Department of M.Sc. 5Yr. Integrated Chemistry
Palamuru University
Minutes of BoS Meeting

The meeting with all the members of Board of studies was held on the 28th day of December 2022 at 3-5 PM through Zoom virtual meeting mode to finalise the I-year syllabi for the academic year 2022-23.

The meeting was held with following members

SN	Name	Designation
1	**Prof. Girija Mangatayaru**, Dept. of Chemistry, Palamuru University, MBNR	Chairperson
2	**Dr. K. Rajender Reddy**, Sr Principal Scientist, IICT, Hyd.	Member
3	**Dr. Md. Noorjahan**, Associate Professor, Dept. of Chemistry, PU, MBNR	Member
4	**Dr. N. Chandra Kiran**, Assistant Professor, Dept. of Chemistry, PU, MBNR	Member
5	**Dr. G. Vijayalaxmi**, Assistant Professor, Dept. of Chemistry, Koti womens college, Osmania University, Hyd.	Member
6	**Dr. M. Satyanarayana**, Assistant Professor, Dept. of Integrated Pharmaceutical Chemistry, Telangana University, Nizamabad.	Member
7	**Dr. M. Narsingam**, Sr Scientist, Heterodrugs Pvt Limited, Balnagar, Hyd.	Member
8	**Dr. K. Thirupathiah**, Assistant Professor, Dept. of Chemistry, MVS Govt. Arts & Science College (autonomus), MBNR	Member
9	**Ms. Afreen Saleha**, Lecturer, TTWRDC, Jedcherla, MBNR	Member

During the meeting the members suggested various important inputs to further improve the syllabi. After the meeting following resolutions were made and are unanimously approved.

1. Adaptation of Nizam's college syllabi, which was approved in their BoS, from the academic year 2022-23.
2. First 02 years of the program is as per the regular UG curriculum while the last 03 years is as per regular PG curriculum.
3. Seminar presentations are considered as external examinations and accordingly workload is distributed among the faculty.
4. As per the suggestions made by BoS members, few modifications to the Nizam's college syllabus is made and are incorporated in Annexure-I.
5. The proposed syllabi, with modifications, is unanimously approved by the members

Prof. Girija Mangatayaru (BoS Chairperson)

(Dr K. Rajender Reddy)

(Dr Md. Noorjahan)

(Dr N Chandra Kiran)

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

ANNEXURE-I

Following modifications in I-Semester and II-Semesters of Nizam's college syllabus were approved by BoS

From course code: ICY-106B, in Chapter Chemistry-I, the subtopic S-block elements has been removed from the Nizam's college syllabi as it is covered in intermediate education.

All the other papers are taken as it is *in toto* from Nizam's college approved syllabi.

DEPARTMENT OF M.Sc. 5 Yr INTEGRATED CHEMISTRY (ICY)
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COURSE STRUCTURE (CBCS Pattern)

(WITH EFFECT FROM ACY 2022-23)

I-YEAR (60 Credits)					
SEMESTER-I (30 Credits)			SEMESTER-II (30 Credits)		
Number	**Title**	**Credit**	**Number**	**Title**	**Credit**
Theory			**Theory**		
ICY-101	General English-I	4	ICY-201	General English-II	4
ICY-102	Telugu-I	4	ICY-202	Telugu-II	4
*AECC-I ICY-103	Environmental Studies	2	*AECC-II ICY-203	Gender Sensitization	2
ICY-104A	Mathematics-I	4	ICY-204A	Mathematics-II	4
ICY-104B	Botany-I	4	ICY-204B	Botany-II	4
ICY-105A	Physics-I	4	ICY-205A	Physics-II	4
ICY-105B	Zoology-I	4	ICY-205B	Zoology-II	4
ICY-106	Chemistry-I	4	ICY-206A	Physics-III	4
ICY-107	Chemistry-II	4	ICY-206B	Zoology-III	4
			ICY-207	Chemistry-III	4
Practicals			**Practicals**		
ICY-151A	Mathematics-I (practicals)	1	ICY-251A	Mathematics-II (practicals)	1
ICY-151B	Botany-I (practicals)	1	ICY-251B	Botany-II (practicals)	1
ICY-152A	Physics-I (practicals)	1	ICY-252A	Physics-II (practicals)	1
ICY-152B	Zoology-I (practicals)	1	ICY-252B	Zoology-II (practicals)	1
ICY-153	Chemistry-I (practicals)	1	ICY-253A	Physics-III (practicals)	1
ICY-154	Chemistry-II (practicals)	1	ICY-253B	Zoology-III (practicals)	1
			ICY-254	Chemistry-III (practicals)	1
	Total Credits	**30**(For Each Stream BZC/MPC)		**Total Credits**	**30** (For Each Stream BZC/MPC)
* AECC = Ability Enhancement Compulsory Course					

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COMPLETE COURSE STRUCTURE (CBCS Pattern)
SEMESTER-I (30 Credits)

Course type	Courses	No of hours per week	No of Credits	Marks			Duration of Exam In Hours
				Internal	Eternal	Total	
Theory							
FC-I	General English-I	4	4	20	80	100	3
FC-II	Telugu-I	4	4	20	80	100	3
AECC-I	Environmental Studies	2	2	10	40	50	2
DSC	Mathematics-I	4	4	20	80	100	3
	Botany-I	4	4	20	80	100	3
	Physics-I	4	4	20	80	100	3
	Zoology-I	4	4	20	80	100	3
	Chemistry-I	4	4	20	80	100	3
	Chemistry-II	4	4	20	80	100	3
Practicals							
DSC Practicals	Mathematics-I (practicals)	3	1		50	50	4
	Botany-I (practicals)	3	1		50	50	4
	Physics-I (practicals)	3	1		50	50	4
	Zoology-I (practicals)	3	1		50	50	4
	Chemistry-I (practicals)	3	1		50	50	4
	Chemistry-II (practicals)	3	1		50	50	4
Total			30 for each stream				

FC = Foundation Courses; **AECC** = Ability Enhancement Compulsory Course; **DSC** = Discipline Specific Course

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SEMESTER-I

Course Code: ICY-101T	**Number of Credits- 04**
Title of the Course : General English-I	**Total Instruction hours - 60 per Semester**

Detailed Syllabus:

Unit I **12h**

SHORT FICTION: "The Curb in the Sky" by James Thurber—PRONUNCIATION: consonant sounds— GRAMMAR: noun—VOCABULARY: roots, prefix and suffix—SPELLING: wrong spellings—PUNCTUATION: capitalization— CONVERSATION: introducing oneself informal /social contexts—READING: biography of Chindula Yelamma, a Telangana Artisan— WRITING: guided writing & expansion —SOFT SKILLS: motivation and goal setting— VALUES: "Well begun is half done"

Unit II **12h**

PROSE: "Happy People" by W.R. Inge— PRONUNCIATION: vowels-monophthongs— GRAMMAR: pronoun—VOCABULARY: roots, prefix & suffix— SPELLING: 'un' and 'dis' for antonyms— PUNCTUATION: capitalization— CONVERSATION: starting & controlling a conversation—READING: Million March—An Initiative for Statehood— WRITING: sequencing— SOFT SKILLS: self confidence— VALUES: "Doubt is the beginning of wisdom"

Unit III **12h**

POETRY: "A Psalm of Life" by Henry Wadsworth Longfellow— PRONUNCIATION: vowels diphthongs—GRAMMAR: auxiliary verbs— VOCABULARY: homonyms, homographs, homophones— SPELLING: words ending 'tion' or 'sion'— PUNCTUATION: full stop andcomma— CONVERSATION: describing your college and course of study— READING: Batukamma: Telangana's Cultural Identity— WRITING: paragraph, descriptive writing—SOFT SKILLS: non-verbal communication/body language— VALUES: "Actions speak louder than words"

Unit IV **12h**

DRAMA: "The Dear Departed" (an extract) by Stanley Houghton— PRONUNCIATION: varied pronunciations of the same letter— GRAMMAR: main verbs and tenses—VOCABULARY: collocation— SPELLING: words ending 'tion' or 'ment'— PUNCTUATION: question and exclamation marks— CONVERSATION: leaving a message on the answering machine, making an appointment on telephone— READING: Husain Sagar Lake: A Well-known Tourist Attraction— WRITING: dialogue writing— SOFT SKILLS: inter personal skills— VALUES: "Faith will move mountains"

Unit V **12h**

Language & Soft Skills Lab: Pronunciation, Conversation, Reading, Soft Skills and Values

Prescribed General English Text Book for I Year (Sem-I & Sem-II) Title: *English Made Easy* published by Orient Blackswan

Editors: Prof. E. Suresh Kumar, Prof. Sumita Roy and Prof. A. Karunaker

SEMESTER-I

Course Code: ICY-102	Number of Credits- 04
Title of the Course : Second Language (Telugu-I)	Total Instruction hours - 60 per Semester

ప్రాచీన పద్యభాగం

1. శకుంతలోపాఖ్యానం
2. గొడగూచి
3. త్యాగనిరతి

ఆధునిక కవిత్వం

1. కాసులు
2. రాజు - కవి
3. గంగిరెద్దు
4. జయభేరి

ఉపవాచకం

రుద్రమదేవి (నవల)

భాషా విభాగం

భాషాభాగాలు, సాధుశబ్దాల గుర్తింపు

పర్యాయ పదాలు, నానార్థాలు

పాఠ్యగ్రంథం తెలుగు అకాడమీ ప్రచురించిన 'సాహితీ మంజీర'. దీనిలో రెండు పాఠాలు (సంవరణుని తపస్సు, శ్రీరంగక్షేత్ర మహిమ) ఉస్మానియా విశ్వవిద్యాలయ పరిధిలోని డిగ్రీ ద్వితీయభాష (తెలుగు) విద్యార్థులకు తొలగించి, వాటిని మోడర్న్ లాంగ్వేజ్ (తెలుగు) విద్యార్థులకు నిర్దేశించనైనది.

పరీక్షా పద్ధతి

ఎ. ఇంటర్నల్ ఎసెస్‌మెంట్ — 20 మార్కులు

బి. సెమిస్టర్ పరీక్ష — 80 మార్కులు

SEMESTER-I

Ability Enhancement Compulsory Course (AECC-I)	
Course Code: ICY-103	**Number of Credits- 02**
Title of the Course : Environmental Studies	**Total Instruction hours - 30 per Semester**

UNIT - I: Ecosystem, Biodiversity & Natural Resources **13h**

1. Definition, Scope & Importance of Environmental Studies.
2. Structure of Ecosystem – Abiotic & Biotic components Producers, Consumers, Decomposers, Food chains, Food webs, Ecological pyramids)
3. Function of an Ecosystem: Energy flow in the Ecosystem (Single channel energy flow model)
4. Definition of Biodiversity, Genetic, Species& Ecosystem diversity , Hot-spots of Biodiversity, Threats to Biodiversity, Conservation of Biodiversity (Insitu & Exsitu)
5. Renewable & Non – renewable resources, Brief account of Forest, Mineral & Energy(Solar Energy & Geothermal Energy) resources
6. Water Conservation, Rain water harvesting & Watershed management.

UNIT – II: Environmental Pollution, Global Issues & Legislation **12 h**

1. Causes, Effects & Control measures of Air Pollution, Water Pollution
2. Solid Waste Management
3. Global Warming & Ozone layer depletion.
4. Ill – effects of Fire- works
5. Disaster management – floods, earthquakes & cyclones
6. Environmental legislation :-

(a) Wild life Protection Act (b) Forest Act (c) Water Act (d) Air Act

7. Human Rights
8. Women and Child welfare
9. Role of Information technology in environment and human health

Field Study: **5 h**

1. Pond Ecosystem 2. Forest Ecosystem

Prescribed Textbooks:

1. Environmental Studies - from crisis to cure – by R. Rajagopalan (Third edition) Oxford University Press.
2. Text book of Environmental Studies for undergraduate courses (second edition) by Erach Bharucha
3. A text book of Environmental Studies by Dr. D.K. Asthana and Dr. Meera Asthana

SEMESTER-I

Course Code: ICY-104A	**Number of Credits- 04**
Title of the Course : Mathematics-I	**Total Instruction hours - 60 per Semester**

DIFFERENTIAL CALCULUS

Objective: The course is aimed at exposing the students to some basic notions in differential calculus .

Outcome: By the time students completes the course they realize wide ranging applications of the subject.

Unit- I **15h**

Successive differentiation- Expansions of Functions- Mean value theorems

Unit – II **15h**

Indeterminate forms – Curvature and Evolutes

Unit – III **15h**

Partial differentiation – Homogeneous functions- Total derivative

Unit – IV **15h**

Maxima and Minima of functions of two variables – Lagrange's Method ofmultipliers – Asymptotes- Envelopes

Text : Shanti Narayan and Mittal, *Differential Calculus*

References: William Anthony Granville, Percey F Smith and William Raymond Longley*; Elements of the differential and integral calculus*

Joseph Edwards ,*Differential calculus for beginners*

Smith and Minton, *Calculus*

Elis Pine, *How to Enjoy Calculus*

HariKishan , *Differential Calculus*

SEMESTER-I

Course Code: ICY-151A	Number of Credits- 02
Title of the Course : Mathematics-I (Practicals)	Total Instruction hours - 45 per Semester

UNIT-I

1. If $u = \tan^{-1} x$, prove that

$$(1+x^2)\frac{d^2u}{dx^2} + 2x\frac{du}{dx} = 0$$

and hence determine the values of the derivatives of u when $x=0$

2. If

$y = \sin(m \sin^{-1} x)$, show that

$$(1-x^2)y_{n+2} = (2n+1)xy_{n+1} + (n^2 - m^2)y_n$$

and find $y_n(0)$.

3. If U_n denotes the nth derivative of $(Lx+M)/(x^2-2Bx+C)$., prove

$$\frac{x^2-2Bx+C}{(n+1)(n+2)}U_{n+2} + \frac{2(x-B)}{n+1}U_{n+1} + U_n = 0.$$

14. If $y = x^2e^x$, then

$$\frac{d^ny}{dx^n} = \frac{1}{2}n(n-1)\frac{d^2y}{dx^2} - n(n-2)\frac{dy}{dx} + \frac{1}{2}(n-1)(n-2)y.$$

5. Determine the intervals in which the function

$$(x^4+6x^3+17x^2+32x+32)e^{-x}$$

is increasing or decreasing.

6. Separate the intervals in which the function

$$(x^2+x+1)/(x^2-x+1)$$

is increasing or decreasing.

7. Show that if $x > 0$,

(i) $x - \frac{x^2}{2} < \log(1+x) < x - \frac{x^2}{2(1+x)}$.

(ii) $x - \frac{x^2}{2} + \frac{x^3}{3(1+x)} < \log(1+x) < x - \frac{x^2}{2} + \frac{x^3}{3}$.

8. Prove that

$$e^{ax}\sin bx = bx + abx^2 + \frac{3a^2b-b^3}{3!}x^3 + \dots$$

$$+ \frac{(a^2+b^2)^{\frac{1}{2}n}}{n!}x^n \sin\left(n\tan^{-1}\frac{b}{a}\right) + \dots$$

9. Show that $\cos^2 x = 1 - x^2 + \frac{1}{3}x^4 - \frac{2}{45}x^6 \dots\dots$

10. Show that

$$e^{m\tan^{-1}x} = 1 + mx + \frac{m^2}{2!}x^2 + \frac{m(m^2-2)}{3!}x^3 + \frac{m^2(m^2-8)}{4!}x^4 + \dots$$

UNIT-II

1. Find the radius of curvature at any point on the curves

(i) $y = c\cosh(x/c)$ (*Catenary*).

(ii) $x = a(\cos t + t\sin t)$, $y = a(\sin t - t\cos t)$.

(iii) $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$. (Astroid)

(iv) $x = (a\cos t)/t$, $y = (a\sin t)/t$.

2. Show that for the curve

$$x = a\cos\theta(1+\sin\theta),\ y = a\sin\theta(1+\cos\theta),$$

the radius of curvature is, a, at the point for which the value of the parameter is $-\pi/4$.

3. Prove that the radius of curvature at the point $(-2a, 2a)$ on the curve $x^2y = a(x^2+y^2)$ is, $-2a$.

4. Show that the radii of curvature of the curve

$$x=ae^{\theta}(\sin\theta-\cos\theta),\ y=ae^{\theta}(\sin\theta+\cos\theta),$$

and its evolute at corresponding points are equal.

5. Show that the whole length of the evolute of the ellipse

$$x^2/a^2+y^2/b^2=1$$

is $4(a^2/b-b^2/a)$.

6. Show that the whole length of the evolute of the astroid

$$x=a\cos^3\theta,\ y=a\sin^3\theta$$

is $12a$.

7. Evaluate the following :

(*i*) $\lim_{x\to 0}\dfrac{xe^x-\log(1+x)}{x^2}$. (*D.U. 1952*) (*ii*) $\lim_{x\to 0}\dfrac{x\cos x-\log(1+x)}{x^2}$. (*D. U. Hons. 1951, P.U. 1957*)

(*iii*) $\lim_{x\to 0}\dfrac{e^x\sin x-x-x^2}{x^3+x\log(1-x)}$. (*D.U. 1953*) (*iv*) $\lim_{x\to 0}\left\{\dfrac{1}{x}-\dfrac{1}{x^2}\log(1+x)\right\}$. (*D.U. 1955*)

8. If the limit of

$$\frac{\sin 2x+a\sin x}{x^3},$$

as x tends to zero, be finite, find the value of a and the limit.

9. Determine the limits of the following functions :

(*i*) $x\log\tan x$, $(x\to 0)$. (*ii*) $x\tan(\pi/2-x)$, $(x\to 0)$.

(*iii*) $(a-x)\tan(\pi x/2a)$, $(x\to 0)$.

10. Determine the limits of the following functions :

i. $\dfrac{e^x-e^{-x}-x}{x^2\sin x}$, $(x\to 0)$. ii. $\dfrac{\log x}{x^3}$, $(x\to\infty)$.

iii. $\dfrac{1+x\cos x-\cosh x-\log(1+x)}{\tan x-x}$, $(x\to 0)$.

iv. $\dfrac{\log(1+x)\log(1-x)-\log(1-x^2)}{x^4}$, $(x\to 0)$.

UNIT-III

1. If $z=xyf(x/y)$, show that

$$x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=2z.$$

2. If $z(x+y)=x^2+y^2$, show that

$$\left(\frac{\partial z}{\partial x}-\frac{\partial z}{\partial y}\right)^2=4\left(1-\frac{\partial z}{\partial x}-\frac{\partial z}{\partial y}\right).$$

3. If $z=3xy-y^3+(y^3-2x)^{\frac{3}{2}}$, verify that

$$\frac{\partial^2 z}{\partial x\partial y}=\frac{\partial^2 z}{\partial y\partial x}\text{ and }\frac{\partial^2 z}{\partial x^2}\frac{\partial^2 z}{\partial y^2}=\left(\frac{\partial^2 z}{\partial x\partial y}\right)^2.$$

4. If $z=f(x+ay)+\varphi(x-ay)$, prove that

$$\frac{\partial^2 z}{\partial y^2}=a^2\frac{\partial^2 z}{\partial x^2}.$$

5. If $u=\tan^{-1}\dfrac{x^3+y^3}{x-y}$, find

$$x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}.$$

6. If $f(x, y)=0$, $\varphi(y, z)=0$, show that

$$\frac{\partial f}{\partial y}\cdot\frac{\partial\varphi}{\partial z}\cdot\frac{dz}{dx}=\frac{\partial f}{\partial x}\cdot\frac{\partial\varphi}{\partial y}.$$

7. If $x\sqrt{(1-y^2)}+y\sqrt{(1-x^2)}=a$, show that

$$\frac{d^2y}{dx^2}=\frac{a}{(1-x^2)^{\frac{3}{2}}}.$$

8. Given that

$f(x, y)\equiv x^3+y^3-3axy=0$, show that

$$\frac{d^2y}{dx^2}\cdot\frac{d^2x}{dy^2}=\frac{4a^6}{xy(xy-2a^3)^3}.$$

9. If u and v are functions of x and y defined by

$$x=u+e^{-v}\sin u,\ y=v+e^{-v}\cos u,$$

prove that

$$\frac{\partial u}{\partial y}=\frac{\partial v}{\partial x}.$$

10. *If* $H=f(y-z,\ z-x,\ x-y)$; *prove that,*

$$\frac{\partial H}{\partial x}+\frac{\partial H}{\partial y}+\frac{\partial H}{\partial z}=0.$$

UNIT-IV

1. Find the minimum value of $x^2+y^2+z^2$ when
   (*i*) $x+y+z=3a$.
   (*ii*) $xy+yz+zx=3a^2$.
   (*iii*) $xyz=a^3$.
2. Find the extreme value of xy when
   $x^3+xy+y^3=a^3$.
3. In a plane triangle, find the maximum value of
   $\cos A\cos B\cos C$.
4. *Find the envelope of the family of semi-cubical parabolas*
   $y^2-(x+\alpha)^3=0$.
5. *Find the envelope of the family of ellipses*
   $x^2/a^2+y^2/b^2=1$,
   where the two parameter a, b, *are connected by the relation*
   $a+b=c$;
   c, *being a constant.*
6. *Show that the envelope of a circle whose centre lies on the parabola* $y^2=4ax$ *and which passes through its vertex is the cissoid*
   $y^2(2a+x)+x^3=0$.
7. Find the envelope of the family of straight lines $x/a+y/b=1$ where a, b are connected by the relation
   (*i*) $a+b=c$. (*ii*) $a^2+b^2=c^2$. (*iii*) $ab=c^2$.
   c is a constant.
8. *Find the asymptotes of*
   $x^3+4x^2y+4xy^2+5x^2+15xy+10y^2-2y+1=0$.
9. *Find the asymptotes of*
   $x^3+4x^2y+4xy^2+5x^2+15xy+10y^2-2y+1=0$.
10. Find the asymptotes of the following curves
    i. $xy(x+y)=a(x^2-a^2)$.
    ii. $(x-1)(x-2)(x+y)+x^2+x+1=0$.
    iii. $y^3-x^3+y^2+x^2+y-x+1=0$.

SEMESTER-I

Course Code: ICY-104B	Number of Credits- 04
Title of the Course : Botany-I	Total Instruction hours - 60 per Semester

Microbial Diversity of Lower Plants

UNIT - I

1. Brief account of Archaebacteria, Actinomycetes. **(4h)**
2. Cyanobacteria: General characters, cell structure, thallus organisation and their significance as biofertilizers with special reference to *Oscillatoria, Nostoc* and *Anabaena.* **(6h)**
3. Lichens: Structure and reproduction; ecological and economic importance. **(5h)**

UNIT- II

4. Viruses: Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro. **(7h)**
5. Bacteria: Structure, nutrition, reproduction and economic importance. An outline of plant diseases of important crop plants caused by bacteria and their control with reference to Angular leaf spot of cotton and Bacterial blight of Rice. **(8h)**
6. General account of Mycoplasma with reference to Little leaf of brinjal and Papaya leaf curl

UNIT-III

7. General characters, structure, reproduction and classification of algae (Fritsch) and thallus organization in algae. **(3h)**
8. Structure and reproduction of the following:

Chlorophyceae- *Volvox, Oedogonium*and*Chara.* **(5h)**

Phaeophyceae-*Ectocarpus* **(2h)**

Rhodophyceae- *Polysiphonia.* **(3h)**

9. Economic importance of algae in Agriculture and Industry. **(2h)**

UNIT-IV

10. General characters and classification of fungi (Ainsworth). **(3h)**
11. Structure and reproduction of the following:

(a) Mastigimycotina- *Albugo*
(b) Zygomycotina- *Mucor*
(c) Ascomycotina- *Saccharomyces* and *Penicillium.*
(d) Basidiomycotina- *Puccinia*
(e) Deuteromycotina- *Cercospora.* **(10h)**

12. Economic importance of fungi in relation to mycorrhizae and mushrooms. General account of mushroom cultivation **(2h)**

References:

1. Alexopolous, J. and W. M. Charles. 1988. Introduction to Mycology. Wiley Eastern, New Delhi.

2. Mckane, L. and K. Judy. 1996. Microbiology – Essentials and Applications. McGraw Hill, New York.

3. Pandey, B. P. 2001. College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd, New Delhi.

4. Pandey, B. P. 2007. Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics. S. Chand & Company Ltd, New Delhi.

5. Sambamurthy, A. V. S. S. 2006. A Textbook of Plant Pathology. I. K. International Pvt. Ltd., New Delhi.

6. Sambamurthy, A. V. S. S. 2006. A Textbook of Algae. I. K. International Pvt. Ltd., New Delhi.

7. Sharma, O. P. 1992. Textbook of Thallophyta. McGraw Hill Publishing Co., New Delhi.
8. Thakur, A. K. and S. K. Bassi. 2008. A Textbook of Botany: Diversity of Microbes and Cryptogams. S. Chand & Company Ltd, New Delhi.

9. Vashishta, B. R., A. K. Sinha and V. P. Singh. 2008. Botany for Degree Students: Algae. S. Chand& Company Ltd, New Delhi.

10. Vashishta, B. R. 1990. Botany for Degree Students: Fungi, S. Chand & Company Ltd, New Delhi.

11. Dutta A.C. 2016. Botany for Degree Students.Oxford University Press.

SEMESTER-I

Course Code: ICY-151B	Number of Credits- 02
Title of the Course : Botany-I (Practicals)	Total Instruction hours - 45 per Semester

1. Study of viruses and bacteria using electron micrographs (photographs). **(3h)**

2. Gram staining of Bacteria. **(3h)**

3. Study of symptoms of plant diseases caused by viruses, bacteria, Mycoplasma and fungi: Viruses: Tobacco mosaic Bacteria: Angular leaf spot of cotton and Rice tumgro. Mycoplasma: Little leaf of Brinjal and Leaf curl of papaya **(3h)**
Fungi: White rust on Crucifers, Rust on wheat &Tikka disease of Groundnut. **(6h)**

4. Vegetative and reproductive structures of the following taxa:
Algae: *Oscillatoria*, *Nostoc, Volvox*, *Oedogonium*, *Chara, Ectocarpus* and *Polysiphonia* **(6h)**
Fungi: *Albugo*, *Mucor*, *Saccharomyces, Penicillium*, *Puccinia* and *Cercospora* **(6h)**

5. Section cutting of diseased material infected by Fungi and identification of pathogens as per theory syllabus. White rust of Crucifers, Rust on wheat &Tikka disease of Groundnut. **(9h)**

6. Lichens: Different types of thalli and their external morphology **(3h)**

7. Examination of important microbial, fungal and algal products: Biofertilizers, protein capsules, antibiotics, mushrooms, Agar-agar etc. **(3h)**

8. Field visits to places of algal / microbial / fungal interest (e.g. Mushroom cultivation, water bodies). **(3h)**

SEMESTER-I

Course Code: ICY-105A	Number of Credits- 04
Title of the Course : Physics-I	Total Instruction hours - 60 per Semester

Mechanics

Unit – I **15h**

1. Vector Analysis

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field and related problems. Vector integration, line, surface and volume integrals. Stokes, Gauss and Greens theorems- simple applications.

Unit – II **15h**

2. Mechanics of Particles

Laws of motion, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross-section,

3. Mechanics of rigid bodies

Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Euler's equation, precession of a top, Gyroscope.

Unit – III **15h**

4. Central Forces

Central forces – definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under acentral force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions.

Unit – IV **15h**

5. Special theory of relativity

Galilean relativity, absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism.

NOTE: Problems should be solved at the end of every chapter of all units.

Textbooks

1. Berkeley Physics Course. Vol.1, **Mechanics** by C. Kittel, W. Knight, M.A. Ruderman - *Tata-McGraw hill Company Edition 2008.*

2. **Fundamentals of Physics**. Halliday/Resnick/Walker *Wiley India Edition 2007.*

3. **First Year Physics** - *Telugu Academy.*

4. **Introduction to Physics for Scientists and Engineers**. F.J. Ruche. *McGraw Hill.*

Reference Books

1. **Fundamentals of Physics** by Alan Giambattista et al *Tata-McGraw Hill Company*Edition,2008.

2. **University Physics** by Young and Freeman, *Pearson Education, Edition 2005.*

3. **Sears and Zemansky's University Physics** by Hugh D. Young, Roger A. Freedman *Pearson Education Eleventh Edition.*

4. **An introduction to Mechanics** by Daniel Kleppner& Robert Kolenkow. *The McGraw Hill Companies.*

5. **Mechanics**. Hans &Puri.*TMH Publications.*

6. **Engineering Physics**. R.K. Gaur & S.L. Gupta.*DhanpatRai Publications.*

7. R. P. Feymman, R B Lighton and M Sands - The Feymman Lectures in Physics, Vol.-1, BIPublications,

8. J. C. Upadhyay - Mechanics.

9. P. K. Srivastava - Mechanics, New Age International.

SEMESTER-I

Course Code: ICY-152A	**Number of Credits- 02**
Title of the Course : Physics-I (Practicals)	**Total Instruction hours - 45 per Semester**

Mechanics

1. Study of a compound pendulum determination of 'g' and 'k'.
2. Y' by uniform Bending
3. Y by Non-uniform Bending.
4. Moment of Inertia of a fly wheel.
5. Measurement of errors –simple Pendulum.
6. 'Rigidity moduli by torsion Pendulum.
7. Determine surface tension of a liquid through capillary rise method.
8. Determination of Surface Tension of a liquid by different methods.
9. Determine of Viscosity of a fluid.
10. Calculation of slope and intercept of a Y= mX + C by theoretical method

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for undergraduate classes

SEMESTER-I

Course Code: ICY-105 B	Number of Credits- 04
Title of the Course : Zoology-I	Total Instruction hours - 60 per Semester

Animal Diversity – Invertebrates

UNIT – I **(15h)**

Brief history of Invertebrates

Kingdom Animalia - Brief history of Invertebrates -
Protozoa General characters - Classification up to classes with examples
Type study - *Elphidium* - Life cycle of *Plasmodium*.- Locomotion, Reproduction and Diseases

Porifera

General characters - Classification of Porifera up to classes with examples
Type study - *Sycon* - Canal system in sponges and Spicules.

UNIT – II **(15h)**

Cnidaria

General characters - Classification of Cnidaria up to classes with examples
Type study - *Obelia* - Polymorphism in hydrozoa.- Corals and coral reef formation

Platyhelminthes

General characters - Classification of Platyhelminthes up to classes with examples
Type study- *Schistosoma*

Nemathelminthes

General characters - Classification of Nemathelminthes up to classes with examples
Type study - *Dracunculus* - Parasitic Adaptations in Helminthes

UNIT – III **(15 h)**

Annelida

General characters - Classification of Annelida up to classes with examples
Type study - *Hirudinariagranulosa*.- Evolutionary significance of Coelome and Coelomoducts and metamerism

Arthropoda

General characters - Classification of Arthropoda up to classes with examples
Type study - Prawn - Mouth parts of Insects - Insect metamorphosis - *Peripatus*- Structure and affinities

UNIT – IV **(15 h)**

Mollusca

General characters - Classification of Mollusca up to classes with examples

Type study - *Pila* - Pearl formation - Torsion and detorsion in gastropods

Echinodermata
General characters - Classification of Echinodermata up to classes with examples
Water vascular system in star fish - Echinoderm larvae and their significance

Hemichordata
General characters - Classification of Hemichordata up to classes with examples
Balanoglossus- Structure and affinities

Suggested Readings

1. **L.H. Hyman** '*The Invertebrates' Vol I, II and V.* – M.C. Graw Hill Company Ltd.
2. **Kotpal, R.L. 1988 - 1992** Protozoa, Porifera, Coelenterata, Helminthes,Arthropoda, Mollusca,Echinodermata. Rastogi Publications, Meerut.
3. **E.L. Jordan and P.S. Verma** '*Invertebrate Zoology'* S. Chand and Company.
4. **R.D. Barnes** '*Invertebrate Zoology'* by: W.B. Saunders CO., 1986.
5. **Barrington. E.J.W**., '*Invertebrate structure and Function'* by ELBS.
6 **P.S. Dhami and J.K. Dhami.**Invertebrate Zoology. S. Chand and Co. New Delhi.
7. **Parker, T.J. and Haswell**'*A text book of Zoology'* by, W.A., Mac Millan Co. London.
8. **Barnes, R.D. (1982).** *Invertebrate Zoology*, V Edition"

SEMESTER-I

Course Code: ICY-152B	**Number of Credits- 02**
Title of the Course : Zoology-I (Practicals)	**Total Instruction hours - 45 per Semester**

ANIMAL DIVERSITY – INVERTEBRATES

1. Study of museum slides / specimens / models (Classification of animals up to orders)
i. **Protozoa:** Amoeba, Paramoecium, Paramoecium Binary fission and Conjugation, Vorticella, Entamoebahistolytica, Plasmodium vivax
ii. **Porifera**: Sycon, Spongilla, Euspongia, Sycon- T.S & L.S, Spicules, Gemmule
iii. **Coelenterata:** Obelia – Colony & Medusa, Aurelia, Physalia, Velella, Corallium, Gorgonia, Pennatula
iv. **Platyhelminthes:** Planaria, Fasciola hepatica, Fasciolalarval forms – Miracidium, Redia, Cercaria, Echinococcusgranulosus, Taeniasolium, Schistosomahaematobium
v. **Nemathelminthes:** Ascaris(Male & Female), Drancunculus, Ancylostoma, Wuchereria
vi. **Annelida:** Nereis, Aphrodite, Chaetopteurs, Hirudinaria, Trochophore larva
vii. **Arthropoda:** Cancer, Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Peripatus, Larvae -Nauplius, Mysis, Zoea, Mouth parts of male &female Anopheles and Culex, Mouthparts of Housefly and Butterfly.
viii. **Mollusca:** Chiton, Pila, Unio, Pteredo, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium larva
ix. **Echinodermata:** Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Bipinnaria larva
x. **Hemichordata:** Balanoglossus, Tornaria larva

2. Dissections:

Prawn: Appendages, Digestive system, Nervous system, Mounting of Statocyst
Insect Mouth Parts

3. Laboratory Record work shall be submitted at the time of practical examination
4. An **"Animal album"** containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

5. Computer aided techniques should be adopted – show virtual dissections Suggested

Manuals:
1. Practical Zoology- Invertebrates S.S. Lal
2. Practical Zoology - Invertebrates P.S. Verma
3. Practical Zoology - Invertebrates K.P. Kurl

SEMESTER-I

Course Code: ICY-106	Number of Credits- 04
Title of the Course : Chemistry-I	Total Instruction hours - 60 per Semester

Unit-I (Inorganic Chemistry) **15h (1 hr/week)**

S1-I-1.p-block elements 1: **7 h**

Group–13: Synthesis and structure of diborane and higher Boranes (B_4H_{10} and B_5H_9), Boron nitrogen compounds ($B_3N_3H_6$ and BN), Lewis acid nature of BX_3

Group – 14: Carbides-Classification – ionic, covalent, interstitial – synthesis.Structuresand reactivity. Industrial application. Silicones – Preapartion – (a) direct silicon process (b) use of Grignard reagent (c) aromatic silylation. Classification – straight chain, cyclic andcross-linked.

Group – 15: Nitrides – Classification – ionic, covalent and interstitial. Reactivity – hydrolysis. Preparation and reactions of hydrazine, hydroxyl amine, phosphazenes.

S1-I-2. General Principles of Inorganic qualitative analysis **9 h**

Anion analysis: Theory of sodium carbonate extract, classification and reactions of anions-CO_3^{2-}, Cl-, Br-, SO_4^{2-}, PO_4^{3-}, BO_3^{3-}.CH_3COO^-, NO_3^{2-} Cation Analysis: Principles involved - Solubility product, common ion effect, general discussion for the separation and identification of group I individual cations (Hg^{2+}, Ag^+, Pb^+) with flow chart and chemical equations. Principle involved in separation of group II & IV cations.

General discussion for the separation and identification of group II (Hg^{2+}, Pb^{2+}, Bi^{3+},Cd^{2+}, Sb^{2+}), Group III: (Al^{3+}, Fe^{3+}), IV (Mn^{2+}, Zn^{2+}) individual cations with flow chart and chemical equations. Application based on concept of hydrolysis in group V cation analysis. General discussion for the separation and identification of group V individual cations (Ba^{2+}, Sr^{2+}, Ca^{2+}) with flow chart and chemical equations. Theory of flame test.Identification of Group VI cations (Mg^{2+}, NH_4^+)

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

S1-O-1:Structural Theory in Organic Chemistry **6 h**

***Bond polarization*:** Factors influencing the polarization of covalent bonds, electronegativity – inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance –Mesomeric effect, application to (a) acidity of phenol. (b) acidity of carboxylic acids and basicity of anilines. Stability of carbocations, carbanions and free radicals. Hyper conjugation and its application to stability of carbonium ions, Free radicalsand alkenes.

***Types of organic reactions*:** Addition reactions- electrophilic, nucleophilic and free radical. Substitution reactions – electrophilic, nucleophilic and free radical. Elimination and Rearrangement reactions– Examples.

S1-O-2:Acyclic Hydrocarbons **6 h**

Alkanes– Methods of preparation: Corey-House reaction, Wurtz reaction, from Grignardreagent, Kolbe synthesis. Chemical reactivity - inert nature, free radical substitution, Halogenation example- reactivity, selectivity and orientation.

Alkenes - Preparation of alkenes (with mechanism) (a) by dehydration of alcohols (b) dehydrohalogenation of alkyl halides (c) by dehalogenation of 1,2-dihalides, Zaitsev's rule. Properties: Addition of Hydrogen – heat of hydrogenation and stability of alkenes. *trans*-addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H_2O, HOX, H_2SO_4 with mechanism and addition of HBr in the presence of peroxide (anti – Markonikov's addition). Oxidation (cis – additions) – hydroxylation by $KMnO_4$, OsO_4, trans addition- peracids (via epoxidation), hydroboration, ozonolysis –location of double bond. Dienes – Types of dienes, reactions of conjugated dienes – 1,2 and 1,4 addition of HBr to 1,3 – butadiene and Diels – Alder reaction.

Alkynes– Preparation by dehydrohalogenation of vicinal dihalides, dehalogenation of tetrahalides. Physical Properties: Acidity of terminal alkynes (formation of metal acetylides) preparation of higher alkynes, Chemical reactivity – electrophilic addition of X_2, HX, H_2O (tautomerism), Oxidation (formation of enediol, 1,2-diones and carboxylic acids) and reduction (Metal-ammonia reduction, catalytic hydrogenation)

S1-O-3:Alicyclic Hydrocarbons **3 h**

Nomenclature, preparation by Freunds method, Dieckmann, heating dicarboxylic metal salts. Properties – reactivity of cyclo propane and cyclobutane by comparing with alkanes. Stability of cycloalkanes – Baeyer strain theory, Sachse and Mohr predictions and Pitzer strain theory. Conformational structures of cyclopentane, cyclohexane.

Unit-III (Physical Chemistry) **15 h (1 hr/week)**

S1-P-1: Atomic structure and elementary quantum mechanics **6 h**

Black body radiation, heat capacities of solids, Rayleigh Jeans law, Planck's radiation law, photoelectric effect, Limitations of classical mechanics, Compton effect, DeBroglie's hypothesis. Heisenberg's uncertainty principle, Schrodinger's wave equation and its importance. Physical interpretation of the wave function, significance of Ψ1 and Ψ2,a particle in a box, energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of variables, radial and angular functions (only equation), hydrogen like wave functions, quantum numbers and their importance.

S1-P-2:Gaseous State **5 h**

Deviation of real gases from ideal behavior. van der Waals equation of state. Critical phenomenon. PV isotherms of real gases, continuity of state. Andrew's isotherms of CO_2. The

van der Waal's equation and critical state. Derivation of relationship between critical constants and van der Waal's constants. The law of corresponding states, reduced equation of states. Joule Thomson effect and inversion temperature of a gas. Liquifaction of gases: i) Linde's method based on Joule Thomson effect ii) Claude's method based on adiabatic expansion of a gas.

S1-P-3: Liquid State **4 h**

Intermolecular forces, structure of liquids (qualitative description). Structural differences between solids, liquids and gases. Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosityof a liquid (qualitative treatment only). Liquid crystals, the mesomorphic state: Classification of liquid crystals in to Smectic and Nematic, differences between liquid crystal and solid / liquid. Application of liquid crystals as LCD devices.

Unit – IV (General Chemistry) **15 h (1 hr/week)**

S1-G-1 Chemical Bonding **11 h**

Ionic solids- lattice and solvation energy, solubility of ionic solids, Fajan's rule, polarity and polarizability of ions, covalent nature of ionic bond, covalent bond – Common hybridization and shapes of molecules.

Molecular orbital theory: Shapes and sign convention of atomic orbitals. Modes of overlapping. Concept ofand π bonds. Criteria for orbital overlap. LCAO concept. Types of molecular orbitals- bonding, antibonding and non bonding. MOED of homonuclear diatomics - H_2, N_2, O_2, O_2^-, O_2^{2-}, F_2 (unhybridized diagrams only) andheteronucleardiatomics CO, CN^-, NO, NO^+ and HF. Bond order, stability and magnetic
properties.

S1-G-2 Evaluation of analytical data **4 h**

Significant figures, accuracy and precision. Errors-classification of errors- determinate and indeterminate errors, absolute and relative errors, propagation of errors in mathematical operations– addition, substraction, division and multiplication (with respect to determinate errors).

References:

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001.Chem.
4. Vogel's Qualitative Inorganic Analysis by Svehla
5. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn.
6. Chemistry of the elements by N.N.Greenwood and A. EarnshawPergamon Press 1989.
7. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
8. Qualitative analysis by Welcher and Hahn.
9. Textbook of Inorganic Chemistry by R Gopalan
10. College Practical chemistry by V K Ahluwalia, SunithaDhingra and Adarsh Gulati

Unit- II

1. Text book of organic chemistry by Morrison and Boyd.
2. Text book of organic chemistry by Graham Solomons.
3. Text book of organic chemistry by BruiceYuranisPowla.
4. Text book of organic chemistry by Soni.
5. General Organic chemistry by Sachin Kumar Ghosh.
6. Text book of organic chemistry by C N Pillai

Unit III

1. Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara..
3. Text Book of Physical Chemistry by Puri and Sharma.
4. Text Book of Physical Chemistry by K. L. Kapoor.
5. Physical Chemistry through problems by S.K. Dogra.
6. Text Book of Physical Chemistry by R.P. Verma.
7. Elements of Physical Chemistry by Lewis Glasstone.

Unit IV

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001.Chem
4. Analytical chemistry by G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasada Rao, K.L.N. Reddy and C. Sudhakar

SEMESTER-I

Course Code: ICY-153	**Number of Credits- 02**
Title of the Course : Chemistry-I (Practicals)	**Total Instruction hours - 3 per week** **45 per Semester**

Semi –micro qualitative analysis of Inorganic salt mixture containing

two anions CO_3^{2-}, Cl^-, Br^-, SO_4^{2-}, PO_4^{3-}, BO_3^{3-}, CH_3COO^-, NO_3^{-2} and

two cations - group II (Hg^{2+}, Pb^{2+}, Bi^{3+}, Cd^{2+}, Sb^{2+}), Group III: (Al^{3+}, Fe^{3+}), Group IV: (Mn^{2+}, Zn^{2+}), group V individual cations (Ba^{2+}, Sr^{2+}, Ca^{2+}), Group VI cations (Mg^{2+}, NH_4^+) (with interfering anion radical)

SEMESTER-I

Course Code: ICY-107	Number of Credits- 04
Title of the Course : Chemistry-II	Total Instruction hours - 4 per week 60 per Semester

Unit-I (Inorgnaic Chemistry) **15 h (1 hr/week)**

S2-I-2: p-block Elements-II **7 h**

Oxides: Types of oxides (a) Normal- acidic, basic amphoteric and neutral (b) Mixed (c) sub oxide d) peroxide e) superoxide. Structure of oxides of C, N, P, S and Cl - reactivity, thermal stability, hydrolysis.

Oxy acids: Structure and acidic nature of oxyacids of B, C, N, P, S and Cl. Redox properties of oxyacids of Nitrogen: HNO_2 (reaction with $FeSO_4$, $KMnO_4$, $K_2Cr_2O_7$), HNO_3 (reaction with H_2S, Cu), HNO_4 (reaction with KBr, Aniline), $H_2N_2O_2$ (reaction with $KMnO_4$). Redox properties of oxyacids of Potassium: H_3PO_2 (reaction with $HgCl_2$), H_3PO_3 (reaction with $AgNO_3$, $CuSO_4$). Redox properties of oxyacids of Sulphur: H_2SO_3 (reaction with $KMnO_4$, $K_2Cr_2O_7$),H_2SO_4 (reaction with Zn, Fe, Cu), $H_2S_2O_3$ (reaction with Cu, Au), H_2SO_5 (reaction with KI, $FeSO_4$), $H_2S_2O_8$ (reaction with $FeSO_4$, KI)

Interhalogens- classification- general preparation- structures of AB, AB_3, AB_5 and AB_7 - type and reactivity. Poly halides- definition and structure of ICl_2^-, ICl_4^- and I_3^-. Comparison of Pseudohalogens with halogens.

S2-I-2: Chemistry of Zero group elements **2h**

General preparation, structure, bonding and reactivity of Xenon compounds – Oxides, Halides and Oxy-. Clatherate compounds and Anomalous behavior of He (II)

S2-I-3: Chemistry of d-block elements **6 h**

Characteristics of d-block elements with special reference to electronic configuration variable valence, ability to form complexes, magnetic properties &catalytic properties. Stability of various oxidation states and SRP Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu triads. Titanium triad –electronic configuration and reactivity of +3 and +4 states – oxides and halides. Chromium triad – halides reactivity of +3 and +6 states. Copper triad – reactivity of +1, +2 and +3 states.

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

S2-O-1: Aromatic Hydrocarbons **7h**

Concept of aromaticity –definition, Huckel's rule – application to Benzenoids and Non – Benzenoids (cyclopropenylcation, cyclopentadienyl anion and tropylium cation). Preapartions: From acetylene, phenols, benzene carboxylic acids and sulphonic acid. Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation, and halogenation, Friedel Craft's alkylation (polyalkylation) and acylation. Orientation of aromatic substitution -

Definition of ortho, para, and meta directing groups. Ring activating and deactivating groups with examples. Orientation – (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivating groups - carboxy, nitro,nitrile, carbonyl and sulphonic acid & halo groups.

S2-O-2: Arenes and Polynuclear Aromatic Hydrocarbons

Arenes: Preparation of alkyl benzenes by Friedel Craft's alkylation, Friedel Craft's acylation followed by reduction, Wurtz-Fittig reaction. Chemical reactivity: Ring substitution reactions, side chain substitution reactions and oxidation.

Polynuclear hydrocarbons – Structure of naphthalene and anthracene (Molecular Orbital diagram and resonance energy) Reactivity towards electrophilic substitution. Nitration and sulphonation asexamples.

S2-O-3: Halogen compounds **5 h**

Nomenclature and classification: alkyl (primary, secondary, tertiary), aryl, aralkyl, allyl,vinyl, benzyl. Chemical reactivity - reduction, formation of RMgX, Nucleophilic substitution reactions – classification into SN1 and SN2. Mechanism and energy profile diagrams of SN1 and SN2 Reactions. stereochemistry of SN2 (Walden Inversion) 2-bromobutane, SN1 (Racemisation) 1-bromo-1-phenylpropane explanation of both by taking the example of optically active alkyl halide. Structure and reactivity – Ease of hydrolysis - comparison of alkyl, vinyl, allyl, aryl, and benzyl halides.

Unit – III (Physical Chemistry) **15 h (1 hr/week)**

S2-P-1: Solutions **5 h**

Liquid - liquid mixtures, ideal liquid mixtures, Raoult's and Henry's laws. Non ideal systems. Azeotropes HCl-H_2O and C_2H_5OH - H_2O systems. Fractional distillation,. Partially miscible liquids- Phenol – Water, Trimethyl amine – Water and Nicotine –Water systems. Lower upper consolute temperatures. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. applications of distribution law with solvent extraction.

S2-P-2: Dilute Solutions & Colligative Properties **5 h**

Dilute Solutions, Colligative Properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis - laws of osmotic pressure, its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, Van't hoff factor, degree of dissociation and association of solutes.

S2-P-3: Solid state Chemistry **5 h**

Laws of Crystallography – (i) Law of Constancy of interfacial angles (ii) Law of Symmetry, Symmetry elements in crystals (iii) Law of rationality of indices. Definition of space lattice, unit cell. Bravais Lattices and Seven Crystal systems (a brief review). X-ray diffraction by crystals;

Derivation of Bragg's equation, Determination of structure of NaCl, KCl & CsCl (Bragg's method and Powder method).

Unit - IV (General chemistry) **15 h (1 hr/week)**

S2-G-1: Theory of Quantitative Analysis **5 h**

Volumetric Analysis: Introduction, standard solutions, indicators, end point, titration curves, Types of titrations: i) neutralization titration- principle, theory of acid base indicators, titration curves and selection of indicators- strong acid - strong base, strong acid –weak base, weak acid-strong base and weak acid –weak base. Gravimetric analysis- Introduction, nucleation, precipitation, growth of precipitate, filtration and washing, drying and incineration of precipitate, coprecipitation and post precipitation. Determination of Ni^{2+}

S3-G-2: Theories of bonding in metals: **5 h**

Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors n-type and p-type, extrinsic & intrinsic semiconductors, and insulators.

S2-G-3: Material Science **5 h**

Classification of materials- classification as metals, ceramics, organic polymers, composites, biological materials etc. The property of super conductivity of materials. Super conducting materials- elements, alloys and compounds. Properties of superconductors- zero resistivity, Meisener effect and thermal properties. Composites meaning of composites, advanced composites, classification –particle rein forced fiber reinforced and structural composites general characters of composite materials-Particle reinforced composites – large particle and dispersion-strengthened composite. Fiber reinforced composites (continuous and discontinuous fiber composites).

References:

Unit I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn
4. Wiley Publishers 2001. Chem
5. Chemistry of the elements by N.N.Greenwood and A. EarnshawPergamon Press 1989.
6. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
7. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn.
8. Textbook of inorganic chemistry by R Gopalan

Unit II

1. Text book of organic chemistry by Morrison and Boyd.
2. Text book of organic chemistry by Graham Solomons.
3. Text book of organic chemistry by BruiceYuranisPowla.
4. Text book of organic chemistry by Soni.
5. General Organic chemistry by SachinkumarGhosh.
6. Text book of organic chemistry by C N pillai

Unit III

1. .Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara.
3. Text Book of Physical Chemistry by Puri and Sharma
4. Text Book of Physical Chemistry by K. L. Kapoor
5. Physical Chemistry through problems by S.K. Dogra.
6. Elements of Physical Chemistry by Lewis and Glasstone.
7. Material science by Kakani & Kakani

Unit IV

1. Vogel's Text Book of Quantitative Analysis by G.H.Jeffery, J.Bassett, J.Mendham and R.C. Denney 5th edn Addison Wesley Longman Inc. 1999.
2. Quantitative Analysis by Day and Underwood Prentice Hall (India) VI Edn..
3. Nano: The Essentials by T. Pradeep, McGraw-Hill Education.
4. Chemistry of nanomaterials: Synthesis, Properties and applications by CNR Raoet.al.
5. Nanostructured Materials and Nanotechnology, edited by Hari Singh Nalwa,Academic Press

College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati

SEMESTER-I

Course Code: ICY-154	**Number of Credits- 02**
Title of the Course : Chemistry-2 (Practicals)	**Total Instruction hours - 3 per week** **45 per Semester**

I. Calibrations
   a) Calibration of weights
   b) Calibration of burette
   c) Calibration of standard flask
   d) Calibration of pipette

II. Water analysis
   a) Determination of total, permanent and temporary hardness of water.
   b) Determination of COD
   c) Determination of DO
   d) Determination of residual Cl^- ions in water by iodometry.

COMPLETE COURSE STRUCTURE (CBCS Pattern)
SEMESTER-II (34 Credits)

Course type	Courses	No of hours per week	No of Credits	Marks			Duration of Exam In Hours
				Internal	Eternal	Total	
Theory							
ELS-I	General English-II	4	4	20	80	100	3
SLS-I	Telugu-II	4	4	20	80	100	3
AECC-I	Gender Sensitization	2	2	10	40	50	2
DSC	Mathematics-II	4	4	20	80	100	3
	Botany-II	4	4	20	80	100	3
	Physics-II	4	4	20	80	100	3
	Zoology-II	4	4	20	80	100	3
	Physics-III	4	4	20	80	100	3
	Zoology-III	4	4	20	80	100	3
	Chemistry-III	4	4	20	80	100	3
Practicals							
DSC Practicals	Mathematics-II (practicals)	3	1		50	50	4
	Botany-II (practicals)	3	1		50	50	4
	Physics-II (practicals)	3	1		50	50	4
	Zoology-II (practicals)	3	1		50	50	4
	Physics-III (practicals)	3	1		50	50	4
	Zoology-III (practicals)	3	1		50	50	4
	Chemistry-III (practicals)	3	1		50	50	4
Total			**30** for each stream				

FC = Foundation Courses; **AECC** = Ability Enhancement Compulsory Course; **DSC** = Discipline Specific Course

Prof. Girija Mangatayaru
(BoS Chairperson)

(Dr K. Rajender Reddy)

(Dr Md. Noorjahan)

28/12/22
(Dr N Chandra Kiran)

(Dr. G. Vijayalaxmi)

(Dr. M. Satyanarayana)

(Dr. M. Narsingam)

(Dr. K. Thirupataiah)

(Ms. Afreen Saleha)

email: puic2021@gmail.com

SEMESTER-II

Course Code: ICY-201	Number of Credits- 04
Title of the Course : General English-II	Total Instruction hours - 4 per week 60 per Semester

Prescribed General English Text Book for I Year (Sem-I & Sem-II)

Title:*English MadeEasy*published byOrientBlackswan

Editors:Prof.E.SureshKumar,Prof.Sumita RoyandProf.A.Karunaker

Unit I 12h

SHORT FICTION: "A Visit of Charity" by Eudora Welty— PRONUNCIATION: plosives— GRAMMAR:non-finiteverbs—VOCABULARY:simileandmetaphor— SPELLING:useof'ie'and'ei'—PUNCTUATION:semicolon— CONVERSATION:askingforadvice/information— READING:Hyderabadcity:theheartofTelangana—WRITING:notetakingandnotemaking— SOFTSKILLS:timemanagement— VALUES:"Timeandtidewaitfor noone"

Unit II12h

PROSE:"Benaras"byAldousHuxley—PRONUNCIATIONn:fricatives— GRAMMAR:adjective—VOCABULARY:oxymoronandhyperbole— SPELLING:useof'able'and'ible'— PUNCTUATION: colon and long dash—CONVERSATION: making/accepting/refusingarequest— READING:Burrakatha—WRITING:informal letter—SOFTSKILLS:leadership— VALUES:"Thepenismightierthanthesword"

Unit III 12h

POETRY: "The Sun is Warm" by P.B Shelley— PRONUNCIATION: affricates and nasals— GRAMMAR: articles— VOCABULARY: portmanteau words, loan words— SPELLING: useof'-ic','-ive','-ity','-al''-ance','-ence'—PUNCTUATION:hyphenandlongdash— CONVERSATION:Conductingameeting/seekingopinionofteammembers— READING:CulturalidentityofTelangana—WRITING:formalletter— SOFTSKILLS:stressmanagement—VALUES:"Practicemakesoneperfect"

Unit IV12h

DRAMA:AnextractofActII,Sc3from*JuliusCaeser*byShakespeare— PRONUNCIATION:Lateral,frictionlesscontinuants,semivowels—GRAMMAR:adverb— VOCABULARY:palindromes—SPELLING:changesofspellingfromnoun-verb-adjective-adverb—PUNCTUATION:invertedcommas— CONVERSATION:Appearingforajobinterview/conductingajobinterview— READING:HandicraftsofTelangana—WRITING:business letter— SOFT SKILLS: etiquette and grooming— VALUES: "Necessity isthemotherof invention"

UnitV12h

Language&SoftSkillsLab:Pronunciation,Conversation,Reading,SoftSkillsandValues

SEMESTER-II

Course Code: ICY-202	**Number of Credits- 04**
Title of the Course : Second Language (Telugu-II)	**Total Instruction hours - 60 per Semester**

ప్రాచీన పద్యభాగం

1. గజేంద్ర మోక్షము
2. హనుమత్సందేశము
3. సుభాషితములు

ఆధునిక కవిత్వం

1. అంతర్నాదము
2. ప్రపంచ పదులు
3. రోడ్డురోలర్
4. ఆల్విదా

వచన విభాగం

1. యుగాంతం
2. ఎంకన్న
3. మామిడి పండు
4. మా ఊరు పోయింది
5. ఇదీ ఒక కళే – పేరులు దారులు గుర్తుంచుకోవడం

భాషా విభాగం

సంధులు, సమాసాలు

పరీక్షా పద్ధతి

ఎ. ఇంటర్నల్ ఎసెస్‌మెంట్	20 మార్కులు
బి. సెమిస్టర్ పరీక్ష	80 మార్కులు

SEMESTER-II

Ability Enhancement Compulsory Course (AECC-I)	
Course Code: ICY-203	Number of Credits- 02
Title of the Course : Gender Sensitization	Total Instruction hours - 30 per Semester

GENDER SENSITISATION (COURSE - SYLLABUS)

AECC – 2 (2hrs/week) **Credits – 2**

(30 hours)

Unit – I: Gender – An Overview **(15 hours)**

1. Gender: Definition, Nature and Evolution, Culture, Tradition, Historicity.
2. Gender Spectrum: Biological, Sociological, Psychological Conditioning
3. Gender based division of labour – domestic work and use value.

Unit – II Gender – Contemporary Perspectives **(15 hours)**

1. Gender Justice and Human Rights : International Perspectives
2. Gender: Constitutional and Legal Perspectives
3. Media and Gender
4. Gender: Emerging Issues and Challenges

SEMESTER-II

Course Code: ICY-204A	**Number of Credits- 04**
Title of the Course : Mathematics-II	**Total Instruction hours - 60 per Semester**

DIFFERENTIAL EQUATIONS

Objective: The main aim of this course is to introduce the students to the techniques of solving differential equations and to train to apply their skills in solving some of the problems of engineering and science.

Outcomes: After learning the course the students will be equipped with the various tools to solvefew types' differential equations that arise in several branches of science.

Unit – I

Differential Equations of first order and first degree: Exact differential equations – Integrating Factors – Change in variables – Total Differential Equations – Simultaneous Total DifferentialEquations – Equations of the form dx/ P = dy/ Q = dz/R

Differential Equations first order but not of first degree: Equations Solvable for y –Equations Solvable for x – Equations that do not contain x (ory) – Clairaut'sequation

Unit – II

Higher order linear differential equations: Solution of homogeneous linear differentialequations with constant coefficients – Solution of non-homogeneous differentialequations P(D)y= Q(x) with constant coefficients by means of polynomial operatorswhen Q(x)=bx!,be!",e!"V, b cosax , b sin (ax)

Unit – III

Method of undetermined coefficients – Method of variation of parameters – Linear differential equations with non constant coefficients – The Cauchy – Euler Equation

Unit – IV

Partial Differential equations- Formation and solution- Equations easily integrable –Linear equations of first order – Non linear equations of first order – Charpit's method– Non homogeneous linear partial differential equations – Separation of variables

Text: ZafarAhsan, Differential Equations and Their Applications

References: Frank Ayres Jr, Theory and Problems of Differential Equations
Ford, L.R, Differential Equations.
Daniel Murray, Differential Equations
S. Balachandra Rao, Differential Equations with Applications and Programs
Stuart P Hastings, J Bryce McLead; Classical Methods in Ordinary DifferentialEquations

SEMESTER-II

Course Code: ICY-251A	Number of Credits- 01
Title of the Course : Mathematics-I (Practicals)	Total Instruction hours - 45 per Semester

Differential Equations
Practicals Question Bank

Unit-I

Solve the following differential equations:

1. $y' = \sin(x+y) + \cos(x+y)$
2. $xdy - ydx = a(x^2 + y^2)dy$
3. $x^2 ydx - (x^3 + y^3)dy = 0$
4. $(y+z)dx + (x+z)dy + (x+y)dz = 0$
5. $y\sin 2xdx - (1 + y^2 + \cos^2 x)dy = 0$
6. $y + px = p^2x^4$
7. $yp^2 + (x-y)p - x = 0$
8. $\frac{dx}{y-zx} = \frac{dy}{yz+x} = \frac{dz}{x^2+y^2}$
9. $\frac{dx}{x(y^2-z^2)} = \frac{dy}{y(z^2-x^2)} = \frac{dz}{z(x^2-y^2)}$
10. Use the transformation $x^2 = u$ and $y^2 = v$ to solve the equation

$axyp^2 + (x^2 - ay^2 - b)p - xy = 0$.

Unit-II

Solve the following differential equations:

1. $D^2y + (a+b)Dy + aby = 0$
2. $D^3y - D^2y - Dy - 2y = 0$
3. $D^3y + Dy = x^2 + 2x$
4. $y'' + 3y' + 2y = 2(e^{-2x} + x^2)$

5. $y^{(5)} + 2y''' + y' = 2x + \sin x + \cos x$

6. $(D^2+1)(D^2+4)y = \cos\frac{x}{2}\cos\frac{3x}{2}$

7. $(D^2+1)y = \cos x + xe^{2x} + e^x \sin x$

8. $y'' + 3y' + 2y = 12e^x$

9. $y'' - y = \cos x$

10. $4y'' - 5y' = x^2e^x$

Unit-III

Solve the following differential equations:

1. $y'' + 3y' + 2y = xe^x$

2. $y'' + 3y' + 2y = \sin x$

3. $y'' + y' + y = x^2$

4. $y'' + 2y' + y = x^2e^{-x}$

5. $x^2y'' - xy' + y = 2\log x$

6. $x^4y''' + 2x^3y'' - x^2y' + xy = 1$

7. $x^2y'' - xy' + 2y = x\log x$

8. $x^2y'' - xy' + 2y = x$

Use the reduction of order method to solve the following hoı whose one of the solutions is given:

9. $y'' - \frac{2}{x}y' + \frac{2}{x^2}y = 0,\ y_1 = x$

10. $(2x^2+1)y'' - 4xy' + 4y = 0,\ y_1 = x$

Unit-IV

1. Form the partial differential equation , by eliminating the arbitrary constants from $z=(x^2+a)(y^2+b)$.

2. Find the differential equation of the family of all planes whose members are all at a constant distance r from the origin.

3. Form the differential equation by eliminating arbitrary function F from

$F(x^2+y^2, z-xy)=0$.

Solve the following differential equations:

4. $x^2(y-z)p+y^2(z-x)q=z^2(x-y)$

5. $x(z^2-y^2)p+y(x^2-z^2)q=z(y^2-x^2)$

6. $(p^2-q^2)z=x-y$

7. $z=px+qy+p^2q^2$

8. $z^2=pqxy$

9. $z^2(p^2+q^2)=x^2+y^2$

10. $r+s-6t=\cos(2x+y)$

SEMESTER-II

Course Code: ICY-204B	Number of Credits- 04
Title of the Course : Botany-II	Total Instruction hours - 60 per Semester

Bryophytes, Pteridophytes, Gymnosperms and Paleobotany

UNIT-I

1. Bryophytes: General characters and classification. **(3h)**
2. Structure, reproduction, life cycle and systematic position of *Marchantia, Anthoceros* and*Polytrichum.* (Development stages are not required). **(10h)**
3. Evolution of Sporophyte in Bryophytes. **(2h)**

UNIT-II

4. Pteridophytes: General characters and classification (Sporne's) **(3h)**
5. Structure, reproduction, life cycle and systematic position of *Rhynia, Lycopodium, Equisetum* and *Marsilea.* **(10h)**
6. Stelar evolution, heterospory and seed habit in Pteridophytes. **(2h)**

UNIT-III

7. Gymnosperms: General characters, structure, reproduction and classification (Sporne's). **(4h)**
8. Distribution and economic importance of Gymnosperms. **(3h)**
9. Morphology of vegetative and reproductive parts, systematic position and life cycle of *Pinus*and *Gnetum.* **(8h)**

UNIT-IV.

10. Palaeobotany: Introduction, Fossils and fossilization ; Importance of fossils. **(8h)**
11. Geological time scale; **(4h)**
12. Bennettitales: General account. **(3h)**

References:

1. Watson, E. V. 1974. The structure and life of Bryophytes, B. I. Publications, New Delhi.
2. Pandey, B. P. 2006. College Botany, Vol. II: Pteridophyta, Gymnosperms and Paleobotany. S. Chand & Company Ltd, New Delhi.
3. Sporne, K. R. 1965. Morphology of Gymnosperms.Hutchinson Co., Ltd., London.
4. Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. Botany - Pteridophyta (Vascular Cryptogams). . Chand & Company Ltd, New Delhi.
5. Pandey, B. P. 2001. College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd, New Delhi.
6. Pandey, B. P. 2007. Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics. S. Chand & Company Ltd, New Delhi.
7. Thakur, A. K. and S. K. Bassi. 2008. A Textbook of Botany: Diversity of Microbes and Cryptogams. S. Chand & Company Ltd, New Delhi.

SEMESTER-II

Course Code: ICY-251B	**Number of Credits- 02**
Title of the Course : Botany-II (practicals)	**Total Instruction hours - 45 per Semester**

Bryophytes, Pteridophytes, Gymnosperms and Paleobotany

1. Study of Morphology (vegetative and reproductive structures) and anatomy of the following
Bryophytes: *Marchantia*, *Anthoceros*and *Polytrichum*. **(9h)**
Pteridophytes: *Lycopodium*, *Equisetum* and *Marsilea*. **(9h)**

2. Study of Morphology (vegetative) and Study of Anatomical features of *Lycopodium*stem, *Equisetum* stem and *Marsilea*petiole &rhizome by preparing double stained permanent mounts. **(12h)**

3. Study of Morphology (vegetative and reproductive structures) of the following taxa:
Gymnosperms: *Pinus*and *Gnetum*. **(6h)**

4. Study of Anatomical features of *Pinus*needle and *Gnetum*stem by preparing double stained permanent mounts. **(6h)**

5. Fossil forms using permanent slides / photographs: *Rhynia* and *Cycadeoidea*. **(3h)**

SEMESTER-II

Course Code: ICY-205A	**Number of Credits- 04**
Title of the Course : Physics-II	**Total Instruction hours - 60 per Semester**

Waves and Oscillations

Unit – I: Fundamentals of vibrations **15h**

Simple harmonic oscillator and solution of the differential equation Physical characteristics of SHM, torsion pendulum, - measurements of rigidity modulus, compound pendulum, measurement of 'g', combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies, Lissajous figures.

Unit – II: Damped and forced oscillations **15h**

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with undamped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance,velocity resonance. Coupled Oscillators.

Unit – III: Vibrating Strings **15h**

Transverse wave propagation along a stretched string, general solution of wave equationand its significance, modes of vibration of stretched string clamped at ends, overtones,energy transport, transverse impedance

Unit – IV: Vibrations of bars **15h**

Longitudinal vibrations in bars- wave equation and its general solution. Special cases (i)bar fixed at both ends ii) bar fixed at the midpoint iii) bar free at both ends iv) bar fixed at one end. Transverse vibrations in a bar- wave equation and its general solution. Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Tuning fork.

NOTE: Problems should be solved at the end of every chapter of all units.

SEMESTER-II

Course Code: ICY-252A	Number of Credits- 02
Title of the Course : Physics-II (practicals)	Total Instruction hours - 45 per Semester

Waves and Oscillations

1. Study of damping of an oscillating disc in Air and Water logarithmic decrement.
2. Study of Oscillations under Bifilar suspension.
3. Study of oscillations of a mass under different combination of springs.
4. Verification of Laws of a stretched string (Three Laws).
5. Determination of frequency of a Bar-Melde's experiment.
6. Observation of Lissajous figures from CRO.
7. Volume Resonator –determination of frequency of a tuning fork.
8. Velocity of Transverse wave along a stretched string.
9. Study of damping of a bar pendulum
10. Study of coupled oscillator.

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batchand maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergradu
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for ate classes" (Vani Publishing House, New Delhi).

SEMESTER-II

Course Code: ICY-205B	Number of Credits- 04
Title of the Course : Zoology-II	Total Instruction hours - 60 per Semester

Ecology, Zoogeography and Animal Behavior

UNIT – I **(15h)**

Ecology - I

Ecosystem structure and functions. - Types of Ecosystems –Aquatic and Terrestrial. Biogeochemical cycles - Nitrogen, Carbon, Phosphorus and Water. - Energy flow in ecosystem. - Food chain, food web and ecological pyramids. - Animal Associations - Mutualism, commensalism, parasitism, competition, predation.

UNIT – II **(15 h)**

Ecology – II

Concept of Species, Population dynamics and Growth curves. - Community Structure and dynamics and Ecological Succession. - Ecological Adaptations. - Environmental Pollution – Sources, Effect and Control measures of Air, Water, Soil and Noise pollution, Wildlife conservation - National parks and Sanctuaries of India, Endangered species. Biodiversity and hotspots of Biodiversity in India.

UNIT – III **(15 h)**

Zoogeography

Zoogeographical regions – Palaearctic, Nearctic, Neotropical, Oriental, Australian and Ethiopian regions - their Climatic and faunal peculiarities, Wallace line, Discontinuous distribution, Continental Drift

UNIT – IV **(15 h)**

Animal Behaviour

Types of Behaviour- Innate and Acquired, Instinctive and Motivated behaviour - Taxes, Reflexes, Tropisms - Physiology and phylogeny of learning, trial and error learning, Imprinting, habituation, Classicalconditioning, Instrumental conditioning, Social behavior, Communication, Pheromones, Biological rhythms, Biological clocks, Circadian rhythms

Suggested Readings

M.P.Arora, '*Ecology*' Himalaya Publishing company.
P.D.Sharma, *Environmental Biology'*.
P.R.Trivedi and Gurdeep Raj. '*Environmental Ecology'*
BuddhadevSarma and Tej Kumar, *Indian Wildlife Threats and Preservation*
Chapman J.L. and Reiss M.J, *Ecology Principles and Applications*, SecondEd., Cambridge University Press, London.
Benny Joseph, *Environmental Studies*, TATA MGraw Hill Com., New Delhi. **Eugene P. Odum**, *Fundamentals of Ecology* Third Ed., NataraJPublishers,Dehradun. **Veer BalaRastogi**, "Ecology and Animal Distribution"
P.K. Gupta, "Text Book of Ecology and Environment" **Bhatnagar and Bansal,** "Ecology and Wildlife biology**Dasmann**, "Wild life Biology"
ReenaMathur, "Animal Behaviour"
Alocock, "Animal Behaviour- an Evolutionary Approach

SEMESTER-II

Course Code: ICY-252A	**Number of Credits- 02**
Title of the Course : Zoology-II (practicals)	**Total Instruction hours - 45 per Semester**

Ecology, Zoogeography and Animal Behavior

1. Determination of pH of Soil and Water
2. Estimation of salinity (chlorides) of water in given samples.
3. Estimation of Carbonates and bicarbonates in the given water samples.
4. Estimation of dissolved oxygen of pond water, sewage water and effluents.
5. Identification of Zooplankton from a nearby water body.
6. Study of Pond Ecosystem / local polluted site - Report submission
7. Study of at least 3 endangered or threatened wild animals of India through photographs / specimens / models
8. Field visit to Zoo Park to study the management, behavior and enumeration of wild animals.
9. Identification of Zoogeographical realms from the Map and identify specific fauna ofrespective regions.
10. Observe the response of invertebrates in different lightening conditions

Computer aided techniques should be adopted as per UGC guide lines.

Suggested manuals

1. **Robert Desharnais,Jeffrey Bell,** 'Ecology Student Lab Manual, Biology Labs'
2. **Darrell S Vodopich,** 'Ecology Lab Manual'

SEMESTER-II

Course Code: ICY-206A	**Number of Credits- 04**
Title of the Course : Physics-II	**Total Instruction hours - 60 per Semester**

Thermodynamics
Unit – I

Kinetic theory of gases: **(7h)**
Introduction – Deduction of Maxwell's law of distribution of molecular speeds, Transport Phenomena – Viscosity of gases – thermal conductivity – diffusion of gases.

Thermodynamics: **(8h)**
Basics of thermodynamics-Kelvin's and Claussius statements – Thermodynamic scale of temperature – Entropy, physical significance – Change in entropy in reversible and irreversible processes – Entropy and disorder – Entropy of universe – Temperature- Entropy (T-S) diagram – Change of entropy of a perfect gas-change of entropy when ice changes into steam.

Unit – II

Thermodynamic potentials and Maxwell's equations: **(8h)**
Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations – Clausius-Clayperon's equation – Derivation for ratio of specific heats – Derivation for difference of two specific heats for perfect gas.Joule Kelvin effect – expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

Low temperature Physics: **(7h)**
Joule Kelvin effect – liquefaction of gas using porous plug experiment. Joule expansion – Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling – Liquefaction of helium, Kapitza's method – Adiabatic demagnetization – Production of low temperatures – Principle of refrigeration, vapour compression type.

Unit – III
Quantum theory of radiation: **(15h)**

Black body-Ferry's black body – distribution of energy in the spectrum of Black body – Wein's displacement law, Wein's law, Rayleigh-Jean's law – Quantum theory of radiation – Planck's law – deduction of Wein's distribution law, Rayleigh-Jeans law, Stefan's law from Planck's law. Measurement of radiation using pyrometers – Disappearing filament optical pyrometer – experimental determination – Angstrom pyroheliometer - determination of solar constant, effective temperature of sun.

Unit – IV

(15h)

Statistical Mechanics:
Introduction, postulates of statistical mechanics. Phase space, concept of ensembles and some known ensembles, classical and quantum statistics and their differences, concept of probability, Maxwell-Boltzmann's distribution law -Molecular energies in an ideal gas-Maxwell-Boltzmann's velocity distribution law, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws, Application of B-E distribution to Photons-planks radiation formula, Application of Fermi-Dirac statistics to white dwarfs and Neutron stars.

Textbooks

1. **Fundamentals of Physics.** Halliday/Resnick/Walker.*C. Wiley India Edition 2007.*
2. **Second Year Physics** – *Telugu Academy.*
3. **Modern Physics** by R. Murugeshan and Kiruthiga Siva Prasath (for statistical Mechanics) *S.Chand & Co.*
4. **Heat and Thermodynamics** by Mark W.Zemansky 5th edition McGraw - Hill
5. **Heat and Thermodynamics** by D.S. Mathur.

Reference Books

1. **Modern Physics** by G. Aruldhas and P. Rajagopal, *Eastern Economy Education.*
2. Berkeley Physics Course. Volume-5.**Statistical Physics** by F. Reif.*The McGraw-Hill Companies.*
3. **An Introduction to Thermal Physics** by Daniel V. Schroeder.*Pearson Education Low PriceEdition.*
4. **Thermodynamics** by R.C. Srivastava, Subit K. Saha&Abhay K. *Jain Eastern Economy Edition.*
5. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand& Co. Publications.*
6. **Feyman's Lectures on Physics** Vol. 1,2,3& 4. *Narosa Publications.*
7. **Fundamentals of Optics** by Jenkins A, Francis and White E. Harvey, *McGraw Hill Inc.*
8 .B.B. Laud **"Introduction to statistics Mechanics"**(Macmillan 1981)

9. F.Reif: **"Statistical Physics "**(Mcgraw-Hill,1998) 10.K.Haung: **"Statistical Physics "**(Wiley Eastern 1988)

SEMESTER-II

Course Code: ICY-253A	**Number of Credits- 02**
Title of the Course : Physics-III (practicals)	**Total Instruction hours - 45 per Semester**

Thermodynamics

1. Co-efficient of thermal conductivity of a bad conductor by Lee's method.
2. Measurement of Stefan's constant.
3. Specific heat of a liquid by applying Newton's law of cooling correction.
4. Heating efficiency of electrical kettle with varying voltages.
5. Determination of Thermo emf
6. Cooling Curve of a metallic body (Null method)
7. Resistance thermometer. To Determine temp coeff resistance
8. Thermal expansion of solids
9. Study of mechanical energy to heat.
10. Determine the Specific of a solid (graphite rod)
11. Thermistor Characteristics. Calculation of A and B

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class ofthree hours per week.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House,New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for students.
4. "Practical Physics" R.K Shukla, Anchal Srivastava

SEMESTER-II

Course Code: ICY-206B	**Number of Credits- 04**
Title of the Course : Zoology-III	**Total Instruction hours - 60 per Semester**

Animal Diversity- Vertebrates and Developmental Biology

UNIT – I **(15 h)**

Urochordata, Cephalochordata, Cyclostomata

Salient features of Urochordata - Retrogressive metamorphosis and its significance in Urochordata - Salient features and affinities of Cephalochordata - General characters of Cyclostomata - Comparison of the *Petromyzon*and *Myxine* - General characters and classification of Chordataupto orders with examples.

Pisces

General characters of Fishes - Classification of fishes up to order level with examples - *Scoliodon*– Respiratory, Circulatory and Nervous system. - Types of Scales and types of Fins

UNIT – II **(15 h)**

Amphibia

General characters of Amphibians - Classification of Amphibians up to orders with examples. *Ranatigrina*- Respiratory, Circulatory and Nervous system. - Parental care in amphibian; neoteny and paedogenesis.

Reptilia

General characters of Reptilia - Classification of Reptilia up to orders with examples - *Calotes*– Respiratory system, Circulatory and Nervous system. - Temporal fosse in reptiles and its evolutionary importance - Distinguished characters of Poisonous and Non poisonous snakes. - Rhynchocephalia.

UNIT – III **(15 h)**

Aves

General characters of Aves - Classification of Aves up to orders with examples. - *Columba livia*-, Digestive system, Circulatory systems, Respiratory system and Nervous system. - Migration in Birds - Flight adaptation in Birds

Mammalia

General characters of Mammalia - Classification of Mammalia up to orders with examples Rabbit –Digestive, Respiratory, Circulatory and Nervous system. - Dentition in mammals. Aquatic adaptations in Mammals.

UNIT – IV **(15 h)**

Developmental Biology and Embryology

Gametogenesis (Spermatogenesis and Oogenesis) - Fertilization - Types of eggs - Types of cleavages - Development of Frog up to formation of primary germ layers - Formation of Foetal membrane in chick embryo and their functions - Types and functions of Placenta in mammals, Regeneration in Turbellaria and Lizards.

Suggested Readings:

1. **E.L.Jordan and P.S. Verma**'*Chordate Zoology*' -. S. Chand Publications.
2. **Mohan P.Arora**. '*Chordata – I*, Himalaya Publishing House Pvt.Ltd.
3. **Marshal, Parker and Haswell**'*Text book of Vertebrates*'. ELBS and McMillan, England.
4. **Alfred Sherwood Romer**. Thomas S. Pearson '*The Vertebrate Body*, Sixth edition,CBS college Publishing, Saunders College Publishing
5. **George C. Kent, Robert K. Carr**. *Comparative Anatomy of the Vertebrates*, 9th ed. McGrawHill.
6. **Kenneth Kardong***Vertebrates: Comparative Anatomy, Function and Evolution*, 4th ed,'McGraw Hill.
7. **J.W. Young**, *The Life of Vertebrates*, 3rd ed, Oxford University press.
8. **Harvey Pough F, Christine M. Janis, B. Heiser,** *Vertebrate Life,* Pearson, 6th ed, PearsonEducation Inc.2002.

SEMESTER-II

Course Code: ICY-253B	**Number of Credits- 02**
Title of the Course : Zoology-III (practicals)	**Total Instruction hours - 45 per Semester**

Animal Diversity- Vertebrates and Developmental Biology

Study of museum slides / specimens / models (Classification of animals up to orders)

1. **Protochordata:** Amphioxus, Amphioxus T.S. through pharynx
2. **Cyclostomata:** Petromyzon, Myxine, Ammocoetus larva
3. **Pisces:** SphyrnaPristis, Torpedo, Channa, Pleuronectes, Hippocampus, Exocoetus, Echieneis,Labeo,Catla, Clarius, Auguilla, Protopterus, Scales: Placoid, Cycloid, Ctenoid
4. **Amphibia:** Ichthyophis, Amblystoma, Siren, Hyla, Rachophous,Bufo,Rana, Axolotal larva
5. **Reptilia** :Draco, Chemaeleon, Gecko, Uromastix, Viperarusselli, Naja, Bungarus, Enhydrina,Typhlops,Testudo, Trionyx, Crocodilus, Ptyas.
6. **Aves:** Archaeopteryx, Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo; Collectionand study ofdifferent types of feathers: Quill, Contour, Filoplume, Down
7. **Mammalia:** Ornithorhynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris, Hedgehog
8. **Histology**: T.S. of Liver, Pancreas, Kidney, Stomach, Intestine, Lungs Artery, Vein, BoneT.S., Spinal cord.
9. **Osteology :** 1. Rabbit – Axial skeleton system (bones of Skull and Vertebral Column)
   2. Varanus, Pigeon and Rabbit – Appendicular skeleton system (bones of limbs and girdles)

Dissections of *Labeo/Tilapia*:

1. Digestive system.
2. Brain, Weberianossicles
3. V, VII, IX, X cranial nerves

Embryology

1. Study of T.S. of Testis and Ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8, 16 cell stages); Morula, Blastula
3. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation

Laboratory Record work shall be submitted at the time of practical examination
An **"Animal album"** containing photographs, cut outs, with appropriate write up about the above mentionedtaxa. Different taxa/ topics may be given to different sets of students for thispurpose.

Computer aided virtual dissections.Suggested manuals

1. **S.S.Lal,** Practical Zoology – Vertebrata
2. **P.S.Verma,** A manual of Practical Zoology – Chordata
3. **Freeman & Bracegirdle,** An atlas of embryology

SEMESTER-II

Course Code: ICY-207	**Number of Credits- 04**
Title of the Course : Chemistry-III	**Total Instruction hours - 60 per Semester**

Unit-I (Inorganic Chemistry) **15 h (1 hr/week)**

S3-I-1: Chemistry of f-block elements: **6 h**

Chemistry of Lanthanides: Position in periodic table, Electronic structure, oxidation state, ionic and atomic radii- lanthanide contraction- cause and consequences, anomalous behavior of post lanthanides-complexation- type of donor ligands preferred. Magnetic properties-paramagnetism. Colour and spectra, f-f transitions –occurrence and separation– ion exchange method, solvent extraction. Chemistry of actinides- general features – electronic configuration, oxidation state, actinide contraction, colour and complex formation. Comparison with lanthanides.

S3-I-2: Symmetry of molecules **5 h**

Symmetry operations and symmetry elements in molecules. Definition of Axis of symmetry types of Cn, Plane of symmetry (σh, σv, σd) Center of symmetry and improper rotational axis of symmetry (Sn). Explanation with examples.

S3-I-3: Non – aqueous solvents **4 h**

Classification and characteristics of a solvent. Reactions in liquid ammonia – physical properties, auto-ionisation, examples of ammono acids and ammono bases. Reactions in liquid ammonia – precipitation, neutralization, solvolysis, solvation - solutions of metals in ammonia, complex formation, redox reactions. Reactions in HF – auto ionisation, reactions in HF – precipitation, acid – base reactions, protonation.

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

S3-O-1: Alcohols **6 h**

Preparation: 1°, 2° and 3° alcohols using Grignard reagent, Ester hydrolysis, reduction of Carbonyl compounds, carboxylic acids and esters. Physical properties: H-bonding, Boiling point and Solubility. Reactions with Sodium, HX/$ZnCl_2$ (Lucas reagent), esterification, oxidation with PCC, alk. $KMnO_4$, acidic dichromates, conc. HNO_3 and Oppenauer oxidation.
Diols: Pinacol - pinacolone rearrangement.
Phenols: Preapartion: (i) from diazonium salts of anilines, (ii) from benzene sulphonic acids and (iii) Cumene hydroperoxide method.
Properties: Acidic nature, formation of phenoxide and reaction with R-X, electrophilic substitution nitration, halogenation and sulphonation. Riemer Tiemann reaction, Gattermann-Koch reaction, Azo-coupling reaction, Schotton-Baumann reaction, Houben-Hoesch condensation, $FeCl_3$ reaction.

S3-O-2: Ethers and epoxides **2h**

Nomenclature, preparation by (a) Williamson's synthesis (b) from alkenes by the action of conc. H_2SO_4. Physical properties – Absence of Hydrogen bonding, insoluble in water, low boiling point. Chemical properties – inert nature, action of conc. H_2SO_4 and HI.

S3-O-3 Carbonyl compounds **7 h**

Nomenclature of aliphatic and aromatic carbonyl compounds and isomerism. Praparation of aldehydes & ketones from acid chloride, 1,3-dithianes, nitriles and from carboxylic acids. Special methods of preparing aromatic aldehydes and ketones by (a) Oxidation of arenes (b) Hydrolysis of benzal halides Physical properties – absence of Hydrogen bonding. Keto-enol tautomerism polarisability of carbonyl groups, reactivity of the carbonyl groups in aldehydes and ketones. Chemical reactivity: Addition of [a] $NaHSO_3$ (b) HCN (c) RMgX (d) NH_3 (e) RNH_2 (f) NH_2OH (g) $PhNHNH_2$ (h) 2,4-DNP (Schiff bases). Addition of H_2O to form hydrate (unstable), comparison with chloral hydrate (stable), addition of alcohols - hemi acetal and acetal formation. Base catalyzed reactions with mechanism- Aldol, Cannizaro reaction, Perkin reaction, Benzoin condensation, haloform reaction, Knoevengeal condensation. Oxidation reactions –$KMnO_4$ oxidation and auto oxidation, reduction – catalytic hydrogenation, Clemmenson's reduction, Wolf- kishner reduction, Meerwein Pondoff Verly reduction, reduction with LAH, $NaBH_4$. Analysis – 2,4 –DNP test, Tollen's test, Fehlings test, Scihff'stest, haloform test (with equations).

UNIT – III (Physical Chemistry) **15 hr (1h/week)**

S3-P-1: Phase Rule **6 h**

Statement and meaning of the terms – Phase, Component and degrees of freedom, bb's Phase rule, phase equilibria of one component system – water system. Phase equilibria oftwo-component system – Solid-Liquid equilibria, simple eutectic – Pb-Ag system, desilverisation of lead. Solid solutions – compound with congruent melting point – Mg-Zn system and incongruent melting point – NaCl-H_2O system.

S3-P-2: Colloids& surface chemistry **9 h**

Definition of colloids. Classification of colloids. Solids in liquids (sols): preparations and properties – (including Kinetic, Optical and Electrical stability of colloids) Protective action. Hardy–Schultz law, Gold number. Liquids in liquids(emulsions): Types of emulsions, preparation and emusifier. Liquids in solids (gels); Classification, preparations and properties, General applications of colloids. Micelles: Classification of surface active agents. Surfactant action, micellization and micellar interactions, Structure of micelles – spherical and laminar. Critical micellar concentration (CMC). Factors affecting the CMC of surfactants. Counter ion binding to micelles.

Adsorption: Types of adsorption, Factors influencing adsorption. Freundlich adsorption isotherm.Langmuir theory of unilayer adsorption isotherm. Applications.

UNIT – IV (General Chemistry) **15 hr (1h/week)**

S3-G-1: *Nanomaterials*: **3h**

Nano structured materials – Definition, size, description of graphene, fullerenes, carbon nano tubes. Synthetic techniques, bottom-up-sol-gel method, top-down, electroeposition method. Production of carbon nano tubes – arc discharge, laser vaporization methods. General applications of nano materials.

S3-G-2: Stereochemistry of carbon compounds **10h**

Isomerism: Definition of isomers. Classification of isomers: Constitutional and Stereoisomers - definition and examples. Constitutional isomers: chain, functional and positional isomers. Stereoisomers: enantiomers and diastereomers – definitions and examples. **Optical activity**: Definition, wave nature of light, plane polarised light, optical rotation and specific rotation, chiral centers. Chiral molecules: definition and criteria - absence of plane, center and Sn axis of symmetry – asymmetric and dissymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and disymmetric molecules (trans-1,2- dichlorocyclopropane). Molecules with constitutionally symmetrical chiral carbons (Tartaric acid) Molecules with constitutionally unsymmetricalchiral carbons (2,3-dibromopentane)Number of enantiomers and mesomers - calculation. D, L &, R, S configuration for asymmetric and disymmetric molecules (Allenes, spiro compounds and biphenyls), Cahn-Ingold-Prelog rules. Racemic mixture, Racemisation and Resolution techniques. Geometrical isomerism with reference to alkenes and cycloalkanes– cis, trans and E, Z- configuration.

S3-G-3: Conformational analysis **2 h**

Classification of stereoisomers based on energy. Definition and examples Conformational and configurational isomers. Conformational analysis of ethane, n-butane, 1,2-dichloroethane,2- chloroethanol, cyclohexane and methylcyclohexane

References:

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications(1996).
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn Van NostrandReinholdCompany(1977)
3. College Practical chemistry by V K Ahluwalia, SunithaDhingra and AdarshGulati UniversitiesPress (India) Limited(2012)
4. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd ednWileyPublishers (2001).
5. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey,E.A. Keiter and
R.L. Keiter 4th edn. (2006)
6. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
7. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press (1999).
8. Textbook of Inorganic Chemistry by R Gopalan(Universities Press(2012)

Unit II

1. Text book of organic chemistry by Soni. Sultan Chand & Sons; Twenty Ninthedition (2012)
2. General Organic chemistry by Sachin Kumar Ghosh. New Age Publishers PvtLtd (2008)
3. Text book of organic chemistry by Morrison and Boyd. Person(2009)
4. Text book of organic chemistry by Graham Solomons. Wiley(2015)
5. Text book of organic chemistry by BruiceYuranisPowla. (2012)
6. Text book of organic chemistry by C N pillai CRC Press (2012)

Unit III

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

Unit IV

1. Text book of organic chemistry by Morrison and Boyd, Person (2009)
2. Text book of organic chemistry by Graham solomons, Wiley (2015)
3. Text book of organic chemistry by Sony, Sultan Chand & Sons; Twenty Ninth edition (2012)
4. Text book of organic chemistry by Bruiceyuranis Powla, (2012)
5. General Organic chemistry by Sachinkumar Ghosh, New Age Publishers PvtLtd (2008)

SEMESTER-II

Course Code: ICY-254	**Number of Credits- 02**
Title of the Course : Chemistry-III (practicals)	**Total Instruction hours - 45 per Semester**

Laboratory Course

Paper III- Quantitative Analysis - I **45hrs (3 h /Week)**

Acid - Base titrations

1. Estimation of Carbonate in Washing Soda.
2. Estimation of Bicarbonate in Baking Soda.
3. Estimation of Carbonate and Bicarbonate in the Mixture.
4. Estimation of Alkali content in Antacid using HCl.

Redox Titrations

1. Determination of Fe(II) using $K_2Cr_2O_7$
2. Determination of Fe(II) using $KMnO_4$ with sodium oxalate as primary standard.
3. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard

Model Paper

FACULTY OF SCIENCE

M.Sc., 5 YEAR INTEGRATED CHEMISTRY

AECC-II

Environmental Studies

Time: 1½ Hours **Max. Marks: 40**

Section - A (Short Answer Questions) 2 x 5=10M

Note: Answer the following questions not exceeding 20 lines each.

1. Need for Conservation of Biodiversity
2. Problems of Solid Waste Management

Section - B (Essay Answer Questions) 2 x 15=30M

Note: Answer the following questions not exceeding 4 pages each.

3. a) Explain the basic characteristics of Single Channel Energy Flow Model.

(OR)

b) Define environmental studies and discuss the scope and importance of Environmental Studies.

4. a) Explain in brief the salient features of Forest Acts in India since 1927.

(OR)

b) Discuss in detail the causes of Global Warming and Ozone Layer depletion and suggest remedial measures to protect the environment.

FACULTY OF SCIENCE

M.Sc., 5 YEAR INTEGRATED CHEMISTRY

Model Paper for **Mathematics, Botany, Physics & Zoology**

Time: 3 hours **Max Marks: 80**

Note: Answer all the questions from each section.

Section-A (Short Answer Questions) **8x4=32M**

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-II
5. Unit-III
6. Unit-III
7. Unit-IV
8. Unit-IV

Section-B (Essay Answer Questions) **4x12=48M**

9. a) Unit-I

(OR)

b) Unit-I

10. a) Unit-II

(OR)

b) Unit-II

11. a) Unit-III

(OR)

b) Unit-III

12. a) Unit-IV

(OR)

b) Unit-IV

Question paper model for all semesters

Part A : 6 లము ప్రశ్నలకు 4 చేయాలి. = 4X5 = 20

Part B : 7. 8. 9. 10 వ్యాసరూపప్రశ్నలు Internal Choice 4 x 15 = 60

Exam 80+

Internal Assessment 20 = 100 Marks

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TELUGU (IInd LANGUAGE)

SCHEME OF THE QUESTIONPAPER

TIME :3 HRS MARKS :80

అ భాగం(సంగ్రహసమాధానాలు)

ఏవేని నాలుగు ప్రశ్నలకు క్లుప్తంగా సమాధానాలు రాయండి. **4x5=20**

1. ప్రాచీనపద్యభాగంనుండి ఒకసందర్భం
2. ఆధునికపద్యభాగంనుండి ఒకసందర్భం
3. నానార్థాలు (5) రాయాలి. (చాయస్ లేదు)
4. పర్యాయపదాలు (5) రాయాలి. (చాయస్ లేదు)
4. నవలనుండి చిన్నప్రశ్న ఒకటి రాయాలి .
3. కవిపరిచయం (ప్రాచీన. ఆధునికపద్యభాగంనుండి)

ఆ భాగం(వ్యాసరూపసమాధానాలు)

అన్ని ప్రశ్నలకు విచరంగా సమాధానాలు రాయండి. **15x4=60**

7. ప్రాచీన పద్యభాగం నుండి రెండు పద్యాలు ఉంటాయి (ఒకదానికి సందర్భం, కవిపరిచయం, ప్రతిపదార్థతాత్పర్యాలు, వ్యాకరణాంశాలు వివరించాలి)

8. ప్రాచీన / ఆధునిక పద్యభాగం నుండి రెండుప్రశ్నలు ఉంటాయి. (ఒకదానికి సమాధానం రాయాలి.)

9. నవల నుండి రెండుప్రశ్నలు ఉంటాయి. (ఒకదానికి సమాధానం రాయాలి.)

10. తెలుగు వాక్యనిర్మాణరీతులను సోదాహరణంగా తెల్పండి. లేదా

మూడుసంధులను / మూడు సమాసాలను లక్ష్యలక్షణ సహితంగా వివరించాలి

Department of English
Palamuru University

Reorganized CBCS Curriculum with effect from AY 2022-

English (First Language)

Question Paper Pattern

Time: 3 Hours **Max Marks: 80**

Note: All questions in Section A and B are to be based on the lessons and exercises included in the prescribed textbook.

Section A
(4 x 5 marks = 20 marks)

6 questions to be set. Any 4 to be answered.

- Q 1-4 to be based on the following components of Units I-IV
  - Pronunciation, Grammar, Vocabulary, Spelling, Punctuation
- Q 5 to be based on the following component of Units I-IV
  - Writing
- Q 6 to be based on the following components of Units I-IV
  - Soft Skills, Value Orientation

Section B
(4 x 15 marks = 60 marks)

Qs 7-10 will have internal choice. Students can answer either A or B.

- Q 7 A & B are to be based on the following component of Unit I
  - Short fiction
- Q 8 A & B are to be based on the following component of Unit II
  - Prose
- Q 9 A & B are to be based on the following component of Unit III
  - Poetry
- Q 10 A & B are to be based on the following component of Unit IV
  - Drama