తపదగ్రస్తాలంకారాలు

అర్థాలంకారాలు: ఉపమ, ఉత్పేక్ష రూపక, స్వభావోక్తి, ఉల్లేఖ, అర్థంతరన్యాస, శ్లేష,

ద్రుష్టాంతాలంకారాలు.

**పరీక్షా పద్ధతి**

- |                            |             |
|----------------------------|-------------|
| ఎ. ఇంటర్మీడియట్ ఎస్ఎస్ఎంబి | 20 మార్కులు |
| బి. సెమిస్టర్ పరీక్ష       | 80 మార్కులు |

*Kiraneswar Alorjiah*  
*K.R.Reddy*  
*M. Gidde*

*Chinnayya*  
*Chinnayya*  
*Arora Balakrishna*

**FACULTY OF SCIENCE**  
**M.Sc., 5 Year Integrated Chemistry**  
**II-Semester (Regular) Examinations, September-2023**  
*(2022 Batch)*  
**Paper-I**  
**English-II**

3901-22829-003

Time: 3 Hours

Max. Marks: 80

**Section -A****Note:** Answer any **Four** of the following questions.

- |  |                   |
|--|-------------------|
| 1. Answer as directed.   | 4x5=20M<br>5x1=5M |
| a) I love Swimming? (Identify the "gerund")  | 1M                |
| b) I struggle to understand. (Identify the Infinitive)   | 1M                |
| c) The movie was interesting. (Identify the present participle)  | 1M                |
| d) She moves with such grace, like a gazelle. (Identify the literary figure of speech)                 | 1M                |
| e) You are the light of my life. (Identify the literary figure of speech)                              | 1M                |
| 2. Answer as directed.<br>(Choose the appropriate word as adjective/ adverb from the options provided) | 5x1=5M            |
| a) I will meet you _____. (latter / later)   | 1M                |
| b) Do you have _____ plans? (further/ farther)   | 1M                |
| c) Your pencil is the _____ of the three in the box. (longer/longest)                                  | 1M                |
| d) My grandfather smiled _____. (carefully / cheerfully)   | 1M                |
| e) She fought the disease _____ for two months. (bravely/ loudly)                                      | 1M                |
| 3. Complete the following words.   | 5x1=5M            |
| a) Incumb _____.   | 1M                |
| b) Indispensa _____.   | 1M                |
| c) Imagina _____.  | 1M                |
| d) Process _____.  | 1M                |
| e) Simultane _____.  | 1M                |
| 4. Answer as directed.   | 5x1=5M            |
| a) Avatar. (Origin of the word)  | 1M                |
| b) A <i>Loan word</i> is a _____.  | 1M                |
| c) Write a portmanteau of "Motor +hotel".  | 1M                |
| d) A <i>portmanteau</i> is a _____.  | 1M                |
| e) What is the 'block format' in letter writing?   | 1M                |

::2::

5. Answer as directed. 5x1=5M
- a) *Plosives* means \_\_\_\_\_ 1M
- b) *Champion*. (Write the phonetic transcription of the given word) 1M
- c) P.B Shelly was \_\_\_\_\_ English poet. (Write a suitable article) 1M
- d) Shakespeare is considered the greatest dramatist and the poet of \_\_\_\_\_ English language. (Write a suitable article) 1M
- e) Quiet everyone silence Brutus is speaking. (Rewrite with appropriate punctuation marks) 1M
6. Answer to the following question. 5M  
What are the steps in 'Note- making'?

**Section – B**

**Note:** Answer the following questions in about 300 words each.

**4x15=60M**

7. a) Use examples from the text, examine how the old ladies behave with Marian. Why did they behave so? 15M
- (OR)
- b) Write an essay on the topic, '*Time Management*'. 15M
8. a) Describe the arrival of the princes in your own words. (From Huxley's *Benares*) 15M
- (OR)
- b) Explain the importance of punctuation marks in language. Substantiate with suitable examples. 15M
9. a) Discuss Shelly as a poet of nature with reference to the poem prescribed for study. 15M
- (OR)
- b) What are the required skills for facing an interview? 15M
10. a) "Let Brutus become our ruler!" – Illustrate the scene from Julius Caesar. 15M
- (OR)
- b) "*Practice makes one perfect*" – Develop it into an essay. 15M

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**FACULTY OF SCIENCE**  
**M.Sc., 5 Year Integrated Chemistry**  
**II-Semester (Regular) Examinations, September-2023**  
 (2022 Batch)  
**Paper-II**  
**Telugu**

3901 - 22-529-003

Time: 3 hours

Max Marks: 80

## భాగం-ఎ (సంక్షిప్త సమాధానాలు)

4x5=20M

నూచన: క్రింది వానిలో ఏవేని నాలుగు ప్రశ్నలకు సమాధానాలు వ్రాయుము. ✓

1. 'వసుధాస్థలి వర్ణిలు బ్రహ్మకల్పముల్' .... సందర్భ సహిత వ్యాఖ్య రాయండి. 5M
2. జలధారల్ చల్లి చల్లారైదన్ .... సందర్భ సహిత వ్యాఖ్య రాయండి. 5M
3. దేవులపల్లి కృష్ణ శాస్త్రి గురించి వివరించండి. 5M
4. ఎంకన్న పాత్రను పరిచయం చేయండి. 5M
5. ఈ క్రింది పదాలకు పర్యాయపదాలు రాయండి. 5M  
 అ) భూమి    ఆ) గాలి    ఇ) నీరు    ఈ) స్త్రీ    ఊ) పూలు    ఊ) నిప్పు
6. ఈ క్రింది పదాలకు నానార్థాలు రాయండి. 5M  
 అ) అంబరం    ఆ) హరి    ఇ) కువలయం    ఈ) రాజు    ఊ) ఉత్తరం    ఊ) పాలు

## భాగం-బి (వ్యాసరూప సమాధానాలు)

4x15=60M

నూచన: క్రింది ప్రశ్నలకు సమాధానాలు వ్రాయుము.

7. ఈ క్రింది వానిలో ఒక పద్యానికి ప్రతిపదార్థ త్పార్య, వ్యాకరణ, విశేషాంశాలు రాయండి. 15M  
 (a) లా వొక్కింతయు లేదు, వైర్యము విలోలం బయ్యె ప్రాణముల్  
 రావుల్ దప్పెను, మూర్ఖ వచ్చె దనువున్ డస్సెన్, క్రమం బయ్యెడిన్  
 నీవే తప్ప నితఃపరం బెఱుగ, మన్నింపందగున్ దీనునిన్,  
 రావే యీశ్వర! కావవే వరద! సంరక్షింపు భద్రాత్మకా!  
 (లేదా)  
 (b) రాముని డా గురించి నిను రావణుడెత్తుక పచ్చువేళ నీ  
 హేమ విభూషణాపకుల నేర్పడ ఋశ్యమహాద్రి వైచిన్  
 మేమవి తీసి దాచితిమి మీవతి యచ్చటి కేగుదేరగా  
 దామరసాప్తనందనుడు తానవి సూసిన జూచి మెచ్చుచున్
8. a) గజేంద్రుడు మొసలి నుండి తనను రక్షింపమని వేడుకున్న విధానం రాయండి. 15M  
 (లేదా)  
 b) సి.నా.రె 'ప్రపంచ పదులు' అందించిన సందేశమేమిటి? 15M
9. a) "యుగాంతం" ఆధారంగా స్వామి పృథ్వాంతాన్ని తెలియజేయండి. 15M  
 (లేదా)  
 b) మామిడి పండును ఏ ఏ భాషల్లో ఏమని పిలుస్తారో వివరించి రకాలను, ప్రత్యేకతను విశ్లేషించండి. 15M
10. a) ఈ క్రింది మూడు సంధులను లక్ష్యలక్షణ సమన్వయం చేయండి. 15M  
 అ) త్రిక సంధి    ఆ) వృద్ధి సంధి    ఇ) ఇకార సంధి  
 (లేదా)  
 b) ఈ క్రింది మూడు సమాసాలకు లక్ష్యలక్షణ సమన్వయం చేయండి. 15M  
 అ) ద్వంద్వ సమాసం    ఆ) ఉపమానపూర్వపదకర్మధారయం    ఇ) సప్తమితత్పురుష సమాసం

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\*సూచన: అన్ని ప్రశ్నలకు సమాధానాలు రాయండి  
విభాగం-ఎ (5×4 = 20 మార్కులు)  
(సంక్షిప్త సమాధానాలు)

1. శ్రీనాథుడి కావ్యాలు
2. ధర్మజుని వాక్యాతుర్యం పాఠ్యభాగ సందర్భం
3. జానాయి
4. విశాలాక్షి
5. బోయి భీమన్న

విభాగం-ఆ (4 × 15=60 మార్కులు) 5×12 = 60  
(వ్యాసరూప సమాధానలు)

6. ధర్మజుని వాక్యాతుర్యాన్ని వివరించండి.  
లేదా  
రైతు ప్రశస్తి పాఠ్యభాగ సారాంశాన్ని రాయండి.
7. విభీషణుడి గురించి వివరించండి.  
లేదా  
గురుదక్షిణ పాఠ్యభాగ సారాంశాన్ని రాయండి.
8. గుడిసెలు కాలిపోతున్నై పాఠభాగం ఇచ్చే సందేశం ఏమిటి?  
లేదా  
గుణనిధి గురించి రాయండి.
9. శబ్దాలంకారాల గురించి సోదాహరణంగా వివరించండి.  
లేదా  
అర్థాలంకారాల గురించి సోదాహరణంగా వివరించండి.
10. గోవిందయ్య స్వభావం ఎటువంటిది?  
లేదా  
చలిచీమలు నాటకం ఇచ్చే సందేశం ఏమిటి?

Kiranesan  
Narasimh  
M. Sridhar

Prayanshu  
Srinivasulu

K. Reddy  
Anil Kumar  
Arun Palcha



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Skill Enhancement Course-I	
Course Code: ICY-303	Number of Credits- 02
Title of the Course : Safety rules in chemistry Laboratory	Total Instruction hours - 30 per semester

**Unit I: Laboratory Safety Rules and Regulations**

**15h**

General rules and regulations for lab safety: Minimizing Risks of Hazards, Personal Protective Equipment (PPE) - Hair, Dressing for the Laboratory, Eye Protection, Eye-wash fountain, Gloves, Laboratory Protocols, Labeling Chemicals, Careful reading of labels Prevention of Inhaling Harmful Chemicals, Guide to Chemical Hazards, Chemical Spills etc., Accidents use of fire extinguisher and first aid kit in the laboratory, safety symbols- Preparation of the charts by the students and display of charts in chemistry labs. Calibration of fractional weights, calibration of glass ware - burette, pipette, standard flask, Normality/Molarity and specific gravity of concentrated acids – Preparation of dilute solutions (Numerical problems). Precautions to be taken in the preparation of dilute acids and bases and bases. Preparation of stock solutions of salts with specific examples. Properties of primary standard salt and preparation of standard solution. Good laboratory practices- maintenance of observation book record.

**UNIT II: Preparation of Lab Reagents:**

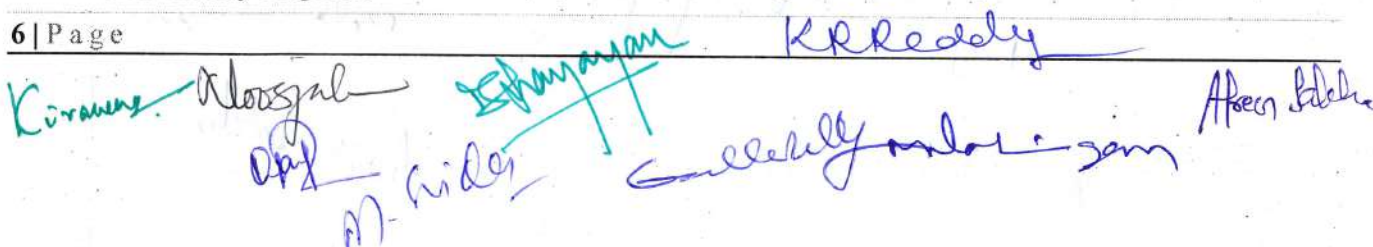
**15h**

Preparation of indicators and use of indicators in volumetric analysis- acid base titrations, redox titrations, precipitation titrations and complexometric titrations. Role of an indicator in detecting end point (Phenolphthalein, Methyl orange, Methyl-red, Potassium Chromate, Diphenylamine, EBT, Murexide, etc). Preparation of buffers – pH 10 ammoniacal buffer and acetate buffer solutions. Preparation of commonly used reagents : Ammonium hydroxide solution, Ammonium molybdate reagent, Ammonium hydrogen phosphate solution, Bayer's reagent, Benedict's solution, Bromine water, Dimethyl glyoxime reagent, 2,4-Dinitrophenyl hydrazine reagent, Eriochrome black-T reagent Fehling solution, Ferric chloride solution, Ferrous sulphate solution, Iodine solution, Molisch's reagent, Nessler's reagent, Neutral FeCl<sub>3</sub>, Schiff's reagent, Silver nitrate solution, Sodium carbonate solution, Sodium hydroxide (Caustic soda) solution, Starch solution, Tollen's reagent. (reference work and submission of assignments). Charts preparation depicting course content.

**RECOMMENDED BOOKS :**

1. Vogel's Text Book of Quantitative Chemical Analysis, 5 th edition.
  2. Vogel's Text Book of macro and semimicro qualitative inorganic analysis. G. Svehla, 5 th edition.
  3. Chemistry Reagent Manual Prepared by Chemistry Department, SGTB Khalsa College under DBT's
  4. StarCollege Scheme, University of Delhi ( Available: online)
  5. American Chemical Society Safety in Academic Chemistry Laboratories 8 th edition.
- [Course objectives (CO)]

- To improve the skills of students in the application of theory and practical knowledge.
- To fill the gap between theory and practicals.
- To train the students in understanding laboratory safety rules and to improve the skills in preparation of laboratory reagents.



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PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

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<b>Course Code: ICY-304A</b>	<b>Number of Credits- 04</b>
<b>Title of the Course : Mathematics-III</b>	<b>Total Instruction hours - 60 per Semester</b>

**Real Analysis**

**Objective:** The course is aimed at exposing the students to the foundations of analysis which will be useful in understanding various physical phenomena.

**Outcome:** After the completion of the course students will be in a position to appreciate beauty and applicability of the course.

**Unit- I** **12h**

Sequences: Limits of Sequences- A Discussion about Proofs-Limit Theorems for Sequences-Monotone Sequences and Cauchy Sequences -Subsequences-Lim sup's and Lim inf's-Series-Alternating Series and Integral Tests .

**Unit- II** **12h**

Continuity: Continuous Functions -Properties of Continuous Functions -Uniform Continuity - Limits of Functions

**Unit- III** **12h**

Differentiation: Basic Properties of the Derivative - The Mean Value Theorem - L'Hospital Rule - Taylor's Theorem.

**Unit- IV** **12h**

Integration : The Riemann Integral - Properties of Riemann Integral-Fundamental Theorem of Calculus. Text: Kenneth A Ross, Elementary Analysis-The Theory of Calculus

**References:**

- S.C. Malik and Savita Arora, Mathematical Analysis, Second Edition, Wiley Eastern Limited, New Age International (P) Limited, New Delhi, 1994.
- William F. Trench, Introduction to Real Analysis
- Lee Larson, Introduction to Real Analysis
- Shanti Narayan and Mittal, Mathematical Analysis
- Brian S. Thomson, Judith B. Bruckner, Andrew M. Bruckner; Elementary Real analysis ; Sudhir R., Ghorpade, Balmohan V., Limaye; A Course in Calculus and Real Analysis

*K. Reddy*

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*Norjhal*

*OP*

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**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

Course Code: ICY-351A	Number of Credits- 01
Title of the Course : Mathematics-III (Practicals)	Total Instruction hours - 45 per Semester

**UNIT-I**

- 1) List the first five terms of the following inductively defined Sequences.
  - (i)  $s_n = \frac{1}{n^2 + 2}$
  - (ii)  $s_1 = 1, s_n = 3s_{n-1} + 1$
  - (iii)  $s_1 = 1, s_2 = 2, s_{n+2} = \frac{s_{n+1} + s_n}{s_{n+1} - s_n}$
- 2) Check whether the following Sequences Convergent . Find the Limit/ Limit Point of the Sequences, g.l.b, l.u.b if exists
  - (i)  $\left\{ \frac{1}{n} \right\}$
  - (ii)  $\left\{ \sqrt[3]{n+1} - \sqrt[3]{n} \right\}$
  - (iii)  $(-1)^n$
- 3) Show that the following Sequences are bounded and check for the convergence.
  - (a)  $\left\{ \frac{n+2}{n^2 + 2n + 2} \right\}$
  - (b)  $\left( 1 + \frac{1}{n} \right)^n$
- 4) Check for the convergence of the following Sequences by using appropriate methods.
  - (a)  $s_n = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{n}$
  - (b)  $s_n = \frac{1}{n^2 + 1} + \frac{1}{n^2 + 2} + \dots + \frac{1}{n^2 + n}$
  - (c)  $s_n = 1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots + \frac{1}{n!}$
  - (d)  $s_n = \frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n.(n+1)}$
- 5) Show that the following Sequences converges.
  - (a)  $s_1 = \sqrt{3}, s_{n+1} = \sqrt{3s_n}$  converges to 3.
  - (b)  $s_1 = 1, s_{n+1} = \sqrt{5 + s_n}$  converges to positive root of  $x^2 - x - 5 = 0$
- 6) Find the limits of (i)  $s_n = \frac{1}{(n!)^{1/n}}$  (ii)  $s_n = \left( \frac{2^n}{(n!)} \right)^{1/n}$
- 7) Check for the Convergence of the following Series by Using appropriate Tests.
  - (a)  $\sum \left( \frac{n+1}{2n+5} \right)^n$
  - (b)  $\sum \left( 1 + \frac{1}{n} \right)^{-n^2}$
  - (c)  $\sum \left( \frac{n^2}{3^n} \right)$
  - (d)  $\sum \frac{x^n}{n}; x > 0$
- 8) Convergence and Test for Absolute Convergence of the following Series.
  - (a)  $1 - \frac{1}{2^p} + \frac{1}{3^p} - \frac{1}{4^p} + \dots, p > 0.$
  - (b)  $\sum \frac{(-1)^n}{n};$  (c)  $\sum \frac{\cos nx}{n^2}$
- 9) If  $(s_n) = (0, 1, 2, 1, 0, 1, 2, 1, 0, 1, 2, 1, 0, \dots)$   $(t_n) = (2, 1, 1, 0, 2, 1, 1, 0, 2, 1, 1, 0, \dots)$  find
  - a)  $\liminf(s_n) + \liminf(t_n)$
  - b)  $\liminf(s_n) + \limsup(t_n)$
  - c)  $\limsup(s_n) + \limsup(t_n)$
  - d)  $\limsup((s_n + t_n))$
- 10) Prove  $\limsup |s_n| = 0$  if and only if  $\lim s_n = 0$

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**UNIT-II**

1) Find the Limits of the following functions if exists.

$$f(x) = \begin{cases} x - [x] & \text{when } [x] \neq 0 \\ 0 & \text{when } [x] = 0 \end{cases}$$

2) If  $f : \mathbb{R} - \{0\} \rightarrow \mathbb{R}$  is defined as  $f(x) = x \left( \frac{e^{1/x} - 1}{e^{1/x} + 1} \right)$  show that  $\lim_{x \rightarrow 0} f(x) = 0$ .

3) Find  $\lim_{x \rightarrow 0} f(x)$  if  $f(x) = \frac{e^{1/x} - e^{-1/x}}{e^{1/x} + e^{-1/x}}$

4) If  $f(x) = \begin{cases} x & \text{if } x \text{ is rational} \\ -x & \text{if } x \text{ is irrational} \end{cases}$  show that  $\lim_{x \rightarrow 0} f(x)$  exists only at  $x = 0$

5) Verify whether the given functions are continuous at given point. If not find the type of discontinuity.

(a)  $f(x) = \begin{cases} 1 & \text{if } x \text{ is rational} \\ -1 & \text{if } x \text{ is irrational} \end{cases}$  at all Real Numbers.

6)  $f(x) = x^m \sin \frac{1}{x}$  at  $x = 0$  (c)  $f(x) = \begin{cases} \left( \frac{e^{1/x} - e^{-1/x}}{e^{1/x} + e^{-1/x}} \right) & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$

7) Define Uniform Continuity. Check the following functions are uniform continuous?  $f(x) = \frac{1}{x}$  on  $(0, 1]$

8) Check the following functions are uniform continuous?  $f(x) = x^2$  on  $[-1, 1]$  and on  $\mathbb{R}$

9) Prove that the function  $f$  defined on  $\mathbb{R}^+$  as  $f(x) = \sin \frac{1}{x} \forall x > 0$ , is continuous but not uniformly continuous on  $\mathbb{R}^+$

10) Examine the Continuity and Uniform Continuity of  $f$  defined by  $f(x) = \lim_{n \rightarrow \infty} \frac{x^n}{1 + x^n e^x} \forall x \geq 0$ ,  $n > 0$ .

**UNIT-III**

1) Check the following functions are differential at a given points

(a)  $f(x) = |x| + |x-1| + |x-2|$  at  $x = 0, 1, 2$

(b)  $f(x) = \begin{cases} 5x-4 & \text{if } 0 \leq x \leq 1 \\ 4x^2-3x & \text{if } 1 \leq x \leq 2 \\ 3x+4 & \text{if } x \geq 2 \end{cases}$  at  $x = 1, 2$

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*Handwritten signatures and notes:*  
 Kiran Kumar, N. Sridhar, N. Hills, S. Reddy, Anil Kumar, Abhinav Babu

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2) Find the value of  $m$  such that  $f(x) = \begin{cases} x^m \sin \frac{1}{x} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$  is differentiable at

3) Define Rolle's Theorem and discuss the applicability for the following Functions.

(a)  $f(x) = x^3 - 6x^2 + 11x - 6$  on  $[1, 3]$  (b)  $f(x) = \sin x$  on  $[0, \pi]$

4) Define Lagrange's Mean Value Theorem discuss the applicability for the following functions.

(a)  $f(x) = \frac{1}{x}$  on  $[-1, 1]$  (b)  $f(x) = \log x$  on  $[1, e]$

(c)  $f(x) = 1 + x^2$  on  $[1, 2]$

5) Define Cauchy's Mean Value Theorem. If

$f(x) = \frac{1}{x^2}$ ,  $g(x) = \frac{1}{x}$  then show that 'c' is the Harmonic Mean of a, b where  $0 < a < b$ .

6) Define Taylor's Theorem and Mc Lauren's Theorem and find the Taylor's Series/ Mc Lauren's Series to the following functions.

(a)  $\sin x$  at  $x = 0$ ,  $x = \frac{\pi}{2}$  (b)  $\cos x$  at  $x = 0$ ,  $x = \frac{\pi}{4}$

7) Let  $f$  be a function defined on  $\mathfrak{R}$  and  $f(x+y) = f(x) + f(y)$ ,  $\forall x, y \in \mathfrak{R}$  then show that (i)  $f$  is continuous then  $f(x) = x.f(1)$ ,  $\forall x \in \mathfrak{R}$

8) By using L'Hospital Rule find the following Limits.

(a)  $\lim_{x \rightarrow 0} \left( \frac{\sin x}{x} \right)^{1/x^2}$

(9)  $\lim_{x \rightarrow \infty} \frac{x^3}{e^x}$

(10)  $\lim_{x \rightarrow 0^+} \left( \frac{1}{x} - \frac{1}{\sin x} \right)$  on  $\left( 0, \frac{\pi}{2} \right)$

**UNIT-IV**

1) Define Upper Riemann Sum, Lower Riemann Sum, Oscillatory sum, Lower Riemann Integral, Upper Riemann Integral.

2) Find Upper Riemann Sum, Lower Riemann sum, Oscillatory sum for the following functions.

(a)  $f(x) = 2x - 1$  on  $[0, 1]$  with  $P = \left\{ 0, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, 1 \right\}$

(b)  $f(x) = \sin x$  on  $[0, \pi]$ , with  $P = \left\{ 0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi \right\}$

*Kiravenu*  
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*app*

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3) Check whether the following functions are Riemann Integrable or not by finding Upper and Lower Riemann Integrals and also find Riemann Integral if it exists.

(a)  $f(x) = 3x - 1$  on  $[1, 2]$

(4)  $f(x) = \begin{cases} 1 & \text{if } x \in \mathbb{Q} \\ -1 & \text{if } x \in \mathbb{R} \setminus \mathbb{Q} \end{cases}$  on  $[a, b] \subseteq \mathbb{R}$

(5)  $f(x) = \begin{cases} 2 & \text{if } 0 \leq x \leq 1 \\ 1 & \text{if } 1 \leq x \leq 2 \end{cases}$  on  $[0, 2] \subseteq \mathbb{R}$

(6)  $f(x) = \frac{1}{a^{n-1}}$  if  $\frac{1}{a^n} \leq x \leq \frac{1}{a^{n-1}}$ ,  $a > 1$  and  $f(0) = 0$ .

(7)  $f(x) = \begin{cases} 2rx, & \frac{1}{r+1} < x \leq \frac{1}{r} \\ 0 & \text{if } x = 0 \end{cases}$  on  $[0, 1]$ ,  $r \in \mathbb{N}$ .

8) Find the following by using appropriate theorems (First Mean Value Theorem etc...)

(a)  $\frac{\pi}{4} \leq \int_0^{\pi/4} \sec x \, dx \leq \frac{\pi}{2\sqrt{2}}$       (b)  $4 \leq \int_1^3 \sqrt{3+x^3} \, dx \leq 2\sqrt{30}$

Find the following Infinite Limits.

(9)  $Lt_{n \rightarrow \infty} \left( \frac{1}{n} + \frac{n^2}{(n+1)^3} + \frac{n^2}{(n+2)^3} + \dots + \frac{1}{8n} \right) = \frac{3}{8}$

(10)  $Lt_{n \rightarrow \infty} \frac{1}{n^2} \sum_{r=0}^{n-1} \sqrt{n^2 - r^2}$

*K. Anand*

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**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
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<b>Course Code: ICY-304B</b>	<b>Number of Credits- 04</b>
<b>Title of the Course : Botany-III</b>	<b>Total Instruction hours - 60 per Semester</b>

**UNIT - I**

**15h**

1. Introduction: Principles of plant systematics, Types of classification: Artificial, Natural and Phylogenetic; Systems of classification: Salient features of Bentham & Hooker and Engler&Prantle. An introduction to Angiosperm Phylogeny Group (APG).
2. Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy, Cytotaxonomy and Chemotaxonomy.
3. Nomenclature and Taxonomic resources: An introduction to *International Code of Nomenclature for algae, fungi, and plants (ICN)*, *Shenzhen Code -2018* a brief account. Herbarium: Concept, techniques and applications.

**UNIT-II**

**15h**

4. Systematic study and economic importance of plants belonging to the following families: Polypetalae : Annonaceae, Capparidaceae, Rutaceae, Fabaceae (Faboideae/papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae
5. Gamopetalae: Apiaceae, Asteraceae, Asclepiadaceae, Lamiaceae
6. Monochalmydeae: Amaranthaceae, Euphorbiaceae, Monocotyledons: Orchidaceae and Poaceae.

**UNIT-III**

**15h**

7. Meristems: Types, histological organization of shoot and root apices and theories.
8. Tissues and Tissue Systems: Simple, complex and special tissues.
9. Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths.
10. Stem and root anatomy: Vascular cambium - Formation and function.
11. Anomalous secondary growth of Stem - *Boerhaavia*, *Dracaena*; Root- *Beta vulgaris*

**UNIT - IV**

**15h**

12. Anther structure, Microsporogenesis and development of male gametophyte.
13. Ovule structure and types; Megasporogenesis; types and development of female gametophyte.
14. Pollination - Types; Pollen - pistil interaction. Fertilization.
15. Endosperm - Development and types. Embryo - development and types.
16. Palynology- Pollen morphology, NPC system and application of Palynology.

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**PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

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**References:**

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- Oliver and Boyd, London. Heywood, V. H. 1965. Plant Taxonomy.
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- Jain, S. K. and V. Mudgal. 1999. A Handbook of Ethnobotany. Bishen Singh Mahendra Pal Singh, Dehradun.
- Jeffrey, C. 1982. An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge
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- Bhojwani, S. S. and S. P. Bhatnagar. 2000. The Embryology of Angiosperms (4th Ed.), Vikas Publishing House, Delhi.
- M.R.Saxena- A textbook of Palynology.
- Vashista- A textbook of Anatomy.
- P.K.K.Nair- A textbook of Palynology.
- Esau, K. 1971. Anatomy of Seed Plants.
- John Wiley and Son, USA. Johri, B. M. 1984. Embryology of Angiosperms.
- Springer-Verlag, Berlin. Kapil, R. P. 1986. Pollination Biology. Inter India Publishers, New Delhi.
- Maheswari, P. 1971. An Introduction to Embryology of Angiosperms.
- McGraw Hill Book Co., London. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.

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**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

<b>Course Code: ICY-351B</b>	<b>Number of Credits- 01</b>
<b>Title of the Course : Botany-III (Practicals)</b>	<b>Total Instruction hours - 45 per Semester</b>

Systematic study of locally available plants belonging to the families prescribed in theory syllabus (Minimum of one plant representative for each family)

1. Demonstration of herbarium techniques.
2. Candidate have to submit at least 30 herbarium sheets
3. Demonstration of double staining technique.
4. Tissue organization in root and shoot apices using permanent slides
5. Preparation of double stained Permanent slides Primary structure: Root - Cicer, Canna; Stem - Tridax, Sorghum
6. Secondary structure: Root - Tridax sp.; Stem - Pongamia Anomalous secondary structure: Examples as given in theory syllabus.
7. Stomatal types using epidermal peels.
8. Microscopic study of wood in T.S., T.L.S. and R.L.S.
9. Structure of anther and microsporogenesis using permanent slides.
10. Structure of pollen grains using whole mounts - Hibiscus, Acacia and Grass).
11. Pollen viability test using Evans Blue - Hibiscus
12. Study of ovule types and developmental stages of embryosac.
13. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot embryos using permanent slides.
14. Isolation and mounting of embryo (using Cymopsis / Senna / Crotalaria)

**SEMESTER III BOTANY-3**

**ANGIOSPERM TAXONOMY, PLANT ANATOMY AND EMBRYOLOGY**

**Practical Model Paper**

**Time: 3 hrs (10M for continuous evaluation + 40M External Exam)**

**Max. Marks : 50**

1. Technical description of the given plant twig "A"  
**1x10=10M**
2. Prepare a double stained permanent mount of transverse section of given material "B" **1x6=6M**
3. Prepare a temporary mount of epidermal peel of the given leaf material "C" and identify the stomatal type.  
**1x4=4M**
4. Conduct pollen viability test for the given pollen material "D". **1x5=5M**
5. Identify and describe the specimens / slides with well labeled diagrams (i) Embryology - "E" (ii) Palynology - "F" (iii) Anatomy - "G" **3x3=9M**
6. Record and Herbarium **2x3=6M**

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**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
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<b>Course Code: ICY-305A</b>	<b>Number of Credits- 04</b>
<b>Title of the Course : Mathematics-IV</b>	<b>Total Instruction hours - 60 per Semester</b>

**Algebra**

**Objective:** The course is aimed at exposing the students to learn some basic algebraic structures like groups, rings etc.

**Outcome:** On successful completion of the course students will be able to recognize algebraic structures that arise in matrix algebra, linear algebra and will be able to apply the skills learnt in understanding various such subjects.

**Unit- I 15h**

Groups: Definition and Examples of Groups- Elementary Properties of Groups-Finite Groups - Subgroups - Terminology and Notation -Subgroup Tests - Examples of Subgroups.

Cyclic Groups: Properties of Cyclic Groups - Classification of Subgroups Cyclic Groups.

**Unit- II 15h**

Permutation Groups: Definition and Notation -Cycle Notation-Properties of Permutations -A Check Digit Scheme Based on  $D_5$ . Isomorphisms ; Motivation- Definition and Examples -Cayley's Theorem Properties of Isomorphisms -Automorphisms-Cosets and Lagrange's Theorem Properties of Cosets - Lagrange's Theorem and Consequences-An Application of Cosets to Permutation Groups -The Rotation Group of a Cube and a SoccerBall.

**Unit- III 15h**

Normal Subgroups and Factor Groups: Normal Subgroups-Factor Groups -Applications of Factor Groups - Group Homomorphisms - Definition and Examples -Properties of Homomorphisms -The First Isomorphism Theorem.

**Unit- IV 15h**

Introduction to Rings: Motivation and Definition -Examples of Rings -Properties of Rings - Subrings;Integral Domains: Definition and Examples - Fields - Characteristics of a Ring,Ideals and Factor Rings: Ideals -Factor Rings -Prime Ideals and Maximal Ideals.

**Text Book**

- Joseph A.Gallian, Contemporary Abstract Algebra (9th edition)

**References:**

- Bhattacharya, P.B Jain, S.K.; and Nagpaul, S.R,Basic Abstract Algebra Fraleigh, J.B, A First Course in Abstract Algebra.
- Herstein, I.N, Topics in Algebra.

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PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

Course Code: ICY-352A	Number of Credits- 01
Title of the Course : Mathematics-IV	Total Instruction hours - 45 per Semester

**Unit-I**

- Show that the set  $(1,2,3,4)$  is a group under multiplication modulo 5
- Let  $G$  be a group with the property that for any  $x, y, z$  in the group,  $xy = zx$  implies  $y = z$ . Prove that  $G$  is Abelian.
- Find the Normal sub groups of (i)  $(G, \cdot) = \{1, -1, i, -i\}$ . (ii)  $(\mathbb{Z}_7^*, \times_7)$ .  
is a group under multiplication.
- Let  $G$  be the group of polynomials under addition with coefficients from  $\mathbb{Z}_{10}$ . Find the orders of  $f(x) = 7x^2 + 5x + 4$ ,  $g(x) = 4x^2 + 8x + 6$ , and  $f(x) + g(x)$
- If  $a$  is an element of a group  $G$  and  $|a| = 7$ , show that  $a$  is the cube of some element of  $G$ .
- Find the generators of the cyclic group of order  $n$  where  $n = 6, 10, 25, 19, 30$
- How many subgroups does  $\mathbb{Z}_{20}$  have? List a generator for each of these subgroups.
- Consider the set  $\{4, 8, 12, 16\}$ . Show that this set is a group under multiplication modulo 20 by constructing its Cayley table. What is the identity element? Is the group cyclic? If so, find all of its generators.
- Prove that a group of order 4 cannot have a subgroup of order 3.
- If  $S = \left\{ \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix} / a, b \in \mathbb{Z} \text{ and } ab \neq 0 \right\}$  is a Subgroup of the set of all  $2 \times 2$  non-singular matrices with respect to matrix multiplication.

**Unit-II**

- Find all of the left cosets of  $\{1, 11\}$  in  $U(30)$
- Determine whether the following permutations are even or odd.  
a. (135)                      b. (1356)                      c. (13567)                      d. (12)(134)(152)                      e. (1243)(3521)
- Let  $G = U(16)$ ,  $H = \langle 1, 15 \rangle$  and  $K = \langle 1, 19 \rangle$ . Are  $H$  and  $K$  isomorphic? Are  $G/H$  and  $G/K$  isomorphic?
- Suppose that  $f$  is a homomorphism from  $\mathbb{Z}_{30}$  to  $\mathbb{Z}_{30}$  and  $\text{Ker } f = \langle 0, 10, 20 \rangle$ . If  $f(23) = 9$ , determine all elements that map to 9.

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*Arjun Babbar*

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6. How many Abelian groups (up to isomorphism) are there
- of order 6?
  - of order 15?
  - of order 42?
  - of order  $pq$ , where  $p$  and  $q$  are distinct primes?
  - of order  $pqr$ , where  $p, q, r$  are distinct primes?
7. Find the regular permutation Group isomorphic to  $(G, \cdot) = \{1, -1, i, -i\}, (\mathbb{Z}_5, \times_5)$
- 8) Classify whether the following permutations are even or odd if  $f = (1234)(567)(235)$ ,  
 $g = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 7 & 5 & 6 & 4 & 3 & 1 & 2 \end{pmatrix}$  in  $S_7$
- 9) Find the generators of the cyclic group of order  $n$  where  $n = 6, 10, 25, 19, 30$
- 10) Find the order of the permutations  $f = (1235)(2354)(153)$ ,  $g = (1235)(235)(15)$  in a group  $(S_5, \circ)$ .

**UNIT-III**

- Show that the mapping  $f(a + bi) = a - i b$  is an automorphism of the group of complex numbers under addition.
- Find the Normal sub groups of (i)  $(G, \cdot) = \{1, -1, i, -i\}$ .  
 Consider the following maps:
  - $f : (\mathbb{Z}, +) \rightarrow (G, \cdot)$  defined as  $f(x) = i^x$  where  $(G, \cdot) = \{1, -1, i, -i\}$
  - $f : (\mathbb{Z}, +) \rightarrow (\mathbb{Z}, +)$  defined as  $f(a) = a + 1$
  - $f : (\mathbb{R}, +) \rightarrow (\mathbb{R}^+, \cdot)$  defined as  $f(x) = e^x$
  - $f : (\mathbb{R}^+, +) \rightarrow (\mathbb{R}^+, \cdot)$  defined as  $f(x) = x^2$
  - $f : (\mathbb{R}^+, \cdot) \rightarrow (\mathbb{R}, +)$  defined as  $f(x) = \log x$

Check whether the above maps are isomorphism or not? Find also their kernels.

8.  $H = \begin{pmatrix} a & b \\ 0 & d \end{pmatrix}$  is  $H$  a normal subgroup of  $GL(2, \mathbb{R})$  ?

9) Suppose that  $f$  is a homomorphism from  $\mathbb{Z}_{30}$  to  $\mathbb{Z}_{30}$  and  $\text{Ker } f = (0, 10, 20)$ . If  $f(23) = 9$ , determine all elements that map to 9.

10) What is the order of the factor group  $\frac{\mathbb{Z}_{60}}{15}$

*(Handwritten signatures and notes at the bottom of the page)*  
 Kiran Kumar, Nagaraj, M. N. S. Reddy, K. Reddy, Arun Sulekha

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**Unit-IV**

- 1) Show that the sets  $(Z(\sqrt{2}), +, \cdot), (Q(\sqrt{2}), +, \cdot), (Z[i], +, \cdot), (C, +, \cdot)$  are Rings.
- 2) The set of Real Continuous functions defined on  $(0, 1)$  with respect to Addition and Multiplication of functions. Is a Ring
- 3) The set of  $2 \times 2$  matrices is of the form  $\begin{bmatrix} a & b \\ -\bar{b} & \bar{a} \end{bmatrix}$  is forms a ring with respect to matrix addition and matrix multiplication.
- 4) The set of all the real polynomials forms a Ring with respect to the addition and multiplication of Polynomials.
- 5) Find the zero divisors, and units of rings  $(Z_6, +_6, \times_6), (Z_7, +_7, \times_7), (Z_{12}, +_{12}, \times_{12}), (Z_{20}, +_{20}, \times_{20}), (Z_p, +_p, \times_p)$
- 6) Which of the following sets
  - (i)  $U = \left\{ A = \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix} / a, b \in R \right\}$
- 7)  $I = \left\{ A = \begin{bmatrix} a & b \\ 0 & 0 \end{bmatrix} / a, b \in R \right\},$  (iii)  $I = \left\{ A = \begin{bmatrix} a & 0 \\ b & 0 \end{bmatrix} / a, b \in R \right\}$
- 8)  $U = \left\{ A = \begin{bmatrix} a & b \\ c & 0 \end{bmatrix} / a, b \in R \right\},$
- 9)  $U = \left\{ A = \begin{bmatrix} a & b \\ 0 & c \end{bmatrix} / a, b \in R \right\}$  are Sub rings or ideals of the Ring of all  $2 \times 2$  real matrices.
- 10) Find the Principal ideals, Prime ideals and maximal ideals of the rings  $(Z_6, +_6, \times_6), (Z_7, +_7, \times_7), (Z_{12}, +_{12}, \times_{12}), (Z_{20}, +_{20}, \times_{20}).$

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*Abp* *M. Anil* *Suresh* *mbaisam*  
*Ahmed Babbar*

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Course Code: ICY-305B	Number of Credits- 04
Title of the Course : Botany-IV	Total Instruction hours - 60 per Semester

**Plant Physiology**

**UNIT - I**

**15h**

- 1.Plant-Water Relations: Importance of water to plant life, physical properties of water, diffusion, imbibition, osmosis; waterosmotic and pressure potentials; absorption.
- 2.Transport of water; Ascent of sap; Transpiration; Stomatal structure and movements.
- 3.Mineral Nutrition: Essential macro and micro mineral nutrients and their role;symptoms of mineral deficiency.

**UNIT-II**

**15h**

- 4.Translocation of organic substances: Mechanism of phloem transport.
- 5.Enzymes: Nomenclature, Characteristics, Classification.
- 6.Mechanism and regulation of enzyme action, factors regulating enzyme activity.
- 7.Photosynthetic pigments, absorption and action spectra; Red drop and Emersonenhancement effect;
- 8.Concept of two photosystems; mechanism of photosynthetic electron transport andevolution of oxygen; Factors effecting Photosynthesis, Photophosphorylation.

**UNIT-III**

**15h**

- 9.Carbon assimilation pathways: C3, C4 and CAM.
10. Nitrogen Metabolism: Biological nitrogen fixation, nitrate reduction, ammoniaassimilation, (GS-GOGAT, transamination)
11. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway.

**UNIT-IV**

**15h**

12. Growth and Development: Physiological effects of phytohormones–Auxins, gibberellins, cytokinins, ABA, ethylene and Brassinosteroids.
13. Physiology of flowering and photoperiodism. Role of Phytochrome in flowering.
14. Stress physiology: Concept of water, salt and temperature stresses and plant responses.

*V. Aravindhan*  
*Moogala*  
*DPJ*

*Debanjan*  
*M. Ritesh*

*Sreevidya*

*KR Reddy*  
*mbaisan*  
*Afreen Akhbar*

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- Jain, J.L., S. Jain and Nitin Jain. 2008. Fundamentals of Biochemistry. S. Chand & Company Ltd., New Delhi.
- Pandey, B. P. 2007. Botany for Degree Students: Plant Physiology, Biochemistry, Biotechnology, Ecology and Utilization of Plants. S. Chand & Company Ltd., New Delhi.
- Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc., USA.
- Taiz, L. and E. Zeiger. 1998. Plant Physiology (2nd Ed.). Sinauer Associates, Inc., Publishers, Massachusetts, USA.
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Course Code: ICY-352B	Number of Credits- 01
Title of the Course : Botany-IV	Total Instruction hours - 45 per Semester

**Plant Physiology Practical Syllabus**

1. Determination of osmotic potential of vacuolar sap by Plasmolytic method using leaves of Rheodiscolor / Tradescantia.
2. Determination of rate of transpiration using Cobalt chloride method
3. Determination of stomatal frequency using leaf epidermal peelings / impressions
4. Determination of catalase activity using potato tubers by titration method
5. Separation of chloroplast pigments using paper chromatography technique
6. Estimation of protein by Biurette method
7. Mineral deficiency- Detail study of Micronutrients and Macro nutrients
8. Identification of C3, C4 and CAM plants

*iranehar* *Abogal* *apud* *M. Gita* *Sehayan* *K. Reddy* *mla. san* *Abeer Sakha*



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**SEMESTER III BOTANY-4**

**Plant Physiology Practical Model paper**

**Practical Model Paper**

**Time: 3 hrs(10M for continuous evaluation + 40M External Exam)**

**Max. Marks : 50**

**I. Major Experiment:**

**(16 marks)**

1. Determination of Osmotic potential of vascular sap- plasmolytic method.
2. Determination of Catalase activity – Potato, tubers by titration method.
3. Separation of Chloroplast pigments by paper chromatography.
4. Estimation of proteins by Biuret Method.

**II. Minor Experiment:**

**(8 marks)**

1. Determination of Stomatal frequency using leaf epidermal peel/impressions.
2. Determination of Rate of transpiration by Cobalt chloride method.

**III. Identify and Comment on: A, B & C**

**(3x4=12 Marks)**

1. Micronutrient Deficiency
2. Macronutrients Deficiency
3. C3, C4 and CAM plants.

**IV. Record**

**(4marks)**

Kiranesu

Moogul

apud

n. s. i. s.

Rayanayam

Surendy

KK Reddy

mbhishan

Arun Lakshmi

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Course Code: ICY-306A	Number of Credits- 04
Title of the Course: Physics-IV	Total Instruction hours - 60 per Semester

**Electromagnetism and Electronics**

**Unit- I**

**15h**

**Electrostatics & Dielectrics:** Gauss law and its application, electric field due to uniformly charged sphere, Mechanical force on a charged conductor; Electric potential- potential due to a charged spherical conductor, electric dipole. An atomic view of dielectrics, potential energy of a dipole in an electric field, Polarization and charge density.

Dielectrics and Gauss's law. Relation between D, E, and P - Dielectric constant and susceptibility. Capacitance: Capacity of concentric spheres, capacity of parallel plate condenser with and without dielectric. Electric energy stored by a charged condenser- force between plates of condenser.

**Unit-II**

**15h**

**Magneto statics:** Magnetic shell, potential due to magnetic shell, field due to magnetic shell, magnetic induction

(B) and field (H), permeability and susceptibility, Dia. Para and ferro-magnetic materials (qualitative), concepts of magnetic domains, Hysteresis loop, B-H curve-theory and experiment.

**Moving Charge in Electric and Magnetic Fields:** Force on a current carrying conductor, force and torque on current loop, Biot-Savart's law and calculation of B due to long straight wire, circular current loop and solenoid. Hall-Effect, Cyclotron, Synchrocyclotron and Synchrotron.

**Unit - III**

**15h**

**Electromagnetic Induction:** Faraday's law, Lenz's law, expression for induced e.m.f. Electromotive force — time varying magnetic fields, Betatron, Ballistic galvanometer- Theory and damping correction, self and mutual inductance, coefficient of coupling, calculation self-inductance of long solenoid and toroid, energy-stored in magnetic field- principles and construction of transformer.

**Maxwell's Equations:** A review of basic laws of electricity and magnetism, displacement current, Maxwell's equations in differential form, Maxwell's wave equation.

**Unit -IV**

**15h**

**Semiconductor devices:** P-N junction diode, Zener diode, Half wave and Full wave rectifiers. PNP and NPN transistors. Current components in a transistor, Input and output characteristics of transistor in CE configurations.

**Digital Principles:** Binary arithmetic, Logic gates, Boolean algebra, OR, AND, NOT gates, truth tables, DeMorgan's theorems: statements and proof logic gates using discrete components, Universal gates; half and full ladders; parallel adder circuits.

*K. Vinayak* *M. S. S. Reddy* *Tejapanyam* *K. R. Reddy*  
*M. S. S. Reddy* *M. S. S. Reddy* *M. S. S. Reddy* *M. S. S. Reddy*

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- Electricity and magnetism, D C Tayal, 1998, Himalaya publishing house
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- Electromagnetics, B B Laud, New age international publishers
- Electronic devices and circuits, S. Salivahanan and N.Suresh Kumar, 2012, Tata Mc-Graw Hill.
- Digital Principles & Applications, A.P.Malvino, D.P.Leach 7<sup>th</sup> Ed., 2011, Tata McGraw Hill publication.
- Electronic devices and circuits- Millman and Halkias, Mc, Graw Hill publication

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<b>Course Code: ICY-353A</b>	<b>Number of Credits- 01</b>
<b>Title of the Course : Physics-III (Practicals)</b>	<b>Total Instruction hours - 45 per Semester</b>

**Electricity & Magnetism Lab**

1. Determination of M and H - Vibration Magnetometer
2. Magnetic Field along the axis of a coil carrying current - Stewart and Gee's Galvanometer
3. Hysteresis Loop - Magnetometer Method (or) I-H Curve
4. Carey Foster's Bridge
5. Potentiometer - Comparison of Low Resistances
6. Constant 'K' of a Ballistic Galvanometer by using Standard Condenser
7. Verification of Logic gates AND, OR, NOT, X-OR and NAND gates
8. Verification of De-Morgan's Laws
9. R.C. Coupled Amplifier
10. Determination of ac-frequency-sonometer.
11. CR or RC circuit (Frequency response i.e. as a High or a Low Pass Filter)
12. RC circuit (Charging & Discharging of a Capacitor)
13. LCR circuit (Frequency response)

**Note:** *Minimum of eight experiments should be performed.*

**References**

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- S.P. Singh, "Advanced Practical Physics" (PragatiPrakashan, Meerut).
- Worsnop and Flint- Advanced Practical physics for students.
- "Practical Physics" R.K Shukla, AnchalSrivastava
- B.Sc Practical Physics, C L Arora- S Chand & Co.
- A text book of practical physics, M.N. Srinivasan, Chand & Co
- Practical physics, M. Arul Thakpathi, Complete publishers
- Via voce in advanced physics, R C Gupta, and P N Saxena, PragathiPrakashan, Meerut

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<b>Course Code: ICY-306 B</b>	<b>Number of Credits- 04</b>
<b>Title of the Course : Zoology-I</b>	<b>Total Instruction hours - 60 per Semester</b>

**UNIT - I**

**15h**

**1. Cell Biology & Molecular Biology**

- 1.1. Differences of Prokaryotic and Eukaryotic cells, Ultrastructure of Animal cell
- 1.2. Structure and functions of Plasma membrane, Endoplasmic reticulum, Golgi body, Ribosomes, Mitochondria and Nucleus
- 1.3 Chromosomes – Structure, types, Cell Division (Mitosis, Meiosis)
- 1.4. DNA (Deoxyribo Nucleic Acid) & RNA (Ribo Nucleic Acid) – Structure & types
- 1.5. DNA Replication & Protein Synthesis

**UNIT - II**

**15h**

**2. Genetics**

- 2.1 Mendel's laws of Inheritance and Non-Mendelian Inheritance, Incomplete dominance Codominance and Epistasis
- 2.2 Linkage and Crossing over
- 2.3. Sex determination in Human beings and sex-linked inheritance
- 2.4 Chromosomes structure. Mutations -Types
- 2.5. Gene mutations- Induced and Spontaneous Mutations.

**UNIT - III**

**15h**

**3. Evolution**

- 3.1. Theories of Evolution – Lamarckism and Neo-Lamarckism, Darwinism and Neo-Darwinism, Modern synthetic theory of organic evolution
- 3.2. Evidences of Evolution and Hardy Weinberg Law.
- 3.3. Forces of Evolution – Mutation, Genetic drift, Natural selection and Migration
- 3.4. Isolation & mechanisms
- 3.5. Speciation: Concept of species, Methods of Speciation

**UNIT - IV**

**15h**

**4. Biomolecules & Metabolism**

- 4.1 Carbohydrate metabolism - Glycolysis, Krebs cycle, , Electron transport system
- 4.2 Protein Metabolism - Transamination and Urea Cycle
- 4.3 Lipid Metabolism – Classification of lipids & Biological significance
- 4.4 Enzymes: Definition & Classification,
- 4.5 Concept of Homeostasis

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- Gupta P.K., 'Genetics'
- Nagabhusanam, Comparative Animal Physiology
- Veer BalRastogi, Text Book of Animal Physiology

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<b>Course Code: ICY-353B</b>	<b>Number of Credits- 01</b>
<b>Title of the Course : Zoology-IV (practicals)</b>	<b>Total Instruction hours - 45 per Semester</b>

**Cell & Molecular Biology, Genetics & Evolution**

**I. Cytology**

1. Preparation and Identification of slides of Mitotic divisions with onion root tips
2. Identification and study of the following slides/photographs/figures. i). Different stages of Mitosis and Meiosis

**II. Genetics**

1. Problems on Genetics - Mendelian inheritance

**III. Evolution**

1. Museum Study of Fossil animals: *Peripatus*, *Coelacanth Fish*, *Dipnoi fishes*, *Sphenodon*, *Archeopteryx*.

**IV. Biomolecules & Metabolism**

1. Effect of pH and Temperature on salivary amylase activity.
  2. Study of permanent histological sections of Mammalian Endocrine glands - Pituitary, Thyroid, Pancreas, Adrenal gland.
- **Laboratory Record work shall be submitted at the time of practical examination**
  - An "Album" containing photographs, cut outs, with appropriate write-up about Genetics and Evolution.

**References**

- Manual of laboratory experiments in cell biology Edward, G.
- Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
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Course Code: ICY-307	Number of Credits- 04
Title of the Course : Chemistry-IV	Total Instruction hours - 60 per Semester

**Unit-I (Inorganic Chemistry) 15h (1 h/week) S3-IV-I-1: Coordination Compounds-I** 7h

Simple inorganic molecules and coordination complexes. Nomenclature – IUPAC rules,

1. Brief review of Werner's theory, Sidgwick's electronic interpretation, EAN rule and their limitations. Valence bond theory (VBT) – postulates and application to (a) tetrahedral complexes  $[\text{Ni}(\text{NH}_3)_4]^{2+}$ ,  $[\text{NiCl}_4]^{2-}$  and  $[\text{Ni}(\text{CO})_4]$  (b) square planar complexes  $[\text{Ni}(\text{CN})_4]^{2-}$ ,  $[\text{Cu}(\text{NH}_3)_4]^{2+}$ ,  $[\text{PtCl}_4]^{2-}$  (c) octahedral complexes  $[\text{Fe}(\text{CN})_6]^{4-}$ ,  $[\text{Fe}(\text{CN})_6]^{3-}$ ,  $[\text{FeF}_6]^{4-}$ ,  $[\text{Co}(\text{NH}_3)_6]^{3+}$ ,  $[\text{CoF}_6]^{3-}$ . Limitations of VBT. 2. Coordination number, coordination geometries of metal ions, types of ligands. 3. Isomerism in coordination compounds, stereo isomerism – (a) geometrical isomerism in (i) square planar metal complexes of the type  $[\text{MA}_2\text{B}_2]$ ,  $[\text{MA}_2\text{BC}]$ ,  $[\text{M}(\text{AB})_2]$ ,  $[\text{MABCD}]$ . (ii) Octahedral metal complexes of the type  $[\text{MA}_4\text{B}_2]$ ,  $[\text{M}(\text{AA})_2\text{B}_2]$ ,  $[\text{MA}_3\text{B}_3]$  using suitable examples, (b) Optical isomerism in (i) tetrahedral complexes  $[\text{MABCD}]$ , (ii) Octahedral complexes  $[\text{M}(\text{AA})_2\text{B}_2]$ ,  $[\text{M}(\text{AA})_3]$  using suitable examples. Structural isomerism: ionization, linkage, coordination ligand isomerism using suitable examples.

**S3-IV-I-2: Organometallic Chemistry** 4h

Definition, nomenclature and classification of organometallic compounds. Methods of preparation, properties and applications of alkyl and aryl compounds of Li, Mg & Al. Preparation and properties of ferrocene.

**S3-IV-I-3: Metal carbonyls and related compounds** 4h

18 valence electron rule, classification of metal carbonyls:  $\text{Ni}(\text{CO})_4$ ,  $\text{Fe}(\text{CO})_5$ ,  $\text{Fe}_2(\text{CO})_9$ ,  $\text{Fe}_3(\text{CO})_{12}$  and  $\text{Cr}(\text{CO})_6$ , Preparation and properties of  $\text{Ni}(\text{CO})_4$ .

**UNIT -II (Organic chemistry) 15 h (1 hr/week) S3-IV-O-1: Carboxylic acids and derivatives** 8h

Nomenclature, classification and methods of preparation a) Hydrolysis of Nitriles, amides and esters. b) Carbonation of Grignard reagents. Special methods of preparation of Aromatic Acids. Oxidation of the side chain of Arenes. Hydrolysis of benzotrighalides. Kolbe reaction. Physical properties- hydrogen bonding, dimeric association, acidity – strength of acids with the examples of trimethyl acetic acid and trichloro acetic acid, Relative differences in the acidity of Aromatic, aliphatic acids & phenols. Chemical properties – Reactions involving H, OH and COOH groups - salt formation, anhydride formation, Acid halide formation, Esterification (mechanism) & Amide formation. Reduction of acid to the corresponding primary alcohol – via ester or acid chloride. Degradation of carboxylic acids by Huns Diecker reaction, Schmidt reaction (Decarboxylation). Arndt

- Eistert synthesis, Halogenation by Hell – Volhard - Zelensky reaction. Carboxylic acid Derivatives – Reactions of acid halides, Acid anhydrides, acid amides and esters (mechanism of ester hydrolysis by base and acid).

**S3-IV-O-2: Nitro hydrocarbons:** 7h

Nomenclature and classification of nitro hydrocarbons. Structure. Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes. Reactivity - halogenation, reaction with  $\text{HNO}_2$  (Nitrous acid), Nef reaction, Mannich reaction, Michael addition and reduction. Aromatic Nitro hydrocarbons: Nomenclature, Preparation of Nitrobenzene by Nitration. Physical properties,

*M. G. S. Rao*  
*M. G. S. Rao*  
*any*

*Tejavarayan*

*K. K. Reddy*  
*Arora*  
*Palcher*



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**PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

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chemical reactivity – orientation of electrophilic substitution on nitrobenzene. Reduction reaction of Nitrobenzenes in different media.

**Unit – III (Physical Chemistry)**

**15 hr(1h/week)**

**S3-IV-P-1: Electrochemistry & EMF**

**15 h**

Electrical transport – conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of specific and equivalent conductance with dilution. Migration of ions and Kohlrausch's law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf's method for attackable electrodes. Applications of conductivity measurements: Determination of degree of dissociation, determination of  $K_a$  of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations. Electrolyte and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurement. Computation of EMF. Types of reversible electrodes- the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes. Electrode reactions, Nernst equation, cell EMF and single electrode potential, standard Hydrogen electrode – reference electrodes (calomel electrode) – standard electrode potential, sign conventions, electrochemical series and its significance. Applications of EMF measurements, Calculation of thermodynamic quantities of cell reactions ( $G$ ,  $H$  and  $K$ ). Determination of pH using hydrogen electrode, glass electrode and quinhydrone electrode, Solubility product of AgCl. Potentiometric titrations.

**Unit-IV (General Chemistry)**

**15h (1 h/week) S4-**

**IV-G-1: Molecular spectroscopy**

Introduction to electromagnetic radiation, interaction of electromagnetic radiations with molecules, various types of molecular spectra.

**Rotational spectroscopy (Microwave spectroscopy)**

Rotational axis, moment of inertia, classification of molecules (based on moment of inertia), rotational energies, selection rules, determination of bond length of rigid diatomic molecules eg. HCl.

**Infra red spectroscopy**

Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum.

**Electronic spectroscopy:**

Bonding and antibonding molecular orbitals, electronic energy levels of molecules ( $\sigma$ ,  $\pi$ ,  $n$ ), types of electronic transitions:  $\sigma$ - $\sigma^*$ ,  $n$ - $\sigma^*$ ,  $n$ - $\pi^*$ ,  $\pi$ - $\pi^*$  with suitable examples. Selection rules, Terminology of chromophore, auxochrome, bathochromic and hypsochromic shifts. Absorption of characteristics of chromophores: diene, enone and aromatic chromophores.

Representation of UV-visible spectra.

**Proton Magnetic Resonance Spectroscopy**

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of

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signals. Chemical shift, NMR splitting of signals – spin-spin coupling, representation of proton NMR spectrum – Integrations.  $^1\text{H}$  NMR spectrum of – ethyl bromide, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate and acetophenone.

**References:**

**Unit- I**

- Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications(1996).
- Concise Inorganic Chemistry by J.D. Lee 3rd edn Van Nostrand Reinhold Company (1977)
- Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
- Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
- Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
- Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press (1999).
- Textbook of Inorganic Chemistry by R Gopalan (Universities Press(2012)
- College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati Universities Press (India) Limited(2012)

**Unit- II**

- Text book of organic chemistry by Soni. Sultan Chand & Sons; Twenty Ninth edition (2012)
- General Organic chemistry by Sachin Kumar Ghosh. New Age Publishers Pvt Ltd (2008)
- Text book of organic chemistry by Morrison and Boyd. Person(2009)
- Text book of organic chemistry by Graham Solomons. Wiley(2015)
- Text book of organic chemistry by Bruce Yuranis Powla. (2012)
- Text book of organic chemistry by C N Pillai CRC Press (2012)

**Unit III**

- Principles of physical chemistry by Prutton and Marron. The Macmillan Company; 4th edition (1970)
- Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons(2011)
- Text Book of Physical Chemistry by Puri and Sharma. S. Naginchand and Co.(2017)
- Text Book of Physical Chemistry by K. L. Kapoor. (2012)
- Colloidal and surface chemistry, M. Satake, Y. Hayashi, Y.Mido, S.A.Iqbal and M.S.sethi, Discovery Publishing Pvt.Ltd (2014)
- Material science by Kakani & Kakani, New Age International(2016)

**Unit IV**

- Fundamentals of molecular spectroscopy: Banwell
- Fundamentals of molecular spectroscopy: P.S. Sindhu
- Elementary Organic Spectroscopy: Y.R.Sharma
- Organic spectroscopy, William Kemp, Palgrave Macmillan; 2nd revised edition(1 February 1987)

*Kiranesa*  
*M. Will*  
*M. Will*

*Prayangan*

*Collected*  
*K.R.Reddy*  
*Arora Babu*

**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

Course Code: ICY-354	Number of Credits- 01
Title of the Course : Chemistry-IV (practicals)	Total Instruction hours - 45 per Semester

**1. (Organic Chemistry)**

**2. Synthesis of Organic compounds:**

Acetylation: Acetylation of salicylic acid, Benzoylation of Aniline.

Aromatic electrophilic substitution: Nitration: Preparation of nitro benzene and m-dinitrobenzene

Halogenation: Preparation of p-bromo acetanilide, Preparation of 2,4,6-tribromo phenol Oxidation: Preparation of benzoic acid from benzyl chloride.

Esterification: Preparation of n-butyl acetate from acetic acid. Methylation:

Preparation of - naphthyl methyl ether.

Condensation: Preparation of benzilidine aniline and Benzaldehyde and aniline.

**Diazotisation: Azocoupling of  $\beta$ -Naphthol.**

**3. Physical Chemistry**

**A. Potentiometry:**

a) Determination of redox potential of  $Fe^{2+}/Fe^{3+}$  by potentiometric titration of ferrous ammonium sulphate vs. potassium dichromate.

b) Precipitation titration of KCl vs.  $AgNO_3$  -Determination of given concentration of silver nitrate.

c) Strong acid Vs Strong base;

**B. Conductometry:**

a) Determination of cell constant of conductivity cell.

b) Determination of dissociation constant ( $K_a$ ) of acetic acid by conductivity measurements

c. Conductometry titrations:

i) Strong acid Vs Strong base;

ii) Weak acid Vs Strong base.

**C. pH metry:**

a) pH metric titration of strong acid (HCl) vs. strong base- Determination of the concentration of the given acid.

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**COMPLETE COURSE STRUCTURE (CBCS Pattern)  
SEMESTER-IV (30 Credits)**

Course Code & type	Courses	No of hours per week	No of Credits	Marks			Duration of Exam In Hours
				Internal	Eternal	Total	
<b>Theory</b>							
ICY-401 (FC)	General English-IV	4	4	20	80	100	3
ICY-402 (FC)	Telugu-IV	4	4	20	80	100	3
ICY-403A/403B (SEC)	Interdisciplinary Course Maths/Biology	2	2	10	40	50	2
ICY-404A	Mathematics-V	4	4	20	80	100	3
ICY-404B	Botany-V	4	4	20	80	100	3
ICY-405A	Physics-V	4	4	20	80	100	3
ICY-405B	Zoology-V	4	4	20	80	100	3
ICY-406	Chemistry-V	4	4	20	80	100	3
ICY-407	Chemistry-VI	4	4	20	80	100	3
<b>Practicals</b>							
ICY-451A	Mathematics-V(practicals)	3	1		50	50	4
ICY-451B	Botany-V(practicals)	3	1		50	50	4
ICY-452A	Physics-V (practicals)	3	1		50	50	4
ICY-452B	Zoology-V (practicals)	3	1		50	50	4
ICY-453	Chemistry-V (practicals)	3	1		50	50	4
ICY-454	Chemistry-VI (practicals)	3	1		50	50	4
<b>Total</b>			30 for each str.				
<b>FC = Foundation Courses; SEC = Skill Enhancement Course; DSC = Discipline Specific Course Note: Except Foundation Courses and Ability Enhancement Compulsory Course remaining are Discipline Specific CourseS</b>							

*K. Kiran*

Dr. N. Chandra Kiran  
(BoS Chairperson)

*C. Malla Reddy*

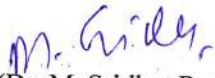
(Prof. C. Malla Reddy)

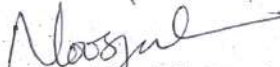
*K. Rajender Reddy*


(Dr. K. Rajender Reddy)

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PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**


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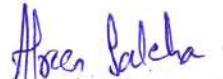
  
(Dr. M. Sridhar Reddy)

  
(Dr. MD. Noorjahan)

  
(Dr. M. Narsingam)

  
(Dr. B. Satyanarayana)

  
(Dr. S. Vijayalaxmi)

  
(Ms. Afreen Saleha)

(Head, Dept. of M.Sc. Integrated  
Chemistry)

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PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

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**Detailed Syllabus  
SEMESTER-IV**

<b>Course Code: ICY-401</b>	<b>Number of Credits- 04</b>
<b>Title of the Course : General English-IV</b>	<b>Total Instruction hours - 4 per week 60 per Semester</b>

- UNIT- VI** **12h**  
Poem: "The Flower" *Alfred Tennyson* ;Prose: "The Kitemaker" *Ruskin Bond*; Vocabulary: Commonly Confused Words; Grammar: Determiners
- UNIT -VII** **12h**  
Poem: "Ecology" *AK Ramanuja* ;Prose: What's the Language of the Future? *Henry Hitchings* ;Vocabulary: Indianisms ;Grammar: Framing Questions (Including Tag Questions)
- UNIT VIII** **12h**  
Poem: "Television" *Roald Dahl* ;Prose: "The Fringe Benefits of Failure, and the Importance of Imagination" *JK Rowling*; Vocabulary: One-word Substitutes; Grammar: Relative Clauses
- UNIT IX** **12h**  
Review writing: Film Review, Book Review; Vocabulary: Technical Vocabulary (Film, Literature)  
Grammar: Conditionals
- UNIT X** **12h**  
CV Writing: Chronological CV, Functional CV; Vocabulary: Appropriacy;Grammar: Common Errors

**Reference:**

Prescribed Textbook for Semesters III & IV: *English in Use*. Eds. T Vijay Kumar, K DurgaBhavani, YL Srinivas. Published by Macmillan

*Viramesh* *Abhishek* *apj* *KK Reddy*  
*Shyamprasad* *M. Gireesh* *Arora Balcha*

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Course Code: ICY-402	Number of Credits- 04
Title of the Course : Telugu-IV	Total Instruction hours - 60 per Semester

**ప్రాచీన పద్యభాగం**

- |                     |     |                                      |
|---------------------|-----|--------------------------------------|
| 1. నారద గానమాతృర్యం | ... | పింగళి సూరన                          |
| 2. వాగ్దన భంగం      | ... | అసూరి మరింగంటి వేంకట నరసింహాచార్యులు |
| 3. నారసింహ శతకం     | ... | ధర్మపురి శేషప్ప                      |

**అధునిక పద్యభాగం**

- |                         |     |                          |
|-------------------------|-----|--------------------------|
| 1. నరుడ నేను, నరుడ నేను | ... | కాళోజీ                   |
| 2. అర్థగీతం             | ... | దేవరకొండ బాలగంగాధర తిలక్ |
| 3. దేవరకొండ దుర్గం      | ... | డా॥ ముకురాల రామారెడ్డి   |

**వచన విభాగం**

- |                             |     |                          |
|-----------------------------|-----|--------------------------|
| 1. అర్థరాత్రి అరుణోదయం      | ... | దాశరథి రంగాచార్య         |
| 2. సి.పి.బ్రౌన్ సాహిత్య సేవ | ... | జానమద్ది హనుమచ్ఛస్త్రి   |
| 3. మన గ్రామ నామాల           | ... | డా॥కపిలవాయి లింగమూర్తిష్ |
| 4. నిపురు తొలగిన నిప్పు     | ... | పోల్కంపల్లిశాంతాదేవి     |
| 5. కొండమల్లెలు              | ... | ఇల్లందల సరస్వతీదేవి      |

**భందస్సు**

పాఠ్యగ్రంథము లోనివి  
సామాజిక వ్యాసం

**పరీక్షా పద్ధతి**

- |                          |             |
|--------------------------|-------------|
| ఎ. ఇంటర్నల్ ఎస్సెస్మెంట్ | 20 మార్కులు |
| బి. సెమిస్టర్ పరీక్ష     | 80 మార్కులు |

*Kiranesu*    *Mooshib*    *Devarayan*    *KR Reddy*  
*apj*    *mbalisan*  
*M. G. Reddy*    *Alroen Babbar*

**FACULTY OF SCIENCE**  
**M.Sc., 5 Year Integrated Chemistry**  
**II-Semester (Regular) Examinations, September-2023**  
*(2022 Batch)*  
**Paper-I**  
**English-II**

3901-22829-003

Time: 3 Hours

Max. Marks: 80

**Section -A****Note:** Answer any **Four** of the following questions.

- |  |                   |
|--|-------------------|
| 1. Answer as directed.   | 4x5=20M<br>5x1=5M |
| a) I love Swimming? (Identify the "gerund")  | 1M                |
| b) I struggle to understand. (Identify the Infinitive)   | 1M                |
| c) The movie was interesting. (Identify the present participle)  | 1M                |
| d) She moves with such grace, like a gazelle. (Identify the literary figure of speech)                 | 1M                |
| e) You are the light of my life. (Identify the literary figure of speech)                              | 1M                |
| 2. Answer as directed.<br>(Choose the appropriate word as adjective/ adverb from the options provided) | 5x1=5M            |
| a) I will meet you _____. (latter / later)   | 1M                |
| b) Do you have _____ plans? (further/ farther)   | 1M                |
| c) Your pencil is the _____ of the three in the box. (longer/longest)                                  | 1M                |
| d) My grandfather smiled _____. (carefully / cheerfully)   | 1M                |
| e) She fought the disease _____ for two months. (bravely/ loudly)                                      | 1M                |
| 3. Complete the following words.   | 5x1=5M            |
| a) Incumb _____.   | 1M                |
| b) Indispensa _____.   | 1M                |
| c) Imagina _____.  | 1M                |
| d) Process _____.  | 1M                |
| e) Simultane _____.  | 1M                |
| 4. Answer as directed.   | 5x1=5M            |
| a) Avatar. (Origin of the word)  | 1M                |
| b) A <i>Loan word</i> is a _____.  | 1M                |
| c) Write a portmanteau of "Motor +hotel".  | 1M                |
| d) A <i>portmanteau</i> is a _____.  | 1M                |
| e) What is the 'block format' in letter writing?   | 1M                |



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5. Answer as directed. 5x1=5M
- a) *Plosives* means \_\_\_\_\_ 1M
- b) *Champion*. (Write the phonetic transcription of the given word) 1M
- c) P.B Shelly was \_\_\_\_\_ English poet. (Write a suitable article) 1M
- d) Shakespeare is considered the greatest dramatist and the poet of \_\_\_\_\_ English language. (Write a suitable article) 1M
- e) Quiet everyone silence Brutus is speaking. (Rewrite with appropriate punctuation marks) 1M
6. Answer to the following question. 5M  
What are the steps in 'Note- making'?

## Section – B

**Note:** Answer the following questions in about 300 words each.

4x15=60M

7. a) Use examples from the text, examine how the old ladies behave with Marian. Why did they behave so? 15M
- (OR)
- b) Write an essay on the topic, '*Time Management*'. 15M
8. a) Describe the arrival of the princes in your own words. (From Huxley's *Benares*) 15M
- (OR)
- b) Explain the importance of punctuation marks in language. Substantiate with suitable examples. 15M
9. a) Discuss Shelly as a poet of nature with reference to the poem prescribed for study. 15M
- (OR)
- b) What are the required skills for facing an interview? 15M
10. a) "Let Brutus become our ruler!" – Illustrate the scene from Julius Caesar. 15M
- (OR)
- b) "*Practice makes one perfect*" – Develop it into an essay. 15M

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**FACULTY OF SCIENCE**  
**M.Sc., 5 Year Integrated Chemistry**  
**II-Semester (Regular) Examinations, September-2023**  
 (2022 Batch)  
**Paper-II**  
**Telugu**

3901-22-529-003

Time: 3 hours

Max Marks: 80

## భాగం-ఎ (సంక్షిప్త సమాధానాలు)

4x5=20M

సూచన: క్రింది వానిలో ఏవేని నాలుగు ప్రశ్నలకు సమాధానాలు వ్రాయుము. ✓

1. 'వసుధాస్థలి వర్ధిలు బ్రహ్మకల్పముల్' .... సందర్భ సహిత వ్యాఖ్య రాయండి. 5M
2. జలధారల్ చల్లి చల్లచైదన్ .... సందర్భ సహిత వ్యాఖ్య రాయండి. 5M
3. దేవులవల్లి కృష్ణ శాస్త్రి గురించి వివరించండి. 5M
4. ఎంకన్న పాత్రను పరిచయం చేయండి. 5M
5. ఈ క్రింది పదాలకు పర్యాయపదాలు రాయండి. 5M  
 అ) భూమి    ఆ) గాలి    ఇ) నీరు    ఈ) స్త్రీ    ఊ) పూలు    ఊ) నిప్పు
6. ఈ క్రింది పదాలకు నానార్థాలు రాయండి. 5M  
 అ) అంబరం    ఆ) హరి    ఇ) కుపలయం    ఈ) రాజు    ఊ) ఉత్తరం    ఊ) పాలు

## భాగం-బి (వ్యాసరూప సమాధానాలు)

4x15=60M

సూచన: క్రింది ప్రశ్నలకు సమాధానాలు వ్రాయుము.

7. ఈ క్రింది వానిలో ఒక పద్యానికి ప్రతిపదార్థ త్పార్య, వ్యాకరణ, విశేషాంశాలు రాయండి. 15M  
 (a) లా వొక్కింతయు లేదు, ధైర్యము విలోలం బయ్యె ప్రాణముల్  
 తావుల్ దప్పెను, మూర్ఖ వచ్చె దనువున్ దస్సెన్, శ్రమం బయ్యెడిన్  
 నీవే తప్ప నితఃపరం బెఱుగ, మన్నింపందగున్ దీనునిన్,  
 రావే యీశ్వర! కావవే వరద! సంరక్షింపు భద్రాత్మకా!  
 (లేదా)  
 (b) రాముని డా గురించి నిను రావణుడెత్తుక వచ్చువేళ నీ 15M  
 హేమ విభూషణాపకుల నేర్పడ ఋశ్యమహాద్రి వైచినన్  
 మేమవి తీసి దాచితిమి మీపతి యచ్చటి కేగుదేరగా  
 దామరసాప్తనందనుడు తానవి సూపిన జూచి మెచ్చుచున్
8. a) గజేంద్రుడు మొసలి నుండి తనను రక్షింపమని వేడుకున్న విధానం రాయండి. 15M  
 (లేదా)  
 b) సి.నా.రె 'ప్రపంచ పదులు' అందించిన సందేశమేమిటి? 15M
9. a) "యుగాంతం" ఆధారంగా స్వామి వృత్తాంతాన్ని తెలియజేయండి. 15M  
 (లేదా)  
 b) మామిడి పండును ఏ ఏ భాషల్లో ఏమని పిలుస్తారో వివరించి రకాలను, ప్రత్యేకతను విశ్లేషించండి. 15M
10. a) ఈ క్రింది మూడు సంధులను లక్ష్యలక్షణ సమన్వయం చేయండి. 15M  
 అ) త్రిక సంధి    ఆ) పృద్ధి సంధి    ఇ) ఇకార సంధి  
 (లేదా)  
 b) ఈ క్రింది మూడు సమాసాలకు లక్ష్యలక్షణ సమన్వయం చేయండి. 15M  
 అ) ద్వంద సమాసం    ఆ) ఉపమానపూర్వపదకర్మధారయం    ఇ) సప్తమితత్పురుష సమాసం

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\*సూచన: అన్ని ప్రశ్నలకు సమాధానాలు రాయండి  
విభాగం-ఎ (5×4 = 20 మార్కులు)  
(సంక్షిప్త సమాధానాలు)

1. ధర్మపురి శీషవు
2. కాళోజి
3. సీసం
4. పంచకమాల
5. పోల్కంపల్లి శాంతాదేవి

విభాగం-ఆ (4 ×  
15=60మార్కులు)  
(వ్యాసరూప సమాధానాలు)

6. తుంబురుణ్ణి అధిగమించడానికి నారదుడు పడిన పాట్లు ఏవి?  
లేదా  
నరుడ నేను, నరుడ నేను పాఠ్యభాగం ఇచ్చే సందేశం ఏమిటి?
7. సి.పి.బ్రౌన్ తెలుగు సాహిత్యానికి చేసిన సేవను తెలియజేయండి.  
లేదా  
అర్చిగీతం పాఠ్యభాగం సారాంశాన్ని రాయండి.
8. నారసింహ శతకంలోని భక్తి భావనను వివరించండి.  
లేదా  
దేవరకొండ పైభవాన్ని వర్ణించండి.
9. గ్రామనామాల అధ్యయన ప్రయోజనాలను తెలపండి.  
లేదా  
కొండమల్లెలు పాఠ్యభాగం సారాంశాన్ని రాయండి.
10. పర్యావరణ కాలుష్యం గురించి ఒక వ్యాసం రాయండి.  
లేదా  
సమాజంపై మీడియా ప్రభావాన్ని వివరిస్తూ ఒక వ్యాసం రాయండి.

Kirana Alorjile

Opj

Shayyan

KReddy

mbeisam

M. Gille

Creedy

Areen Saleha.

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Skill Enhancement Course-II	
Course Code: ICY-403A	Number of Credits- 02
Title of the Course : Interdisciplinary course (Biology)	Total Instruction hours - 30 per Semester

**Cell Biology**

Periods: 30

**Unit-I**

**15 h**

**1. Cell Biology**

- 1.1. Ultra structure of Animal cell, Differences of Prokaryotic and Eukaryotic cells
- 1.2. Structure and functions of Plasma membrane.
- 1.3. Structure and functions of cell organelles - Endoplasmic reticulum, Golgi body, Ribosomes, Lysosomes, Centrosomes, Mitochondria and Nucleus
- 1.4. Chromosomes - Structure and types.
- 1.5. Cell Division - Mitosis, Meiosis.

**Unit-II**

**15 h**

**2. Molecular Biology**

- 2.1. DNA (Deoxyribo Nucleic Acid) - Structure and functions.
- 2.2. RNA (Ribo Nucleic Acid) Structure, types and functions.
- 2.3. DNA Replication.
- 2.4. Protein Synthesis - Transcription and Translation
- 2.5. Gene Expression - Genetic Code; operation concept

*Kreddy*

*Kiran Kumar*   *Abhishek*   *Shayam*   *M. G. Reddy*   *Suresh*   *Abhinav*   *Satish*

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Skill Enhancement Course-II	
Course Code: ICY-403 B	Number of Credits- 02
Title of the Course : Interdisciplinary course (Maths)	Total Instruction hours - 30 per Semester

**Unit I Limits and Continuity & Differentiation: 10h**

Intervals and neighborhoods. Limits, Standard Limits, Continuity, Derivative of a function. Elementary Properties. Trigonometric, Inverse Trigonometric, Hyperbolic, Inverse Hyperbolic Function – Derivatives, Methods of Differentiation, Second Order Derivatives.

**Unit II Integration: 10h**

Integration as the inverse process of differentiation- Standard forms – properties of integrals. Method of substitution- integration of Algebraic, exponential, logarithmic, trigonometric and inverse trigonometric functions. Integration by parts.

**Unit III Vectors: 10h**

Classification of vectors, Addition of vectors, Scalar multiplication. Angle between two non zero vectors, Linear combination of vectors. Component of a vector in three dimensions, Vector equations of line and plane including their, Cartesian equivalent forms.

**Reference**

TELUGU ACADEMY -INTER FIRST YEAR

Kiranasa Allogab  
M. Githa

Srinivasan

KK Reddy  
M. Sai San  
Arjun Babu

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<b>Course Code: ICY-404A</b>	<b>Number of Credits- 04</b>
<b>Title of the Course : Mathematics-V</b>	<b>Total Instruction hours - 60 per Semester</b>

**Numerical Analysis**

**Objective:** Students will be made to understand some methods of numerical analysis.  
**Outcome:** Students realize the importance of the subject in solving some problems of algebra and calculus.

**Unit- I 15h**

Errors in Numerical Calculations - Solutions of Equations in One Variable: The Bisection Method - The Iteration Method - The Method of False Position-Newton's Method - Muller's Method - solution of Systems of Nonlinear Equations.

**Unit- II 15h**

Interpolation and Polynomial Approximation: Interpolation - Finite Differences - Differences of Polynomials - Newton's formula for Interpolation - Gauss's central differences formulae - Stirling's and Bessel's formula - Lagrange's Interpolation Polynomial - Divided Differences - Newton's General Interpolation formula - Inverse Interpolation.

**Unit- III 15h**

Curve Fitting: Least Square Curve Fitting: Fitting a Straight Line-Nonlinear Curve Fitting.

Numerical Differentiation and Integration: Numerical Differentiation - Numerical Integration: Trapezoidal Rule-Simpson's 1/3rd-Rule and Simpson's 3/8th-Rule - Boole's and Weddle's Rule - Newton's Cotes Integration Formulae.

**Unit- IV 15h**

Numerical Solutions of Ordinary Differential Equations: Taylor's Series Method - Picard's Method -Euler's Methods - RungeKutta Methods.

**Text:**

- Richard L. Burden and J. Douglas Faires, Numerical Analysis (9e) S.S.Sastry, Introductory Methods of Numerical Analysis, PHI

**References:**

- M K Jain, S R K Iyengar and R K Jain, Numerical Methods for Scientific and Engineering computation
- B.Bradie , A Friendly introduction to Numerical Analysis

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*M. G. V. Apurva* *Sreeddy* *Abhishek*

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<b>Course Code: ICY-451A</b>	<b>Number of Credits- 02</b>
<b>Title of the Course : Mathematics-V</b>	<b>Total Instruction hours - 45 per Semester</b>

**NUMERICAL ANALYSIS**

**UNIT-I**

- 1) Define Absolute Error, Relative Error, Percentage Error. If  $\pi = \frac{22}{7}$  is approximated as 3.14 then find  $E_A, E_R$  &  $E_p$ .
- 2) If  $f(x, y, z) = 10x^3y^2z^2$  find the general error if  $x=1, y=2, z=3, \Delta x=0.01, \Delta y=0.02, \Delta z=0.03$ .
- (3) If  $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$ , absolute error  $\epsilon = 0.001$ , then find  $n =$  the number of terms if  $x=1$ .
- 4) Bi-Section Method and Iteration method.
  - (a)  $x^3 - 4x - 9 = 0$
- 5) Regula- falsi / Method of false position.
  - (a)  $x^3 + x^2 + x + 7 = 0$
- 6)  $2xe^{-x} - \sin x = 0, x_0 = 1$  Newton-Rap son Method.
- 7)  $x^3 - x - 4 = 0, x_0 = 0$  Newton-Rap son Method.
- 8)  $x + \log x = 3, x_0 = 1$
- 9) Generalized Newton's Method Double root of  $x^3 - 3x + 2 = 0, x_0 = 0.7$
- 10) Mullers Method (a)  $x^3 - x - 1 = 0$

**UNIT-II**

1. Compute the following:  $\Delta^3(x^3 + 2x + 1), \Delta^2(\sin x + \cos x), \nabla^2((x+1)(x+2))$ ,
2. Find the relations between  $E, \Delta, \nabla, \delta, \mu$  operators.
3. Using Newton's Forward and Back word differences find  $f(0.54)$  if

$x$	0.1	0.2	0.3	0.4	0.5	0.6	0.7
$f(x)$	2.631	3.328	4.097	4.944	5.875	6.896	8.013

4. Find the Interpolation Polynomial by using Newton's forward and Back ward difference formula

$x$	0	1	2	3
$f(x)$	1	8	27	64

5. By using Gauss Central Forward/ Backward difference formulae and Stirling formulae compute  $f(1.22)$  if

$x$	1.00	1.05	1.10	1.15	1.20	1.25	1.30
$f(x)$	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

*Kirankumar Alavjath*  
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*Abhy*  
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*mbaisan*  
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6. Using Lagrange's Interpolation / Newton's divided difference formulae find the interpolating polynomial.

$x$	-2	-1	2	3
$f(x)$	-12	-8	3	5

7. Find the cubic polynomial by using Lagrange's Interpolation formula for

$x$	0	1	3	4
$y$	-1	1	17	43

8. By using Newton's Forward difference formulae find  $f(3.5)$  if

$x$	1	2	3	4	5	6	7
$f(x)$	2.631	3.328	4.097	4.944	5.875	6.896	8.013

- 9). Define Forward difference operator and find  $\Delta^2(\sin x + x^2)$ .

1. By using Newton's Backward difference formulae find  $f(8.5)$

$x$	0	2	4	6	8	10
$f(x)$	1	1	9	25	49	81

**UNIT-III**

- 1) Find the first and second derivative of the function at given points by using below tables.

X	1.0	1.1	1.2	1.3	1.4	1.5	1.6
Y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

at  $x=1.3$ , and  $x=1.6$

- 2) The distance travelled by a vehicle at various time intervals during the initial running is given by

Time t (s)	5	6	7	8	9
Distance Travelled(km)	10.0	14.5	19.5	25.5	32.0

Evaluate the velocity and acceleration of the vehicle at time  $t = 5, 7$  &  $9$  secs.

- 3) The population of a certain town is shown in the following table

X(yr)	1931	1941	1951	1961	1971
Y(population)	40.62	60.80	79.95	103.56	132.65

Find the rate of growth of population in 1961.

- 4) Solve the following functions By Trapezoidal Rule, Simson's  $\frac{1}{3}$ rd Rule, Simson's  $\frac{3}{8}$ th Rule for  $n = 4, 6, 8, 10$  and apply Romberg's Integration any one.

(i)  $\int_0^1 \frac{1}{1+x} dx$  (ii)  $\int_0^2 \frac{1}{1+x^2} dx$

*Kirankumar* *Mosqul* *apj* *M. Gur.* *Tejanyan* *KRRReddy* *Abhishek* *Abhishek*



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- 5)  $\int_0^{\pi/2} \cos x \, dx$  By Trapezoidal Rule, Simson's  $\frac{1}{3}$ rd Rule
- 6) Solve the following by Weddle's and Boole's formulae. i)  $\int_4^{5.2} \log x \, dx$  (ii)  $\int_0^2 \frac{1}{1+x+x^3} \, dx$
7. Using Lagrange's Interpolation / Newton's divided difference formulae find  $f(302)$  if  $(x, f(x))$  is given by  $(300, 2.4771), (304, 2.4829), (305, 2.4843), (307, 2.4871)$ .
8. Fit the following data in a Straight Line  
 $(1, 2.4), (2, 3.1), (3, 3.5), (4, 4.2), (6, 5.0), (8, 6.0)$
9. Fit the following data in a quadratic polynomial.  
 $(0, 1), (1, 0), (2, 3), (3, 10), (4, 21)$
10. Fit the following data in  $y = ae^{bx}$   $(1, 40.17), (1.2, 73.196), (1.4, 133.372), (1.6, 243.02)$

**UNIT-IV**

- 1) If (i)  $\frac{dy}{dx} = x - y^2, y(0) = 1$  by Taylor's Series Method.
- 2) (ii)  $y' - xy' - y = 0, y(0) = 1, y'(0) = 0$  find  $y(0.2)$  by Taylor's Series Method.
- 3) Solve by Picard's successive iteration method  $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$   
Hence find  $y(0.1), y(0.2)$ .
- 4) Find  $y(0.5)$  if  $\frac{dy}{dx} = 1 + y^2, y(0) = 0, h = 0.1$  by Euler's Method and Modified Euler's Method.
- 5) Solve for  $y(0.5)$  by Runge-Kutta Method (i)  $\frac{dy}{dx} = \frac{x^2 + y^2}{10}$  if  $y(0) = 1, h = 0.1$
- 6)  $\frac{dy}{dx} = x^2 - y; y(0) = 1, h = 0.1$ . by Runge-Kutta Method
- 7) By using Picard  $\frac{dy}{dx} = \frac{x^2 + y^2}{10}, y(0) = 1, h = 0.1$  for  $y(0.1)$ ,
- 8) Solve the equation  $\frac{dy}{dx} = x^2 - y, y(0) = 1, h = 0.1$  by Runge - Kutta fourth order.
- 9) Solve  $\frac{dy}{dx} = 1 + y^2, y(0) = 0, h = 0.1$  by Euler's method also find  $y(0.5)$
- 10) Solve  $\frac{dy}{dx} = 1 + y^2, y(0) = 0, h = 0.1$  by Taylor method also find  $y(0.2)$

*(Handwritten signatures and names in blue ink)*  
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Arjun Salhan  
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Course Code: ICY-404B	Number of Credits- 04
Title of the Course : Botany-V	Total Instruction hours - 60 per Semester

**Cell Biology and Genetics**

**Unit - I: 15h**

1. Principles of Microscopy: Light Microscope and Electron Microscope.
2. Plant cell envelopes: Ultra structure of cell wall, molecular organization of cell membranes.
3. Nucleus: Ultra structure, Nucleic acids - Structure of DNA, types and functions of RNA.
4. Prokaryotic and Eucaryotic ribosome organization

**Unit-II 15h**

5. Chromosomes: Morphology, organization of DNA in a chromosome with reference to nucleosome model.
6. Euchromatin and Heterochromatin, Karyotype. Special types of chromosomes: Lampbrush and Polytene chromosomes.
7. Extra nuclear genome: Mitochondrial DNA and Plastid DNA, Plasmids.
8. Cell division: Cell cycle and its regulation; mitosis, meiosis and their significance, Apoptosis.

**Unit-III 15h**

9. Mendelism: Laws of inheritance. Genetic interactions - Epistasis- 12:3:1, 9:3:4, 9:7, Complementary, Supplementary and inhibitory genes.
10. Linkage: A brief account and theories of Linkage. Crossing over: Mechanism and theories of crossing over.
11. Genetic maps: Construction of genetic maps with Two point and Three point test cross data.

**Unit - IV 15h**

12. Mutations: Chromosomal aberrations - structural and numerical changes; Gene mutations, Transposable elements: ACDS elements.
13. Gene Organization- Structure of gene, Genetic code, Process of DNA Replication with Polymerase enzyme.
14. Mechanism of transcription in Prokaryotes and Eukaryotes, processing of Eucaryotic m-RNA.
15. Regulation of gene expression in prokaryotes (Lac and Trp. Operons ).

*Kiranesa* *Novyul* *Abul* *M. K. T.* *K. R. Reddy* *Salleddy* *Arora* *Saleh*

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- Singh, H. R. 2005. Environmental Biology. S. Chand & Company Ltd., New Delhi.
- Snustad, D. P. and M. J. Simmons. 2000. Principles of Genetics. John Wiley & Sons, Inc., U S A.
- Strickberger, M. W. 1990. Genetics (3rd Ed.). Macmillan Publishing Company.
- Verma, P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.

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<b>Course Code: ICY-451B</b>	<b>Number of Credits- 02</b>
<b>Title of the Course : Botany-V</b>	<b>Total Instruction hours - 45 per Semester</b>

**Cell Biology and Genetics**

1. Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies.
2. Study of various stages of mitosis using cytological preparation of Onion root tips.
3. Study of various stages of meiosis using cytological preparation of Onion flower buds.
4. Solving genetic problems related to monohybrid, dihybrid ratio incomplete dominance and interaction of genes (minimum of six problems in each topic).
5. Construction of linkage maps; two and three point test cross.
6. Study of ultra-structure of cell organelles using micrographs. Chloroplast, Mitochondria, Nucleus, Ribosomes, Endoplasmic reticulum, and Golgi complex.
7. Study of Special types of Chromosomes (Polytene chromosome and Lampbrush chromosomes- Permanent slide).

**Cell Biology and Genetics**

**Practical Model paper**

**Time: 3 hrs (10M for continuous evaluation + 40M External Exam)**

**Max. Marks : 50**

1. Prepare a cytological slide of given material "A" and identify & describe any two stages with well labeled diagrams. (16M)
2. Solve genetic problems "B" related to dihybrid ratio or incomplete dominance. (8M)
3. Solve the genetic problem "C" related to interaction of genes. (6 M)
4. Slides "D"-Cell organelles "E"-Chromosomes (Polytene Chromosome) (2x3=6 M)
5. Record (4M)

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Course Code: ICY-405A	Number of Credits- 04
Title of the Course : Physics-V	Total Instruction hours - 60 per Semester

**Modern Physics**

**Unit -I**

**15h**

**Quantum Mechanics:** Planck's theory of blackbody radiation; Photoelectric effect; Einstein's photoelectric theory; Compton effect (quantitative); wave particle duality; de-Broglie matter waves; electron diffraction; Davison and Germer Experiment, Heisenberg's uncertainty principle; Bohr's principle of correspondence.

**Unit - II**

**15h**

**Postulates of Quantum Mechanics:** Schrodinger's wave equation, time - dependent, time- independent form, properties of wave function; preparation of wave functions; concept of stationary states. Applications of Schrodinger's equation: particle in a box, potential step, potential barrier and potential square well.

**Unit - III**

**15 h**

**General properties of Atomic nucleus:** Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, semi-empirical mass formula and binding energy. Quantum properties of nuclear states, particle groups, nuclear resonances, liquid drop model, shell model, collective model.

**Unit - IV**

**15 h**

**Radioactivity:** Stability of nucleus; Law of radioactive decay; Mean life & half-life;  $\alpha$  decay;  $\beta$  decay - energy released, spectrum and Pauli's prediction of neutrino;  $\gamma$ -ray emission.

**Fission and fusion:** - Mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions

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- Six Ideas that Shaped Physics: Particle Behave like Waves, Thomas A. Moore, 2003, McGrawHill
- Quantum Physics, Berkeley Physics Course Vol.4. E.H. Wichman, 2008, Tata McGraw-HillCo.
- Modern Physics, R.A. Serway, C.J. Moses, and C.A. Moyer, 2005, Cengage
- Introduction to modern physics, Rictmyer, Kannard, Cooper, TMH edition.
- Nuclear Physics: D C Tayal, Himalaya publishing house

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**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

Course Code: ICY-452A	Number of Credits- 02
Title of the Course : Physics-V	Total Instruction hours - 45 per Semester

**Modern Physics Lab**

1. To determine work function of material of filament of directly heated vacuum diode.
2. To determine value of Planck's constant using LEDs of at least 4 different colors.
3. To determine the ionization potential of mercury.
4. To determine the wavelength of H-alpha emission line of Hydrogen atom.
5. e/m of an electron by Thomson method
6. Characteristic of GM counter
7. Study of absorption of  $\beta$  and  $\gamma$  rays
8. Determination of Planck's constant
9. Characteristics of a solar cell
10. Characteristics of a photodiode

**Note:** Minimum of eight experiments should be performed

**References**

- D.P. Khandelwal, "A laboratory manual for undergraduate classes" (VaniPublishing House, New Delhi).
- S.P. Singh, "Advanced Practical Physics" (PragatiPrakashan, Meerut).
- Worsnop and Flint- Advanced Practical physics for students.
- "Practical Physics" R.K Shukla, AnchalSrivastava
- B.Sc Practical Physics, C L Arora- S Chand & Co.
- A text book of practical physics, M.N. Srinivasan, Chand & Co
- Practical physics, M. Arul Thakpathi, Complete publishers
- Via voce in advanced physics, R C Gupta, and P N Saxena, PragathiPrakashan, Meerut
- Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia PublishingHouse.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4<sup>th</sup> Edition, reprinted1985, Heinemann Educational Publishers
- A Text Book of Practical Physics, InduPrakash and Ramakrishna, 11<sup>th</sup> Edition, 2011, KitabMahal, New Delhi.

*Handwritten signatures and initials:*  
K. K. Reddy  
M. G. Reddy  
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Course Code: ICY-405B	Number of Credits- 04
Title of the Course : Zoology-V	Total Instruction hours - 60 per Semester

**Physiology and Immunology**

**UNIT - I** **15 h**

- 1.1 Digestion: Digestion Absorption and Assimilation of carbohydrates, Proteins and lipids.
- 1.2 Role of Gastrointestinal hormones in digestion
- 1.3 Respiration: Respiratory Pigments; Transport of oxygen, Oxygen dissociation curves. Bohr's effect. Transport of CO<sub>2</sub> - Chloride shift
- 1.4 Circulation: Structure of Mammalian Heart, Types of hearts - Neurogenic and Myogenic; Heartfunction, Regulation of Heart rate
- 1.5 Excretion: Structure and function of Nephron. Urine formation, Counter current mechanism

**UNIT - II** **15 h**

- 2.1 Muscle contraction: Types of Muscles. Ultra structure of skeletal muscle fibre
- 2.2 Nerve impulse: Structure of Neuron. Nerve impulse - Resting potential and Action potential
- 2.3 Neurotransmitters types and functions, Synapse, types of synapses
- 2.4 Endocrine glands - Structure, secretions and functions
- 2.5 Male and Female Hormones, Hormonal control of Menstrual cycle in humans.

**UNIT - III** **15 h**

- 3.1 Immunology: Definition of immunology, cells and organs of immune system
- 3.2 Types of Immunity - Innate and acquired, Humoral and Cell Mediated
- 3.3 Structure, function and types of antibodies, epitopes, haptens, and adjuvants.
- 3.4 Types of hyper sensitivity.
- 3.5 Introduction to Vaccines and types of Vaccines

**UNIT - IV** **15 h**

- 4.1 History, Definition and Scope of Transplantation.
- 4.2 Genetic barriers between donor and recipient, Immunological recognition of variation
- 4.3 Acute and Chronic Rejection, Mechanism of Graft Rejection, Manifestation of the rejection
- 4.4 Stem Cells & stem cell therapy & limitations
- 4.5 Concepts of autoimmunity

**References:**

- Sherwood, Klandrof, Yanc, *Human Physiology*, Thompson Brooks/Coole, 2005.

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- Knut Schmidt-Nielson, *Animal Physiology*, 5th ed, Cambridge Low Price Edition
- Roger Eckert and Randal, *Animal Physiology*, 4th ed, Freeman Co, New York.
- Singh. H.R, Text Book of Animal Physiology and Biochemistry
- Nagabhushanam, Comparative Animal Physiology
- Veer BalRastogi, Text Book of Animal Physiology
- Arthur C. Guyton MD, *A Text Book of Medical Physiology*, Eleventh ed., John E. Hall, HarcourtAsia Ltd.
- Knut Schmidt-Nielson, *Animal Physiology*, 5th ed, Cambridge Low Price Edition.
- Richard A. Glodsby, Thomas J Kind, Barbara A. Osborne, Janis Kuby, *Immunology*, 5th ed, Freeman and Co. New York
- Ivan Roitt, *Immunology*, 4th ed, JohanthanBrostoff, Moshy, London.
- Thomas C. Chung, *General Parasitology*, Hardcourt Brace and Co ltd. Asia. New Delhi. Gerard D. Schmidt and Larry S Roberts, *Foundations of Parasitology*, McGraw Hill
- Kindt, T. J., Goldsby, R. A., Osborne, B. A., Kuby, J. (2006). VI Edition. *Immunology*. W.H. Freeman and Company.
- Delves, P. J., Martin, S. J., Burton, D. R., Roitt, I.M. (2006). XI Edition. *Roitt's Essential Immunology*, Blackwell Publishing.
- ArunIngale (2012): *Basic Immunology*; Published by New Central Book Agency (P) Ltd. London

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**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

Course Code: ICY-452B	Number of Credits- 02
Title of the Course : Zoology-V	Total Instruction hours - 45 per Semester

**Physiology and Immunology**

**1. Physiology**

1. Qualitative tests for identification of carbohydrates, proteins and lipids.
2. Qualitative tests for identification of ammonia, urea and uric acid (Nitrogenous excretory products)
3. Estimation of Haemoglobin by Sahlis method.

**2. Immunology**

1. Identification of Blood groups
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Enumeration of RBC & WBC from a given blood sample
4. Identification of Autoimmune disease through charts.

□ **Laboratory Record work shall be submitted at the time of practical examination**

**References**

- Tortora, G.J. and Derrickson, B.H. (2009). *Principles of Anatomy and Physiology*, XI Edition, John Wiley & Sons, Inc.
- Widmaier, E.P., Raff, H. and Strang, K.T. (2008) *Vander's Human Physiology*, XI Edition., McGraw Hill
- Guyton, A.C. and Hall, J.E. (2011). *Textbook of Medical Physiology*, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company
- Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). *Biochemistry*. VI Edition. W.H Freeman and Co.
- Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). *Principles of Biochemistry*. IV Edition. W.H. Freeman and Co.
- Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). *Immunology*, VI Edition. W.H. Freeman and Company.
- David, M., Jonathan, B., David, R. B. and Ivan R. (2006). *Immunology*, VII Edition, Mosby, Elsevier Publication.
- Abbas, K. Abul and Lichtman H. Andrew (2003.) *Cellular and Molecular Immunology*. V Edition. Saunders Publication.

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Course Code: ICY-406	Number of Credits- 04
Title of the Course : Chemistry-V	Total Instruction hours - 60 per Semester

**Unit-I ( Inorganic Chemistry)**

**S3-V-I-1: Coordination compounds -II**

**15h (1 h/week)**

Crystal field theory (CFT)- Postulates of CFT, splitting patterns of d-orbitals in octahedral, tetrahedral, square planar with suitable examples. Crystalfield stabilization energies and its calculations for various  $d^n$  configurations in octahedral complexes. High Spin Low Spin complexes. Magnetic properties of transition metal complexes- para, dia, ferro, anti ferromagnetic properties, determination of magnetic susceptibility (Guoy method), spin only formula, calculations of magnetic moments.

Electronic spectra of metal complexes - colour of transition metal aqua complexes- d-d transitions. Detection of complex formation - basic principles of various methods- change in chemical properties, solubility, colour, pH, conductivity, magnetic susceptibility. Thermodynamic and kinetic stability of transition of metal complexes

.Stability of metal complexes -stepwise and overall stability constant and their relationship. Factors effecting the stability constants. Chelate effect, determination of composition of complex by Job's method and mole ratio method.

**Applications of coordination compounds**

Applications of coordination compounds a) in quantitative and qualitative analysis with suitable examples b) in medicine for removal of toxic metal ions and cancer therapy c) in industry as catalysts polymerization - ZieglerNatta catalyst d) water softening.

**Unit-II (Organic Chemistry) 15h (1 h/week) S3-V-O-1: Amines, Cyanides and Isocyanides 9h**

**Amines:**

Nomenclature, classification into  $1^0$ ,  $2^0$ ,  $3^0$  Amines and Quaternary ammonium compounds. Preparative methods- 1. Ammonolysis of alkyl halides 2. Gabriel synthesis

4. Hoffman's bromamide reaction (mechanism). Reduction of Amides and Schmidt reaction.

Physical properties and basic character - Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline- comparative basic strength of aniline, N-methylaniline and N,N- dimethyl aniline (in aqueous and non- aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts. 4. Chemical Properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation. 5. Reaction with Nitrous acid of  $1^0$ ,  $2^0$ ,  $3^0$  (Aliphatic and aromatic amines).

Electrophilic substitutions of Aromatic amines - Bromination and Nitration, oxidation of aryl and  $3^0$  Amines, diazotisation. 6. Diazonium salts: Preparation with mechanism. Synthetic importance -

*Kirankumar* *Noorjahan* *Shayam* *Green* *Kareddy*  
*Day* *M. R. C.* *mba isam* *Ahmed Patel*

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a) Replacement of diazonium group by -OH, X (Cl)-Sandmeyer and Gatterman reaction, by fluorine (Schiemann's reaction), by iodine, CN, NO<sub>2</sub>, H and aryl groups. Coupling Reaction of diazonium salts. i) with phenols ii) with anilines. Reduction to phenyl hydrazines.

**Cyanides and isocyanides:**

Nomenclature (aliphatic and aromatic) structure. Preparation of cyanides from a) Alkyl halides b) from amides

c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. 2. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation.

**S3-V-O-2: Heterocyclic Compounds**

6h

Introduction and definition: Simple 5 membered ring compounds with one hetero atom Ex. Furan, thiophene and pyrrole. Importance of ring systems - presence in important natural products like hemoglobin and chlorophyll. Numbering the ring systems as per Greek letter and Numbers. Aromatic character - 6- electron system (four-electrons from two double bonds and a pair of non-bonded electrons from the hetero atom). Tendency to undergo substitution reactions.

Resonance structures: Indicating electron surplus carbons and electron deficient hetero atom. Explanation of feebly acidic character of pyrrole, electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions. Reactivity of furan as 1,3-diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene from 1,4-dicarbonyl compounds only, Paul-Knorr synthesis, structure of pyridine, Basicity - Aromaticity - Comparison with pyrrole one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction chichibabin reaction.

**Unit-III(Physical Chemistry)**

15h (1 h/week)

**S3-V-P-1: Chemical Kinetics**

Introduction to chemical kinetics, rate of reaction, variation of concentration with time, rate laws and rate constant. Specific reaction rate. Factors influencing reaction rates: effect of concentration of reactants, effect of temperature, effect of pressure, effect of reaction medium, effect of radiation, effect of catalyst with simple examples, order of reaction. First order reaction, derivation of equation for rate constant. Characteristics of first order reaction. Units for rate constant. Half-life period, graph of 1<sup>st</sup> order reaction, examples. Decomposition of H<sub>2</sub>O<sub>2</sub> and decomposition of oxalic acid.

Pseudo first order reaction, Hydrolysis of methyl acetate, inversion of cane sugar, problems.

Second order reaction, derivation of expression for 2<sup>nd</sup> order rate constant, examples- Saponification of ester, 203

→ 3O<sub>2</sub>, C<sub>2</sub>H<sub>4</sub> + H<sub>2</sub> → C<sub>2</sub>H<sub>6</sub>. Characteristics of second order reaction, units for rate constants, half-life period and second order plots.

Zero order reaction: derivation of rate expression, examples i) combination of H<sub>2</sub> and Cl<sub>2</sub> to form HCl, ii) thermal decomposition of HI on gold surface characteristics of Zero order reaction units of k, half-life period and graph, problems.

Determination of order of reaction: i) method of integration, ii) half life method, iii) Vant-Hoff differential method iv) Ostwald's isolation method. Problems Kinetics of complex reactions (first

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order only): opposing reactions, parallel reactions, consecutive reactions and chain reactions. Problems. Effect of temperature on reaction rate, Arrhenius equation. Temperature coefficient. Concept of energy of activation, determination of energy of activation from Arrhenius equation and by graphical method, problems. Simple collision theory based on hard sphere model explanation of frequency factor, orientation or steric factor. The transition state theory (elementary treatment).

**Unit-IV (General Chemistry)**

**15(1 h/week)**

**S3-V-G-1: Mass Spectrometry**

**4h**

Electron Impact Mass: Basic principles, Nitrogen rule, types of ions: Molecular ion, fragment ion and isotopic ions, representation of mass spectrum, types of peaks (molecular ion, fragment and isotopic ion peaks). Determination of molecular weight Mass spectrum of ethyl chloride, ethyl bromide and acetophenone.

**Chromatography I**

**11h**

**S5-E-A-I: Solvent Extraction-** Principle, Methods of extraction: Batch extraction, continuous extraction and counter current extraction. Application - Determination of Iron (III).

**Chromatography:** Classification of chromatographic methods, principles of differential migration, adsorption phenomenon, nature of adsorbents, solvent systems.

**Thin layer Chromatography (TLC):** Advantages, preparation of plates, development of the chromatogram, Detection of the spots, factors effecting R<sub>f</sub> values and applications.

**Paper Chromatography:** Principle, choice of paper and solvent systems, development of chromatogram -

ascending, descending, radial and two dimensional chromatography and applications.

**Column Chromatography-** Principle, Types of stationary phases, Column packing - Wet packing technique, Dry packing technique. Selection criteria of mobile phase solvents for eluting polar, non-polar compounds and its applications.

**References:**

**Unit- I**

- Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications(1996).
- Concise Inorganic Chemistry by J.D. Lee 3<sup>rd</sup>edn. Van Nostrand Reinhold Company(1977)
- Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3<sup>rd</sup>edn Wiley Publishers (2001).Chem.
- Inorganic Chemistry Principles of structure and reactivity by James E.Huhey,E.A. Keiter and R.L. Keiter 4<sup>th</sup>edn. (2006)
- Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
- Inorganic Chemistry by Shriver and Atkins 3<sup>rd</sup>edn Oxford Press (1999).

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**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

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**Unit- II**

- Text book of organic chemistry by Soni. Sultan Chand & Sons; TwentyNinth edition (2012)
- General Organic chemistry by Sachin Kumar Ghosh. New Age Publishers Pvt Ltd (2008)
- Text book of organic chemistry by Morrison and Boyd. Person (2009)
- Text book of organic chemistry by Graham Solomons. Wiley (2015)
- Text book of organic chemistry by Bruice Yuranis Powla. (2012)

**Unit III**

- Principles of physical chemistry by Prutton and Marron. The Macmillan Company; 4th edition (1970)
- Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons. (2011).
- Text Book of Physical Chemistry by Puri, Sharma and Pattania. chand and Co. (2017)
- Physical Chemistry by Atkins & De Paula, 8th Edition
- Text Book of Physical Chemistry by K. L. Kapoor. (2012)
- Physical Chemistry through problems by S.K. Dogra. (2015)
- Text Book of Physical Chemistry by R.P. Verma.
- Elements of Physical Chemistry by Lewis Glasstone. Macmillan (1966)

**Unit IV**

- Fundamentals of molecular spectroscopy: Banwell
- Fundamentals of molecular spectroscopy: P.S. Sindhu
- Elementary Organic Spectroscopy: Y.R. Sharma
- Analytical Chemistry by David Krupadanam, Universities Press (India) Limited.
- D.A. Skoog, F.J. Holler, T.A. Nieman, Principles of Instrumental Analysis, Engage earning India Ed.
- D. A. Skoog, D.M. West, F.J. Holler, Fundamentals of Analytical Chemistry 6<sup>th</sup> Ed., Saunders College Publishing, Fort worth (1992).
- Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. Instrumental Methods of Analysis. 7<sup>th</sup> Ed. Wadsworth Publishing Co. Ltd., Belmont, California, USA, 1988.
- Vogel, A. I. Vogel's Qualitative Inorganic Analysis 7<sup>th</sup> Ed., Prentice Hall.
- Vogel, A. I. Vogel's Quantitative Chemical Analysis 6<sup>th</sup> Ed., Prentice Hall.
- 11. Analytical Chemistry 7<sup>th</sup> edition by Gary D. Christian (2004).
- M.N Sastry, Separation Methods, Paperback (2004), Himalaya Publications.

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Course Code: ICY-453	Number of Credits- 02
Title of the Course : Chemistry-V (practicals)	Total Instruction hours - 45 per Semester

**Qualitative analysis: 20M**

Identification of an Organic compound through the functional group analysis, determination of melting points/boiling points, functional group tests and preparation of suitable derivatives of the following:

Carboxylic acids, phenols, amines, urea, thiourea, carbohydrates, aldehydes, ketones, amides, nitrohydrocarbons, ester and naphthalene.

**Spectral analysis 10M**

Determination of structures from combined spectral data (IR, <sup>1</sup>H-NMR and Mass): Minimum of five problems.

**Organic Laboratory Techniques: 10M**

MP, BP, Distillation, TLC (2-Nitro aniline, 4-Nitro aniline, Acetophenone and Ethyl Benzoate), column (Mixture separation 2-Nitro aniline & 4-Nitro aniline, Anthracene + ethyl benzoate) of Chromatography, crystallisation.

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**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

Course Code: ICY-407	Number of Credits- 04
Title of the Course :Chemistry-VI	Total Instruction hours - 60 per Semester

**Unit-I ( Inorganic Chemistry) 15h**  
(1 h/week)**S4-VI-I-1.Hard and soft acids bases (HSAB) 2h**  
Classification, Pearson's concept of hardness and softness, application of HSAB principles

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Stability of compounds / complexes, predicting the feasibility of reaction

**S4-VI-I-2.Metallurgy 5h**  
**General Methods involved in extraction of metals:**  
Minerals and ores, ore concentration – electromagnetic separation, gravity separation – wilfley table, hydraulic classifier, leaching, froth flotation, Calcination and roasting. Acid and alkali digestion.

Reduction – of oxides, carbonates, halides, sulphides, sulphates – smelting, flux, auto reduction, alumino – thermic reduction, hydrometallurgy, electrolytic reduction. Purification of impure metals – liquation, fractional distillation, zone refining, oxidative process, cupellation, bassemerisation, puddling, poling, thermal decomposition, Amalgamation and Electrolysis.

**S4-VI-I-3. Alloys 3h**  
Classification, substitutional solid solutions, interstitial alloys, intermetallic compounds, Hume – Rothery rules. Preparation of alloys – fusion, electro deposition, reduction and compression Uses  
– ferrous and non-ferrous alloys

**Unit -II (Organic Chemistry) 15h**  
(1 h/week)

**S4-VI-O-1.Diseases:** Common diseases, infective diseases–insect borne, air-borne, water-borne and hereditary diseases.

**S4-VI-O-2.Terminology in Medicinal Chemistry:** Drug, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics, metabolites, anti metabolites and therapeutic index.

**S4-VI-O-3.Drugs:** Nomenclature: Chemical name, Generic name and Trade names with examples; Classification: Classification based on structures and therapeutic activity with examples.

**ADME:** a) Absorption: Definition, absorption of drugs across the membrane – active and passive absorption, routes of administration of drugs. b) Distribution: definition and effect of plasma protein binding. c) Metabolism: definition, phase I and phase II reactions. d) Elimination: definition and renal elimination.

**Synthesis and Therapeutic Activity of Drugs 12Hrs**

Introduction, synthesis and therapeutic activity of Chemotherapeutics: Sulphanilamide, dapson, Pencillin-G ( semi synthesis), Chloroquin, Isoniazid, Cisplatin and AZT

**Unit-III(Physical Chemistry) 15h**  
(1 h/week)**S4-VI-P-1.Thermodynamics- II 4 h**

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Entropy: Definition from Carnot's cycle. Entropy as a state function. Entropy as a measure of disorder. Sign of entropy change for spontaneous and non-spontaneous processes & equilibrium processes. Entropy changes in i). Reversible isothermal process, ii). Reversible adiabatic process, iii). phase change, iv). reversible change of state of an ideal gas. Problems. Entropy of mixing inert

perfect gases. Free energy Gibbs's function (G) and Helmholtz's function (A) as thermodynamic quantities. Concept of maximum work and net work  $\Delta G$  as criteria for spontaneity. Derivation of equation  $\Delta G = \Delta H - T\Delta S$ . significance of the equation. Gibbs equations and the Maxwell relations. Variation of G with P, V and T.

**S4-VI-P-2. Photochemistry 4 h**

Introduction to photochemical reactions, Difference between thermal and photochemical reactions, Laws of photo chemistry- Grotthus - Draper law, Stark - Einstein's Law of photo chemical equivalence. Quantum yield. Examples of photo chemical reactions with different quantum yields. Photo chemical combinations of  $H_2 - Cl_2$  and  $H_2 - Br_2$  reactions, reasons for the high and low quantum yield. Problems based on quantum efficiency, Consequences of light absorptions. Singlet and triplet states. Jablonski diagram Explanation of internal conversion, inter-system crossing, Phosphorescence, fluorescence.

**Unit-IV (General Chemistry)**

**15h (1 h/week)**

**S4-VI-G-1. Colorimetry and Spectrophotometry**

General features of absorption - spectroscopy, transmittance, absorbance, and molar absorptivity. Beer Lambert's law and its limitations, difference between Colorimetry and Spectrophotometry. Instruments - Single beam UV- Visible Spectrophotometer, Double beam UV- Visible Spectrophotometer. Lamps used as energy sources. Verification of Beer's law. Estimation of iron in water samples by thiocyanate method. Estimation of (i) Chromium and (ii) Manganese in steel. **S4-VI-G-2. IR Spectrophotometer:** Principle, Sources of Radiations, Sampling, Block diagram of FT-IR Spectrophotometer.

**References:**

**Unit- I**

- Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications(1996).
- Concise Inorganic Chemistry by J.D. Lee 3<sup>rd</sup>edn. Van Nostrand Reinhold Company(1977)
- Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3<sup>rd</sup>edn Wiley Publishers (2001).Chem.
- Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and  
o R.L. Keiter 4<sup>th</sup>edn. (2006)
- Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
- Inorganic Chemistry by Shriver and Atkins 3<sup>rd</sup>edn Oxford Press (1999).

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**Unit - II**

- G.L. Patrick: Introduction to Medicinal Chemistry, Oxford University Press, New York. 2013.
- Thomas Nogrady, Medicinal Chemistry, Oxford Univ. Press, New York. 2005.
- David William and Thomas Lemke, Foye's Principles of Medicinal Chemistry, LippincottWilliams & Wilkins, 2008.
- AshutoshKar Medicinal Chemistry, New Age International, 2005.
- O.D.Tyagi&M.Yadav Synthetic Drugs by, Anmol Publications, 1998.
- Medicinal Chemistry by Alka L. Gupta, PragatiPrakashan.
- G. L. David Krupadanam, D.Vijaya Prasad, K.VaraprasadRao, K. L. N. Reddy, C. Sudhakar, Drugs, Universities Press (India) Ltd. 2012.

**Unit - III**

- Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons. (2011).
- Text Book of Physical Chemistry by Puri, Sharma and Pattania. chand and Co. (2017)
- Physical Chemistry by Atkins & De Paula, 8th Edition
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- Physical Chemistry through problems by S.K. Dogra. (2015)
- Text Book of Physical Chemistry by R.P. Verma.
- Elements of Physical Chemistry by Lewis Glasstone. Macmillan (1966)
- Thermodynamics by Rajaram, Vishal Publishing Co, (2013).
- Photochemistry by Gurdeep Raj, Goel publishing house, 5<sup>th</sup> edition

**Unit IV**

- Fundamentals of molecular spectroscopy: Banwell
- Fundamentals of molecular spectroscopy: P.S. Sindhu
- Elementary Organic Spectroscopy: Y.R. Sharma
- Organic spectroscopy, William Kemp, Palgrave Macmillan; 2nd revised edition (1 February 1987)

K. ranchar

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**DEPARTMENT OF M.Sc. 5 Yr. INTEGRATED CHEMISTRY (ICY)  
PALAMURU UNIVERSITY, MAHBUBNAGAR 509001**

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Course Code: ICY-454	Number of Credits- 02
Title of the Course : Chemistry-VI (Practicals)	Total Instruction hours - 45 per Semester

**(Physical Chemistry) 45hrs (3 h / w)**

**1. Distribution law**

- a) Determination of distribution coefficient of iodine between water and carbon Tetrachloride/determination of molecular status and partition coefficient of benzoic acid in Toluene and water.
- b) Determination of distribution coefficient of acetic acid between n-butanol and water.

**2. Kinetics**

- a) Determination of specific reaction rate of the hydrolysis of methyl acetate catalyzed by hydrogen ion at room temperature.
- b) Determination of rate of decomposition of hydrogen peroxide catalyzed by  $\text{FeCl}_3$ .

**3. Colorimetry**

Beer's law using  $\text{KMnO}_4$

Verification of and determination of the concentration of the given solution.

**4. Adsorption**

Adsorption of acetic acid on animal charcoal, Verification of Freundlich adsorption isotherm.

**5. Physical constants**

Surface tension and viscosity of liquids.

Kiranesu

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