Course Structure of B.Sc.B.Ed. (BCZ): Paper wise Credits and Hours/Week

Sl. No	Course Code	Course (Subject	Crdits			Total Credits (L+T+P)	Hours/ Week
			L	T	P		
Semester-I (BCZ)							
1	16TIED11/ 16IHED11	Tamil/ Hindi: Paper-1	2	1	0	3	4
2	16IEED11	English: Paper-1	2	1	0	3	4
3	16GEVS13	Environmental Education	1	0.5	0.5	2	3
4	16CIED11	Developmental Stages of Learner	2	0.5	0.5	3	4
5	16EIED13	Botany: Paper-1: Phycology (Algae), Fungi and Lichen	3	0	1	4	5
6	16CIED12	Chemistry: Paper-1: Introduction to Organic Chemistry	3	0	1	4	5
7	16EIED14	Zoology: Paper-1: Invertebrata-I	3	0	1	4	5
		Total	**16**	**3**	**4**	**23**	**30**
Semester-II (BCZ)							
1	16TIED21/ 16IHED21	Tamil/ Hindi: Paper-2	2	1	0	3	4
2	16IEED21	English: Paper-2	2	1	0	3	4
3	16CIED21	Health, Physical Education and Yoga	1	0.5	0.5	2	3
4	16CIED22	Psychological Perspectives of Learners	2	0.5	0.5	3	4
5	16EIED24	Botany: Paper-2: Cytology, Anatomy, and Embryology	3	0	1	4	5
6	16CIED23	Chemistry: Paper-2: Metallurgy and Chemistry of Non-Metals	3	0	1	4	5
7	16EIED25	Zoology: Paper-2: Invertebrata-II	3	0	1	4	5
		Total	**16**	**3**	**4**	**23**	**30**
Semester-III (BCZ)							
1	16TIED31/ 16IHED31	Tamil/ Hindi: Paper-3	2	1	0	3	4
2	16IEED31	English: Paper-3	2	1	0	3	4
3	16CIED31	Education in Contemporary India	3	1	0	4	5
4	16CIED32	Teaching and Learning: Part-1	1	1	0	2	3
5	16EIED34	Botany: Paper-3: Bryophytes, Pteridophytes and Gymnosperms	3	0	1	4	5
6	16CIED33	Chemistry: Paper-3:	3	0	1	4	5

Sl. No	Course Code	Course (Subject	Crdits			Total Credits (L+T+P)	Hours/ Week
			L	T	P		
		Chemical Kinetics and Phase Rule					
7	16EIED35	Zoology: Paper-3: Chordata	3	0	1	4	5
		Total	**17**	**4**	**3**	**24**	**31**
Semester-IV (BCZ)							
1	16TIED41/ 16IHED41	Tamil/ Hindi: Paper-4	2	1	0	3	4
2	16IEED41	English: Paper-4	2	1	0	3	4
3	16CIED41	Teaching and Learning: Part-2	1	1	0	2	3
4	16CIED42	Information and Communication Technology	3	0.5	0.5	4	5
5	16EIED44	Botany: Paper-4: Taxonomy, Plant Physiology and Plant Biochemistry	3	0	1	4	5
6	16CIED43	Chemistry: Paper-4: Molecular Rearrangements and Stero Chemistry	3	0	1	4	5
7	16EIED45	Zoology: Paper-4: Developmental Biology	3	0	1	4	5
		Total	**17**	**3.5**	**3.5**	**24**	**31**
Semester-V (BCZ)							
1	16CIED51	Planning for Assessment and Evaluation	2	0.5	0.5	3	4
2	16CIED52	Pedagogy of Physical Science-P1	3	0.5	0.5	4	5
3	16EIED54	Pedagogy of Biology-P1	3	0.5	0.5	4	5
4	16EIED55	Botany: Paper-5: Plant Pathology and Paleo Botany	2	1	1	4	6
5	16EIED5C/ 16EIED5D	Botany: Paper-6 (Major Based Elective) (1). Medical and applied Botany. (2). Plant Bio Technology and Bio informatics	2	1	1	4	6
6	16CIED53	Chemistry: Paper-5: Solid State Chemistry	3	0	1	4	5
7	16EIED56	Zoology: Paper-5: Cell Biology	3	0	1	4	5
		Total	**18**	**3.5**	**5.5**	**27**	**36**
Semester-VI (BCZ)							
1	16CIED61	Educational Measurement	1	0.5	0.5	2	3
2	16CIED62	Pedagogy of Physical Science-P2	3	0.5	0.5	4	5
3	16EIED64	Pedagogy of Biology-P2	3	0.5	0.5	4	5
4	16EIED65	Botany: Paper-7: Genetics, Bio Statistics and Evolution	3	0	1	4	5

Sl. No	Course Code	Course (Subject	Crdits			Total Credits (L+T+P)	Hours/ Week
			L	T	P		
5	16CIED63	Chemistry: Paper-6: Thermodynamics	3	0	1	4	5
6	16EIED66	Zoology: Paper-6: Animal Physiology	2	1	1	4	6
7	16PIED67/ 16PIED68	Zoology: Paper-7 (Major Based Elective) (1). Economic Entomology and Pest Management. (2). Ornamental Fish Farming	2	1	1	4	6
		Total	**17**	**3.5**	**5.5**	**26**	**35**
Semester-VII (BCZ)							
1	16PIED71	Pedagogy of Physical Science-Subject Content at School	0	0.5	0.5	1	2
2	16PIED73	Pedagogy of Biology-Subject Content at School	0	0.5	0.5	1	2
3		Internship in Physical Science	0	0	4	4	8
4		Internship in Biology	0	0	4	4	8
5	16CIED73	Botany: Paper-8: Plant Ecology and Conservation	3	0	1	4	5
6	16CIED71	Chemistry: Paper-7: Chemistry of Natural Products	3	0	1	4	5
7	16CIED74	Zoology: Paper-8 Genetics and Evolution	3	0	1	4	5
		Total	**9**	**1**	**12**	**22**	**35**
Semester-VIII (BCZ)							
1	16CIED81	Inclusive Education	2	0.5	0.5	3	4
2	16CIED82	Drama & Art in Education	1	0.5	0.5	2	3
3	16CIED83	Human Rights and Duties Education	1	0.5	0.5	2	3
4	16CIED8A/ 16CIED8B/ 16CIED8C	Education Elective (any one among the following) (1). Guidance and Couselling. (2). Communication Skills (3). Understanding the Self	1	0.5	0.5	2	3
5	16CIED85	Botany: Paper-9: Micro Biology, Plant Protection and Toxicology	3	0	1	4	5
6	16CIED84	Chemistry: Paper-8: Chemistry of Coordination Complexes	2	1	1	4	6
7	16CIED8D/ 16CIED8E	Chemistry: Paper-9 (Major Based Elective) (1). Electro Chemistry and Surface	2	1	1	4	6

Sl. No	Course Code	Course (Subject	Crdits			Total Credits (L+T+P)	Hours/ Week
			L	T	P		
		Chemistry. (2). Analytical Techniques in Chemistry					
8	16CIED86	Zoology: Paper-9: Bio Technology	3	0	1	4	5
		Total	**15**	**4**	**6**	**25**	**35**
		Overall Total	**125**	**30.5**	**43.5**	**194**	**263**

SUMMARY OF CREDITS AND HOURS/ WEEK

FOR B.Sc.B.Ed. (BCZ) IN EIGHT SEMESTERS

Sl. No	SEMESTERS	Crdits			Total Credits (L+T+P)	Hours/ Week
		L	T	P		
1	Semester – I	16	3	4	23	30
2	Semester – II	16	3	4	23	30
3	Semester – III	17	4	3	24	31
4	Semester – IV	17	3.5	3.5	24	31
5	Semester – V	18	3.5	5.5	27	36
6	Semester – VI	17	3.5	5.5	26	35
7	Semester – VII	9	1	12	22	35
8	Semester – VIII	15	4	6	25	35
	Overall Total	**125**	**30.5**	**43.5**	**194**	**263**

SUMMARY OF MARKS FOR B.Sc.B.Ed. (BCZ) IN EIGHT SEMESTERS

	Continuous Assessment (CA)	Theory- External (UE)	Practical (External) (UE)	Marks
Total Marks in Theory and Practical	2000	2850	1350	6200
Total Marks in Practicum/ Activities/ Records in Education	-	-	900	900
Grand Total	2000	2850	2250	7100

SEMESTER-I

பருவம் **I**

தமிழ்– தாள் - **1**

CODE: 16TIED11 **Credits: 3 (2L: 1T: 0P)**

Hours: 4/Week

நோக்கங்கள்: -

1. மாணவர்களுக்கு பண்டைய தமிழக மக்களின் வரலாற்றை அறிமுகம் செய்தல்
2. மாணவர்களுக்கு அற இலக்கியங்களை போதிப்பதன் வழியாக நல்லொழுக்கத்தை வளரச் செய்தல்
3. மாணவர்களுக்கு படைப்பாற்றல் திறனை வளர்த்தல்
4. பயன்பாட்டித்தமிழ் வழியாக மொழித்திறனை மேம்படுத்துதல்

அலகு – 1 தமிழக வரலாறு

சங்ககாலத் தமிழகம் – அரசியல் நிலை – போர் முறை – சமூக அமைப்பு – திருமணமுறை – நம்பிக்கைகள் – வணிகம் – உணவு – உறையுள் – அணிகலங்கள் – கல்வி – பொழுதுபோக்குகள் – அறம்

அலகு – 2 அற இலக்கியங்களும், காப்பியங்களும்

களப்பிரர் காலம் விளக்கம் – நீதி இலக்கியத்தின் சமூகதி தேவை – திருக்குறள் – அன்புடைமை அதிகாரம் - அடக்கவுமை, நட்பு, தீ நட்பு, ஐம்பெருங்காப்பியங்கள் – ஐஞ்சிறுங்காப்பியங்கள்

காப்பியங்கள் – சிலப்பதிகாரம் கதை சுருக்கம் – வழக்குரைத்தகாதை (மட்டும்)

அலகு – 3 உரைநடை

நலவாழ்வு – டாக்டர் மு. வரதராசன்

அலகு – 4 இக்கால இலக்கியங்கள்

சிறுகதை – தோற்றம் – வளர்ச்சி – சிறுகதை ஆசிரியர்கள் – சிறுகதை வகைகள் விடியுமா? – கு.ப.ராஜகோபலன், நாற்று - (சிறுகதிய தொகுப்பு), வானதி பதிப்பகம், தி.நகர்.

அலகு – 5 பயன்பாட்டுத் தமிழ்

பிறமொழிக் சொற்களை தமிழ்ச்சொற்களாக மாற்றுதல் – எழுத்து பிழை நீக்கம் – கலைச் சொல்லாக்கம் – வல்லினம் மிகு இடம் – மிகா இடங்களை கண்டறிதல் – சந்திவிதிகள் – சொற்றொடர் மாற்றம் (தன்வினை – பிறவினை – செயப்பாட்டு வினை – நேர் கூற்று – அயற் கூற்று) – பயிற்சிகள்

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Recall and recognize heritage and culture through History of Tamil literature.

CO2: Interpret the cultural lifestyle of Ancient Tamil people.

CO3: Evaluate social and individuals' moral value after studying Epics and Ethics Literature.

CO4: Build the humanistic concept and moral life skills in divine and minor literature.

CO5: Improve their own creativity and writing skills in Tamil language.

<u>பார்வை நூல்கள்: -</u>

1. முனைவர் அ . தட்சிணாமூர்த்தி – தமிழர் நாகரிகமும் பண்பாடும் யாழ் வெளியீடு செ-46
2. கே.கே. பிள்ளை – "தமிழக் வரலாறு" மக்கள் பண்பாடும்", உலகத் தமிழாராய்ச்சி நிறுவனம், மீள் பதிப்பு, 2009
3. முனைவர் கு. மோகணராசு – திருக்குறள் மக்கள் உரை, மணிவாசகர் பதிப்பகம்
4. முனைவர். பொற்கோ – நீங்களும் தமிழை தவறு இல்லாமல் எழுதலாம்

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SEMESTER – I

HINDI – PAPER-1

CODE: 16IHED11 **Credits: 3 (2L: 1T: 0P)**
Hours: 4/Week

Objectives: Students develop proficiency in Hindi which equips them to

1. enable the students to acquire basic skills in functional language.
2. develop independent reading skills and reading for appreciating literary works.
3. internalise grammar rules so as to facilitate fluency in speech and writing .
4. develop functional and creative skills in language.
5. develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode:
Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit - I: Descriptive Grammar

Sandhi (Agama, Adesa, Dwitwa etc) A suitable book on Sandhi will be followed in the classroom

Reference: Hindi Vyakaran by N Nagappa.

Unit - II: Functional Language

(a) Group Discussion: Introduction-Definition-characteristics-types of discussions-round-table –symposium-panel-lecture forum etc.-relevance of group Discussions – Exercises.

(b) Conversation: Definition-styles of conversation-formats of conversation-telephonic conversa6ion, etc-Exercises

Reference: Effective Group Discussion – Theory and Practice by Gloria J.Galanes, McGraw Hill Company (Publishers).

Unit - III: Modern Poetry:

i) Kavya Kusumaakar - First eight Poets (Modern)
Prasaranga, University of Mysore, Mysore

Unit - IV: Prose : Collection of Short Stories:

Katha Kousthubh (Ed). Dr Tippeswamy

Sessional work :

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Familiar with the writing style of great writers in India.

CO2: Understand the importance of selecting a profession according to one's own interest.

CO3: Describe the present situation; politicians' behavior& their self-oriented activities.

CO4: Develop their appreciation skills

CO5: Understand the writing style of writer "Fanishwarnath renu" who is well known for his village type stories.

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SEMESTER – I

ENGLISH – PAPER-1

CODE: 16IEED11 **Credits: 3 (2L: 1T: 0P)**

Hours: 4/Week

Objectives: Students develop proficiency in English which equips them to

1. Students develop proficiency in English which equips them to:
2. understand the demands of audience, subject, situation and purpose and the
3. use of language for effective communication.
4. analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
5. examine authentic literary and non-literary texts and develop insight and appreciation.
6. gain an understanding of study and reference skills.
7. plan, draft, edit and present a piece of writing.

Unit I : Descriptive Grammar

Parts of speech: Nouns, pronouns, adjectives, verbs, adverbs, prepositions, conjunctions, interjections.

Tenses- **articles.**

Unit II : **Skills in Communication**

Use of conventional formulae: Greeting, apology, invitation, refusal, accepting, thanking. Debating on an issue – agreeing / disagreeing.

Unit III : Study and Reference Skills

Study skills: Note making, Note- taking, Paraphrasing. Reference skills: Dictionary, library, thesaurus, encyclopedias

Unit IV: Literature – Prose

Extract from Abdul Kalam's *Wings of Fire*. Women, Not the Weaker Sex - M.K. Gandhi

Unit V: Composition

Reading Comprehension,Filling up Forms, Railway Reservation/ Cancellation Forms, Bank-Challan, Convocation Form,Money Order Form.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the demands of audience, subject, situation and purpose of using language.

CO2: Analyze the language in context to gain an understanding of grammar rules.

CO3: Examine authentic literary and non-literary texts and develop insight and appreciation.

CO4: Plan, draft, edit and present a piece of writing.

CO5: gain an understanding of study and reference skills.

Sugested Readings:

- Block, C.C.(1997). *Teaching the Language Arts*, 2nd Ed. Allyn and Bacon
- Mckay. et al. (1995). *The Communication Skills Book*, 2nd Ed. New Harbinger Publications.
- Hornby,A.S.(2001).*Oxford Advanced Learner's Dictionary*,OUP
- Thomsan,A.J. & Martinet.(2002).*A Practical English Grammar*.OUP
- Mahadevan, Usha. Empower with English, Sun Beams – 1. Emerald Publication, Chennai, 2012

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SEMESTER – I

ENVIRONMENTAL EDUCATION

CODE: 16GEVS13 **Credits: 2 (1L-0.5T-0.5P)**
Hours: 3/Week

Objectives: On completion of the course, the student-teachers will be able to

1. understand the importance of protecting the environment.
2. develop the knowledge of various awareness programmes on protecting the environment
3. identify the ways to utilize conventional energy sources.
4. describe the future of Solar Energy.
5. explain the role of an individual in conservation of natural resources.
6. suggest ways to increase the ground water level in and around college campus.
7. conduct awareness programmes on different types of pollution.
8. report on action-taken to protect college campus from Land Pollution.
9. discuss the adverse effects of Global Warming.
10. explain the ways to avoid nuclear accidents.
11. Justifying the role of an individual in protecting the Environment.

UNIT-I: Introduction to Environmental Education and Natural Resources

Definition and Meaning of Environment – Components – Scope – Nature – Importance - Need for public awareness and objects of Environmental Study. Resources : Natural Resources – Renewable resources - Non renewable resources – Energy resources – Chief resources of energy and their classification – Growing needs of energy – Alternative sources of energy – Future of Solar Energy.

UNIT-II: Role of an individual in Conservation of Natural Resources and Environmental Pollution

Role of an individual in conservation of natural resources – Water Conservation – Energy Conservation – Conservation of Forest resources – Soil conservation – Equitable use of resources for sustainable life style.

Environmental Pollution: Definition – Causes - Effects and control measures of air pollution – Water Pollution – Soil Pollution – Noise Pollution - Nuclear Hazards – Role of an individual in prevention of Pollution.

UNIT–III: Environmental Issues and Role of Education

Climate change – Global Warming – Acid Rain – Ozone Layer depletion – Nuclear accidents and Holocaust. Education for sustainable development of environment, Environmental Education in National Policy on Education (1986) – Need – Providing Environmental Education at different levels – current status of Environmental Education in School curriculum – Role of NCERT – Role of Teachers.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: understand the importance of protecting the environment.

CO2: develop the knowledge of awareness on protecting the environment

CO3: conduct awareness programmes on different types of pollution.

CO4: discuss the adverse effects of Global Warming.

CO5: plan the ways to avoid nuclear accidents.

References

- Amandeep Kaur. (2003). Environmental Education, Tandon Publications, Ludhiana.
- Arul Jothy. (2009). Environmental Education, Centrum Press, New Delhi.
- Gopal Dutt .N.H. (2007). Environmental Pollution Control, Neelkamal Publications, New Delhi.
- Joshi. A.L. (2012). Environmental Education Saurabh Publishing House, New Delhi.
- Khoshoo.T.N. (1991). Environmental concerns and strategies, Ashish Publishing House, New Delhi.
- Raghavan Nambiar. K, (2010), Text book of Environmental Studies, Scitech Publication Pvt. Ltd., Chennai.
- Reena Mohanka. (2009). Environmental Education A.P.H Publishing Corporation, New Delhi.
- Suresh Pachauri. (2012). Environmental Education, Pearson Series in Education, Delhi.
- Surinder Singh Sirohi. (2010). Environmental Education, Tandon Publications, Ludhiana.

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SEMESTER – I
DEVELOPMENTAL STAGES OF LEARNER

CODE: 16CIED11 **Credits: 3 (2L-0.5T-0.5P)**
Hours: 4/Week

Objectives: On completion of the course, the student-teachers will be able to

1. describe the principles of growth and development
2. explain the characteristics of prenatal development
3. understand the physical, mental, emotional, social and moral development of infancy and babyhood
4. understand the physical, mental, emotional, social and moral development of Early and late childhood
5. analyse the characteristics of adolescents and their problems.

UNIT-I: Growth and Development

Concept of Growth, Development and Maturation - Principles of Growth and Development - Introduction to Stages of development: Prenatal and Postnatal: Infancy, Babyhood, childhood, adolescence - Aspects of development: Physical, Mental, Emotional, Moral & Social.

UNIT-II: Role of Heredity and Environment

Heredity and Environment: Mechanism of Heredity – Identical and Fraternal Twins – Biological Inheritance: principles & significance – Role of Heredity - Role of Environment –concept of Nature and Nurture in the development of an individual.

UNIT-III: Developmental Stages

Prenatal Development: Prenatal – 3 Stages of prenatal development: Zygote, Embryo and Fetus - Hazards during prenatal stages: Physical and Psychological. Infancy and Babyhood: Characteristics – Developmental tasks – Physical Development – Cognitive Development – Emotional Development – Social Development – Moral Development – Physical and Psychological hazards (Stage wise). Early and Late Childhood: Characteristics – Developmental tasks – Physical Development – Cognitive Development – Emotional Development – Social Development – Moral Development – Physical and Psychological hazards (stage wise). Adolescence: Characteristics – Developmental Tasks – Physical development – Cognitive development (Piaget) – Social development(Erickson) – Emotional development, Moral development (Kohlberg) – Discipline. Interests of Adolescents – Problems of Adolescents. Group Behaviour - Leadership.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Identify the characteristics of pre-natal development

CO2: Understand physical, mental, emotional, social, and moral development of childhood.

CO3: Analyze the interests of adolescence

CO4: Demonstrate the development tasks of the adolescence

CO5: Plan and execute guidance programmes for early and late childhood

References:

- Berk, Laura E. (2007). Child Development, Pearson Prentice Hall, New Delhi.
- Bhatia, H.R. (2008). Educational Psychology, Pearson Prentice Hall, New Delhi.
- Dash, B.N. (2007). Educational Psychology, Neelkamal Publications (P) Ltd, Delhi.
- Hurlock, Elizabeth B. (2006). Child Growth and development, Tata Mc Graw Hill Pvt Company, Delhi.
- Mangal, S.K. (2008). General Psychology, Sterling Publishers (P) Ltd, New Delhi.
- Robert A.Baron, (2007). Psychology, A.I.T.B.S Publishers, New Delhi.
- Santrock, John W. (2007). Adolescence, Tata Mc Graw Hill, New Delhi.
- Stella Reynolds. (2006). Educational Psychology, Lotus Press, New Delhi.

SEMESTER-I

CHEMISTRY – PAPER-I

INTRODUCTION TO ORGANIC CHEMISTRY

Code: 16CIED12 **Credits: 4 (3L: 0T: 1P)**

Hours: 5/Week

Course objective: To know about what are hydrocarbons and their classification, conformations, preparations, properties and about aromaticity.

Unit I – Classifications of hydrocarbons

Chemistry of alkanes and cycloalkanes petroleum source of alkanes-Methods of preparing alkanes and cycloalkanes - chemical properties –mechanism of free radical substitutions in alkanes - halogenation –uses.

Unit II – Conformational Analysis

Conformational study of ethane and n-butane – Relative stability of cyclo alkanes from cyclopropane upto cyclooctane – Bayer's straintheory – Limitations – cyclohexane and mono-and disubstituted cyclohexanes.

Unit III – Preparation methods of hydrocarbons

General methods of preparation and properties of Alkenes and alkynes –electrophilic and radical addition mechanisms- addition reactions with H_2,X_2, HX, HOX, H_2SO_4, H_2O , hydroboration Ozonolysis and peroxide effect. Hydroxylation of alkenes with $KMnO_4$-allylic substitution of alkenes by NBS –acidity of alkynes and formation of acetylides-test for alkenes and alkynes.

Unit IV – Types of dienes and reactions

Dienes-types-stability-preparation of 1, 3 butadiene, isoprene and chloroprene-reactivity –1, 2 and 1, 4 additions in conjugated dienes,-Diels-Alder reaction. Types of polymerization-mechanisms of ionic and free radical addition polymerization.

Unit V - Aromaticity and preparation of aromatic compounds

Aromaticity-Huckel's rule-resonance in benzene –electrophilic substitution in aromatic compounds-general machanism –nitration, sulphonation, halogenation, Friedelcraft's alkylation and acylation-Orientation and reactivity in monosubstituted benzenes polynuclear hydrocarbons –naphthalene, anthracene and phenanthrene – preparation, properties and uses.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the nature and function of hydrocarbons.

CO2: Learn and classify the stability and aromaticity of organic molecules

CO3: Interpret the laws of gaseous behaviour in different concepts

CO4: understand the geometry of simple organic compounds

CO5: Analyze the basic mechanism of different reactions

Text Book:

- P. L. Soni. Text Book of Organic Chemistry" Sultan Chand & sons. 32nd edition. **2013**

Reference Books

- Robert Thornton Morrison, Robert Neilson Boyd, "Organic Chemistry" Ashok K. Ghosh 10th edition, **2013**
- Dr. Jagadamba singh, Dr. L. D. S. Yadav, "Advanced Organic Chemistry" Pragati Prakashan, 7th Edition, **2011**

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CHEMISTRY

PRACTICAL-I

Acid – Base Titrations

1. Estimation of Hydrochloric acid using oxalic acid

2. Estimation of sodium Hydroxide using sodium carbonate
3. Estimation Borax

Redox Titration

4. Estimation of oxalic acid using Mohr's salt
5. Estimation of Calcium
6. Estimation of Ferrous Sulphate using oxalic acid
7. Estimation of H_2O_2
8. Estimation of copper using Potassium Dichromate
9. Estimation of Ferric Iron using Potassium Dichromate

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SEMESTER-I

BOTANY – PAPER-1

PHYCOLOGY (ALGAE), FUNGI AND LICHEN

CODE: 16EIED13 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: Enable the Students to

1. understand the structure, reproduction, culture, classification and economic importance of Algae, Fungi and Lichen.
2. study the classification, ecology, distribution, morphology and life-cycle of Algae and Fungi.
3. impart knowledge on distribution, classification, structure, physiology, reproduction and function of lichens and significance of ectomycorrhiza and endomycorrhiza.

Unit – I - Algae.

Classification and general characters of algae(smith 1958) classification; Ecology and distribution; Thallus structure, reserve food materials and life cycles of cyanoplyceae. (Ex.1.Oscillation 2. Nostoc).

Unit – II

Classification,Occurrence,distribution,thallus structure ,pigmentation, reserve food materials and life cycles in cholorphyceae (Ex.1. Chollrella and 2.oedogonium).

Unit – III

Classification,occurrence, distribution, thallus structure, pigmentation,reserve food and life cycles in pheaophyceae(sargassum)and Rhodophyceae(Gracillaria). Economic importanceof algae with reference to Agar, Alginate and Oxidation ponds spirullina culture.

Unit - IV – Fungi

General characteristics, ecology and distribution, range of thallus organization, cell wall composition, nutrition, reproduction and classification- life cycle of Alexopolous, Rhizopus, Penicillium and puccinia; Economic importance of Fungi.

Unit – V -- Lichens

Symbiotic Associations – Lichens: Occurrence, thallus organization, classification, physiology, reproduction and role in environment pollution and uses; Mycorrhiza – General account and their significance.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Analyse the different types of algae according to the distribution/habitat, structure, pigmentation, and reserve food materials.

CO2: Synthesize the importance of algae in food, medical and other type of industries.

CO3: Distinguish the types of fungi according to the distribution/habitat, structure, pigmentation, and reserve food materials.

CO4: Synthesize the importance of fungi in food, medical and other type of industries.

CO5: Prove lichens plays a special role as pollution indicator.

PRACTICAL – I

A detailed study of structure of thallus and reproductive structures of

1. Oscilatoria.
2. Nostoc
3. Chollrella
4. Oedogonium
5. Sargassum
6. Gracillaria
7. Rhizopus
8. Pencillium
9. Puccinia
10. Alexopolous.

Viewed through the permanent slide and submission of record.

References Books

1. Vasishta B.R.(1990), Botany for Degree students, Algae. S.Chand &Co.
2. Singh.V. Pandey P.C and Jain D.K 1998. A Text book of Botany for undergraduate students, Rastogi Publications.
3. Fritsch F.B. 1945, structure and Reproductiion of Algae Vol.I&II. Cambridge University Press.
4. Sethi.I.K. and Walia.S.K (2011). Text books of fungi & their Allies. Publishers MacMillan Pvt, Ltd., Delhi.

5. Alexopoulos C.J, Minus C.W and Blackwell.M (1996). Introductory Mycology (4th edition), John Wiley and sons (Asia), Singapore.
6. Pandey B.P(2001). College Botany Vol. I: Algae, Fungi, Lichens and Bacteria.
7. Vashishta B.R(1990). Botany for Degree students Fungi. S.Chand & Company Ltd., New Delhi.

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SEMESTER-I

ZOOLOGY – PAPER-1

INVERTEBRATA – I

CODE: 16EIED14 **Credits: 4 (3L: 0T: 1P)**

Hours: 5/Week

Objectives: Enable the Students to

1. To enlighten the student about the diverse forms of Invertebrate animals which belong to 5 major phyla present around us.
2. To help our student to distinguish various Invertebrate animals and to know the evolutionary sequence of them.
3. To understand Habitat, Adaptation organization and taxonomic status of Invertebrates.
4. Explaining the basic aspects of classification, structural and functional details of Invertebrates.

Unit –I

Principles of taxonomy – Binomial nomenclature – classification of animal kingdom Phylum protozoa: General characters and classification up to class level, giving examples. Detailed structure and life cycle. General topics: Parasitic protozoan of man, Nutrition in protozoa.

Unit – II

Phylum Porifera: general characters and classification up to class level giving examples. Type study – Ascon & Sycon – canal system in sponges – economic importance.

Unit – III

Phylum Coelenterata: General characters and classification up to class level giving examples. Type study: Obelia and Aurelia. General structure and life cycle corals and coral reefs – Polymorphism – Economic importance.

Unit – IV

Phylum Platyhelminthes: General characters and classification up to class level giving examples. Type study – Fasciola hepatica & Taenia solium. General structure & life cycle. General topics. Regeneration in Platy helminthes, parasitic adaptation in Platy helminthes.

Unit – V

Phylum Nematoda: General characters and classification up to class level giving examples. Type study: Ascaris – General structure and life cycle.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the diverse forms of Invertebrate animals which belong to 5 major phyla present around us.

CO2: Distinguish various Invertebrate animals and to know the evolutionary sequence of them.

CO3: Understand the habitat, adaptation organization and taxonomic status of Invertebrates.

CO4: Explain the basic aspects of classification, structural and functional details of Invertebrates.

CO5: Understand the economic importance of the major and minor phylum.

References:

1. Agarwal, V.K. (2003). Invertebrate Zoology,S.Chand & company Ltd, New Delhi
2. Jordan, E.L and Verma, P.S 2009 (Multi colour revised edition). Invertebrate zoology. S. chand & Company Ltd, New Delhi
3. Nair, N.C Leelavathy, L., Soundara Pandian, N. Murugan, T. and Arumugam, N. (2009). A text book of zoology. Invertebrates, Rastogi publications , New Delhi
4. Ekambaranatha Ayyar, M., Ananthakrishnan, T.N. (1985). A Manual of Zoology, S.Visvanathan pvt., Chennai.
5. Kotpal R.L. (2014). Modern Text book of Zoology Invertebrates, Rastogi Publications, Meerut,.

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Practical:

a. Classify giving reasons: Paramecium, Obelia (Entire) Sea Anemone, Aurelia, Plasmodium, Ascon, Sycon.
b. Biological significance: Paramecium – conjugation and binary fission, sponge – Gemmule, Fasciola hepatica, Tape worm, Ascaris.
c. Relate the structure and function: Sponge – Spicules, Taenia solium – Scolex
d. Draw and label the parts: – Planaria – T.S, Fasciola hepatica – T.S, Tape worm – T.S, Ascaris – Male T.S, Ascaris – Female T.S

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SEMESTER-II

பருவம் **II**

தமிழ்– தாள் **- 2**

CODE: 16TIED21 **Credits: 3 (2L: 1T: 0P)**

Hours: 4/Week

நோக்கங்கள்: -

- தமிழ் மொழியின் வரலாற்றை அறிவியல் கண்ணோட்டத்துடனும் மொழிக்குடும்மங்களின் அடிப்படையுலும் விளக்குதல்
- சங்க இலக்கியத்தை வழி மாணவர்களிக்கு பண்டைய மக்களின் வாழ்க்கை நிலையை அறியச் செய்தல்
- படைப்பாற்றல் திறனை வளர்த்தல்
- பயன்பாட்டு தமிழ் வழியாக மாணவர்களுக்கு எழுதும் திறன் பேச்சு திறனை வளர்த்தல்

அலகு – 1 தமிழ் மொழி வரலாறு

மொழிக்குடும்பம் – இந்திய மொழிக்குடும்பங்கள் – இந்திய ஆட்சி மொழிகள் – திராவிட மொழிக்குடும்பங்கள் - திராவிட மொழிகளிமன் சிறப்புகள் – திராவிட மொழிகளுள் தமிழின் இடம் – தமிழ்மொழியின் சிறப்புகள் – தமிழ் பிறமொழித் தொடர்புகள்

அலகு – 2 சங்க இலக்கியம்

சங்க இலக்கியம் – எட்டுத்தொகை – நற்றினை – குறுந்தொகை – ஐங்குறுநூறு – பதிற்றுப்பத்து – பரிபாடல் – கலித்தொகை – அகநாநூறு – புறநானூறு – பத்துப்பாட்டு – திருமுருகாற்றுப்படை – சிறுபாணாற்றுப்படை – பெரும்பாணாற்றுப்படை – பொருநராற்றுப்படை – மலைபடுகடாம் – குறிஞ்சிப்பாட்டு – முல்லைப்பாட்டு, பட்புனப்பாலை – நெடுநல்வாடை – மதுரைகாஞ்சி

அலகு – 3

வைரமுத்து எழுதிய “ சிற்பியே உன்னைச் செதுக்குகிறேன்” முழுவதும்

அலகு – 4

நாடகம் – தோற்றம் – வளர்ச்சி – நாடக ஆசிரியர்கள் நாடக வகைகள் – பயிற்சி

நாடகம்: - தண்ணீர் தண்ணீர் – கோமல் சுவாமிநாதன், வானதி பதிப்பகம், தி.நகர் – சென்னை – 600017

அலகு – 5 – பயன்பாட்டுத்தமிழ்

கடிதம் – கடித வகைகள் – அலுவலகக்கடிதங்கள் – விண்ணப்பக் கடிதம் – கடிதத்தில் கையாளும் மொழி – இ.மெயில் – பயிற்சிகள் கட்டுரை – கட்டுரை எழுதுதல் – பண்புகள் – வரையறை வகைகள் – கட்டுரை எழுதும் முறை – பயிற்சிகள்

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Measure human mind through the studying of Tamil classical literature in the aspect of moral value.

CO2: Justify the contemporary social issues through studying Tamil Epics.

CO3: Improve their own style of writing after studying Sirpiye Unnai sethukkukiren essays.

CO4: Develop narrative skill after reading short stories.

CO5: Build the life skills after studying of the poetry.

<u>பார்வை நூல்கள்: -</u>

1. சக்திவேல்.சு “தமிழ் மொழி வரலாறு”, மணிவாசகர் பதிப்பகம், முதற் பதிப்பு 1998
2. விமலானந்தம், மது.ச., :இலக்கியவரலாறு:. பாரி நிலையம், மறுபதிப்பு,2008
3. அ.கி பரந்தாமனார்:நல்ல தமிழ் எழுத வேண்டுமா? பாரி நிலையம், சென்னை – 600108
4. கா.பட்டாபிராமன், மொழிப்பயன்பாடு – (நீயு செஞ்சரி புக் வூவஸ்)

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SEMESTER – II

HINDI – PAPER-2

CODE: 16IHED21 **Credits: 3 (2L: 1T: 0P)**

Hours: 4/Week

Objectives: Students develop proficiency in Hindi which equips them to

1. enable the students to acquire basic skills in functional language.
2. develop independent reading skills and reading for appreciating literary works.
3. internalise grammar rules so as to facilitate fluency in speech and writing .
4. develop functional and creative skills in language.
5. develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode:

Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit - I: Descriptive Grammar

Samasa and Alankara (Yamak, Shlesh, Upama, Rupak, Apahnuti, Utpreksha, Drishtanta, Virodhabasa, Arthantharanyas, Ananvaya).

Reference Book: a) Hindi Vyakaran—N.Nagappa, b) Kavya ke Vibhinna Ang -- Dr. Krishna Narayan Prasad Magadh

Unit - II: Functional Language:

News reporting: Characteristics-Definition-language of news reporting-model of news report-patterns-role of media in news reporting-exercises.

Interview: Characteristics-definitions-preparation for interview-various types of interviews (business-employment-literary etc.) - exercises.

References:

a) Fundamentals of Journalism, Report Writing and Editing by R.Thomas Berner, Marquette Books LLC, Washington.
b) The Perfect Interview by Max Eggert, Random House, UK.

Unit - III: Medieval Poetry

Text- **Pracheen evam madhyakaleen Hindi Kavya.** Prof Poornachand Tandan (Ed.) Published by Rajpal and sons, Kashmiri gate, Delhi-110006

Following poets' work will be taught: **Tulasidas, Surdas, Meerabai** (one poem of each poet)

Unit - IV: Collection of Essays:

Shresht Nibandh- Dr. Aalok Gupta (Ed.) published by Shiksha Bharathi, Madarasa Road, Kashmiri Gate, Delhi –110006

Prescribed essays:

a) Sahitya ki mahatta b) Pahla safed bal c) Gehun banam gulab d) Devdary e) Sahitya aur Jeevan

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Use descriptive grammar in writing the Hindi language.

CO2: Understand the multimedia report writing.

CO3: Analyze the medieval poetry.

CO4: Points out the problems occur due to carelessness lack of communication

CO5: Build the skill of story writing.

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SEMESTER – II

ENGLISH – PAPER - 2

Code: 16IEED21 **Credits: 3 (2L: 1T: 0P)**

Hours: 4/Week

Objectives: Students develop proficiency in English which equips them to

1. Students develop proficiency in English which equips them to:
2. understand the demands of audience, subject, situation and purpose and the
3. use of language for effective communication.
4. analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
5. examine authentic literary and non-literary texts and develop insight and appreciation.
6. gain an understanding of study and reference skills.
7. plan, draft, edit and present a piece of writing.

Unit I: Descriptive Grammar

Function of Auxiliaries; Modals; Question form - Framing questions - Wh – Questions - Question tags

Unit II: Development of Reading skills.

Silent reading, loud reading - SQR3 method of reading – Skimming – Scanning

Unit III: Development of writing skills.

Mechanical skill - Paragraph writing - Essay Writing – Summery Writting

Unit IV: Literature – Short Stories

Open Window	- H. H. Munro (Saki)
The Lion's Share	- Arnold Bennett
The Sparrows	- K.A. Abbas
The Cop and The Anthem	- O.Henry
The Necklace	- Guyde Maupassant

Unit V: Composition

Letter writing: Personal, Business Letters, Hints development

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Examine the difference between poetic language and the language of the prose.

CO2: Utilize instructions on fundamentals of grammar.

CO3: Develop their own style of writing after studying diverse prose essays.

CO4: Classify different poems based on their types.

CO5: Conclude the textual content of both and poetry.

Suggested Readings:

- Chan. et al. (1997*) Professional Writing Skills*, San Anselma, CA
- Fiderer, A. (1994) *Teaching Writing: A Workshop Approach*. Scholastic.
- Block, C.C.(1997). *Teaching the Language Arts*, 2nd Ed. Allyn and Bacon
- Mckay. et al. (1995). *The Communication Skills Book*, 2nd Ed. New Harbinger Publications.
- Rao,Shoba B, *Empower with English,Sunbeams-II.* Emerald Pub:Chennai,2012

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SEMESTER-II
HEALTH, PHYSICAL FITNESS & YOGA

CODE: 16CIED21 **Credits: 2 (1L-0.5T-0.5P)**
Hours:3/Week

Objectives: On completion of the course student teachers will be able to

1. create awareness on different aspects of health and fitness;
2. recognize the importance of hygiene for healthy living;
3. appreciate the importance of correct posture;
4. create an awareness of the rules of safety and importance of first aid;
5. evaluate ones present physical fitness status
6. provide the basis for setting-up an exercise programme;
7. acquire the importance of weight management through exercise and diet;
8. expound to cope up with daily stress.

UNIT-I: Introduction to Health Education and First Aid

Meaning, Definition, Aims & Objectives of Health Education, Methods of Imparting Health Education in Schools – Health Instruction, Health Services, Health Supervision. Personal hygiene - Meaning, Definition, Elements and Importance of Personal hygiene.

Posture Management: Meaning of Posture, Importance of Good posture, Causes of Poor Posture, Preventive Measures, Proper posture in various situations ,Common Postural Defects - Kyphosis, Lordosis, Scoliosis, Knock Knee ,Bow Legs and Flat Foot, Exercises for improving Postural Defects.

First Aid and Treatment: First aid - Meaning, definition, Scope, Qualities of a first aider, Basic principles of rendering first aid, First aid box Contents, First aid for different types of accidents – Sprain, Stain, Contusion, Bleeding, Dislocation, Fracture, Burns, Electric Shock, Heat Stroke, Drowning and Snake bites - Symptom, Prevention and Treatment.

UNIT-II: Physical Fitness and Assessment

Meaning, Definition, Importance of physical fitness, factors influencing physical fitness, Health related Components : Strength ,Muscular Endurance , Flexibility, Cardio-Respiratory Endurance and Body Composition, Benefits of physical fitness, Assessment of physical fitness, Planning a fitness programme, Common injuries :Plantar Fasciitis, Achilles tendinitis, Chondromalacia, Hamstring Strain, Shin splints -Prevention and Treatment.

UNIT-III: Stress Management and Yoga

Weight management - Definition, Meaning, Factors contributing to weight management, Exercise – Definition, Meaning, Types : Aerobic exercise , Flexibility exercise, Strength exercise -Role of exercise in weight management, Misconception about exercise and weight control: Exercise and appetite, Spot reducing, Weight reduction by sweating, Diet

- Balanced diet, Food groups- A guide to menu planning, Role of diet in weight management.

Stress Management: Meaning, Definition, Causes and effects of stress, managing stress - Exercise, Relaxation techniques-Deep breathing, Progressive muscular relaxation.

Yoga - Introduction, Meaning and misconceptions of Yoga; Ashtang Yoga (8 stages of Yoga); Types of Yoga; Importance of Yogasanas, Pranayama and Shudhikriya; Importance of Meditation in school.

PRACTICAL

1. Assessment of health related physical fitness (H.R.P.F.)
   a) Body composition: Body Mass Index (B.M.I.) and Waist HipRatio (W.H.R.)
   b) Cardio-respiratory endurance
   c) Muscular strength and endurance
   d) Flexibility
2. Yogasana, Pranayama and Shudhikriya.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Appraise health education and first aid

CO2: Select the appropriate postures for preventing measures for improving postural defects

CO3: Support with appropriate first aid and treatment

CO4: Value weight management, stress management and yoga

CO5: Expound to cope up with daily stress.

References:

- Aggarwal, J.C. (2013). *Health and Physical Education*. NewDelhi: Shipra Publications.
- Bass, David H. (1996). *Your personal fitness trainer*. New Delhi: BPB Publications.
- Charles, P. (1998). *A key to stay fit*. Delhi: Shanthi Publication.
- Daryl, Syedentop. (1994). Introduction to physical education, fitness and sports (2nd ed.). London: Mayfield publishing company.
- Dharmendra prakash Bhatt. (2006). *Health Education*. New Delhi:Khel Sahitya Kendra.
- Getchell, Bud. (1992). *Physical fitness: A Way of Life.* America: Macmillian publishing company.
- Greenberg, Jerrold S., Dintiman,George., & Oakes Barbee Myers. (1995). *Physical fitness and Wellness.*
- Kangane, Sopan.,& Sonawane, Sanjeev. (2007). Physical Education (D. Ed.). Pune: Nirali publication.
- McCorthy, Aine. (1998). *How to lose weight & keep it* .Chennai: Joice publishing house.
- Rajeswari. (1999).*Weight Loss* Delhi: Pustak Mahal.
- Reema Kirtani. (2003). *Physical fitness for health*. New Delhi: Khel Sahitya Kendra.

- Sheokand, Daisy. (2007). *Physiology of physical fitness*. New Delhi: Sports publication.
- Singh, Ajmer. (2003). Essentials of physical Education. Ludhiana: Kalyani publishers.
- Uppal, A.K., & Gautam, G.P. (2004). Physical education and Health. Delhi: Friends Publisher.
- Vijayalakshmi.(2011). *Physical fitness*. New Delhi: Khel Sahitya Kendra.

E-References:

- http://www.webhealthcentre.com/general/first_aid_index.asp
- http://www.livingposture.com/article.php?id=15
- http://www.stress-vacation.com/relaxation.htm

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SEMESTER – II

PSYCHOLOGICAL PERSPECTIVES OF LEARNERS

CODE: 16CIED22 **Credits: 3 (2L-0.5T-0.5P)**
Hours: 4/Week

Objectives: On completion of the course, the student-teachers will be able to

1. recognise higher mental process of concept formation, thinking, reasoning, problem solving and creativity.
2. familiarise with the theories and assessment of personality.
3. differentiate Mental health and Hygiene.
4. develop stress reduction strategies.
5. identify the role of teacher in guidance and counselling

UNIT-I: Intelligence and Creativity

Development of mental abilities: sensation, perception, memory, imagination, reasoning – Concept formation - Thinking process: role of language, images and imagination - Reasoning and problem solving.

Intelligence: definition and nature - Theories : monarchic, multi factor, two factor, group factor theory, Guilfords structure of intellect, multiple intelligence (Gardner) - Intelligence tests – their uses and abuses - Creativity and intelligence – identification and promotion of creativity – concept of Emotional intelligence and meta cognition.

UNIT-II: Personality

Meaning and concept – Determinants of Personality, Theories of Personality: Type approaches : Sheldon, Kretschmer, Jung, Hippocrates – Trait approaches : Allport, Cattell – Type cum Trait approach : Eysenck - Psycho-analytic approach: Sigmund Freud – Individual approach : Alfred Adler - Factors influencing Personality – Assessment of Personality – Integrated Personality.

UNIT-III: Mental Health and Hygiene

Concept of mental health and hygiene – conflicts, tensions and frustration – Reasons for Conflict: dilemmas, competition, perceived injustice, imperceptions of action or goals – adjustment – Defense mechanism – Stress – Stress coping/ reduction strategies – individual peace contributing to social cohesion. Effects of Stress on mental and physical health - Students problems – Unrest- Teacher as Counsellor.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Examine the development of mental abilities

CO2: Differentiate mental health and hygiene

CO3: Appraise stress reduction strategies

CO4: Formulate the role of teacher in guidance and counseling

CO5: Identify the role of teacher in guidance and counselling

References:

- Aggarwal, J.C. (2008). Essentials of Educational Psychology, Vikas Publishing House (P) Ltd, New Delhi.
- Alla Appa Rao. (2010). Learning Disabilities, Neelkamal Publication (P) Ltd, New Delhi.
- Aruna Mohan, Y. (2009). Educational Psychology, Neelkamal Publication (P) Ltd, New Delhi.
- Baron, Robert A. (2011). Psychology, Darling Kinderssly (P) Ltd, New Delhi.
- Bharathi, T. (2008). Personality Development, Neelkamal Publications Pvt Ltd, New Delhi.
- Crow, L.D. (2008). Adjustment, Surjeet Publications, Delhi.
- Kenra, Asha K. (2008). Guidance & Counselling, Darling Kinderssly India Ltd, New Delhi.
- Kirunba Charles. (2011). Guidance & Counselling, Neelkamal Publication, Delhi.
- Kuppuswamy, B. (2008). Advanced Educational Psychology, Sterling Publishers, New Delhi.
- Safaya, R.N. (2007). Modern Educational Psychology, Dhanpat Publishers Company, New Delhi.
- Sangupta, Manjaree. (2010). Educational Psychology, New Central Book Agency (P) Ltd, Delhi.
- Santrock, John W. (2007). Child Development, Tata Mc Graw Hill, New Delhi, 2007.
- Skinner, Charles E. (2008). Educational Psychology, Surjeet Publications, Delhi.
- Vishala, Sis. Mary. (2009). Guidance and Counselling, S.Chand & Company Ltd, New Delhi.

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SEMESTER-II

CHEMISTRY – PAPER-II

METALLURGY AND CHEMISTRY OF NON-MENTALS

Code: 16CIED23 **Credits: 4 (3L: 0T: 1P)**

Hours: 5/Week

Course objective: To learn about the periodic table classification, properties and comparative studies

Unit-I – Chemistry of `d' block elements

Characteristics of `d' block elements. Comparative study of Ti, V, Cr, Mn and Iron group metals- occurrence, oxidation states, magnetic properties, catalytic properties and color.

Unit II – Metallurgy

General principles of metallurgy –occurrence- concentration of the ores- extraction of the metals Extraction of following metals: Al, Ca, Ti, Cr, Mn, Ni, V, Sn and Pb.

Unit-III – Chemistry of P block elements

Carbon family - Comparison of properties of carbon and silicon valencies, oxides, halides, hydrides and oxyacids classification, properties and uses of carbides. Classification of silicates.

Unit-IV – Nitrogen and Oxygen family

Comparative study of N, P, As, Sb, and Bi – elements, oxides, oxyacids, halides and anhydrides, valency states – preparation, properties, structure and uses of hydrazine, hydroxylamine and hydrazoic acids, preparation and uses of $NaBiO_3$.

Comparative study of O, S, Se, and Te - elements, hydrides, oxides and oxyacids of sulphur including peroxy acids.

Unit-V – Halogens and Nobel Gases

Comparative study of F, Cl, Br, I and At – elements reactivities, hydrogen halides, oxides and oxyacids. Interhalogen compounds and pseudo halogens. Exceptional properties of Fluorine. Electronic onfiguration and position in the periodic table. Applications, clathrates and compounds of xenon, hybridization and geometries of XeF_2, XeF_4, $XeOF_4$.

Text Books:

- P. L. Soni, "Text Book of Inorganic Chemistry" Sultan Chand & sons. 32nd edition. **2013.**
- R. D. Madhan, "Modern Inorgnaic Chemistry" S. Chand & Co., 6th edition **2012**

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Gain the knowledge about the Characteristics of `d' block elements

CO2: comparative study of Ti, V, Cr, Mn and Iron group metals

CO3: Analyze the general principles of metallurgy, occurrence, and concentration of the ores

CO4: Apply the theories in extraction of the selected metals.

CO5: Examine the characteristics Halogens and Nobel Gases.

Reference Books:

- James E. Huheey, Ellen, A. Keiter, Richard, L. Keiter, "Inorganic Chemistry" Pearson education (Singapore Pvt Limited) 9th edition, **2013**
- J. D.Lee, Concise Inorganic chemistry" Blackwell Science Limited (France) 9th edition **2013**

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CHEMISTRY
PRACTICAL-II

List of Experiments

1. Reaction of simple radicals.
2. Reaction of Interfering acid radicals
3. Reactions of groups I, II and III cations.
4. Reactions of groups IV, V and VI cations
5. Elimination of interfering acid radicals
6. Analysis of salt mixture – I.
7. Analysis of salt mixture – II.
8. Analysis of salt mixture – III.

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SEMESTER-II

BOTANY – PAPER-2

CYTOLOGY, ANATOMY AND EMBRYOLOGY

Code: 16EIED24 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: Enable the Students to

1. study microscopy, cell organelles of Prokaryotic and Eukaryotic cells, chromosomes, cell divisions, DNA and RNA.
2. understand gene regulation and chloroplast and mitochondria genome organization.
3. inculcate the basics of tissues and anatomical features of plants.
4. impart the knowledge about the various aspects of morphogenesis.
5. understand the key aspects of embryology of Angiosperms.

Unit – I – Cytology

Basic principles of microscopy. Differentiating features of Prokaryotic and Eukaryotic cells – Ultra structure and functions of plasma membrane – Ultra structure of cell organelles – Plastids, Mitochondria, Golgi bodies, Endoplasmic Reticulum and Lysosomes and Cell Inclusions.

Unit -II

Nucleus – Nucleolus - Structure of euchromatin and heterochromatin – Special types of chromosomes – Lamp brush chromosomes and polytene chromosomes. Cell cycle, Cell Division: Mitosis and meiosis. Nucleic acids – DNA and RNA – Differentiating features

Unit – III - Anatomy

Anatomy: Plant tissue – Classification of meristems- apical meristems, lateral meristerms and intercalary meristem. Epidermal tissue system, stomatal types. Permanent tissue – simple – Parenchyma, collenchyma and sclerenchyma. Complex Permanent Tissues: Xylem and Phloem – Components.

Unit - IV

Primary structure of root, stem and leaf in dicots and monocots. Normal Secondary growth in stem and root - annual rings – heart Wood, sapwood. Periderm formation. Anomalous secondary growth in dicot stems: *Nyctanthes* and *Boerhaavia* and monocot stem-*Dracaena*. Nodal anatomy – uni and trilacunar types.

Unit – V- Embryology

Embryology – Structure and development of anther. Microsporogenesis; Microgametogenesis; Ultrastructure of pollen wall – structure, development and types of ovules, megasprogenesis, Megagametogenis (*Polygonum* type of embryosac development), Fertilization - Double fertilization – Syngamy – Triple fusion – Post fertlization changes.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Compare the features of procaryotic and eukaryotic cells.

CO2: Evaluate that chromosomes, DNA, genes are the hereditary materials of all living things.

CO3: Analyze the different cells and tissues in plants.

CO4: Compare and synthesize the monocot and dicot plants.

CO5: Synthesize fertilization ad poet- fertilization process in plants.

Practical –II
CYTOLOGY, ANATOMY AND EMBRYOLOGY

1. Study of structures of plant cell organelles from electron micrographs and standard publication.
2. Study of Mitosis and Meiosis division through squash technique and slide.
3. Study of simple and complex (primary and secondary) tissues.
4. Study of internal structure of root and stem of dicotyledons and monocotyledons.
5. Study of dicot and monocot leaves.
6. Study of stomatal types.
7. T,S, of mature anther (slide)
8. Types of ovule (slide)
9. Embryo sac (slide)
10. Stages in the development of dicot and monocot embryos

References Books

1. Bhojwani, S.S. and Bhatnagar, S.P. (2000). *The Embryology of Angiosperms* (4th Edition). Vikas Publishing House (P) Ltd., UBS Publisher's Distributors, New Delhi.
2. Brown W.V. and Bertke E.M. 1974. A Textbook of Cytology, C.V. Moshy Co. St.Louis
3. Cohn N.S 1979. Elements of Cytology, Freeman Book Co.
4. Cutter, E.G. (1978). *Plant Anatomy Part-I: Cells and Tissues* (2nd Edn.), *Plant Anatomy Part-II: Experiments and Interpretations*. Edward Arnold, London.
5. Esau, K. (1965). *Vascular Differentiation in Plants*. Holt, Rinehart and Winston, New York.
6. Esau, K. (1980). *Plant Anatomy* (2nd Edition). Wiley Eastern Ltd., New Delhi.
7. Fahn, A. (1997). *Plant Anatomy*. Pergamon Press, Oxford.
8. Foster, A.S. (1960). *Practical Plant Anatomy*. Van Nostrand and East–West Press, New Delhi.
9. Govindarajulu, A. (1980). *"Marangal" (Trees)* (In Tamil). Tamilnadu Textbook Society, Chennai.
10. Hell J.I. Flowers T.J. and Roberts R.M. 1978. Plant cell structure and metabolism. Longman.
11. Johri, B.M. (1982). *Experimental Embryology of Vascular Plants*. Springer – Verlag, Heidelberg.
12. Krishnamurthy, K.V. (1980). *Wood*. Tetrahedron Publications, Tiruchirappalli.

13. Maheswari, P. (1985). *An Introduction to the Embryology of Angiosperms*. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
14. Maheswari, P. (1963). *Recent Advances in the Embryology of Angiosperms*. International Society of Plant Morphologists, University of Delhi.
15. Rogland, A. (2000). Developmental *Botany (Embrylogy of Angiosperms*). Saras Publications, Nagercoil.
16. Swamy, B.G.L. and Krishnamoorthy, K.V. (1980). *From Flower to Fruit*. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
17. Swanson C.P 1971. The Cell. Prentice Hall of India
18. Vasishta, P.C. (1977). *A Text Book of Plant Anatomy*. S. Nagin and Co., New Delhi.
19. Verma P.S and Agarwal V,K,1980, Cytology, S. Chand & Co Limited

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SEMESTER-II

ZOOLOGY – PAPER-2

INVERTEBRATA – II

CODE: 16EIED25 **Credits: 4 (3L: 0T: 1P)**

Hours: 5/Week

Objectives: Enable the Students to

1. enlighten the student about the diverse forms of Invertebrate animals which belong to 5 major phyla present around us.
2. help our student to distinguish various Invertebrate animals and to know the evolutionary sequence of them.
3. understand Habitat, Adaptation organization and taxonomic status of invertebrates.
4. explain the basic aspects of classification, structural and functional details of Invertebrates.

Unit – I:

Phylum Annelida: General characters and classification up to class level with examples. Detailed study: Earthworm and Leech – Metamerism – Trochopore Larva and its significance – vermiculture – Economic importance

Unit – II:

Phylum Arthropoda: General characters and classification up to class level with examples. Detailed study: Prawn and Scorpion. Crustacean larvae and their significance, Peripatus and its affinities. Economic importance of insects, social life in insects

Unit –III:

Phylum Mollusca : General characters and classification up to class level with examples. Detailed study: Pila and fresh water mussel economic importance

Unit – IV:

Phylum Echinodermata: General characters and classification up to class level with examples. Detailed study: star fish – Echinoderm larvae and its significance – water vascular system in echinoderms.

Unit – V: Minor Phylums

Acoelomate groups: Phylum Mesozoa – Ctenophora; Pseudocoelomate groups: Phylum Acanthocephala – Rotifera – Nematoda; Coelomate groups: Phylum Brachiopoda – Chaetognatha – General characters, concept, significance.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Gain knowledge about the diverse forms of Invertebrate animals.

CO2: Distinguish various Invertebrate animals and to know the evolutionary sequence of them.

CO3: Understand Habitat, Adaptation organization and taxonomic status of invertebrates.

CO4: Classify the structural and functional details of invertebrates.

CO5: Prove the concept of its habitat.

References:

1. Agarwal, V.K. (2003). Invertebrate Zoology,S.Chand & company Ltd, New Delhi
2. Dhami, P.S., and Dhami, J.K. – Invertebrate zoology – R. chand and Co
3. Ekambaranatha Ayyar, M., Ananthakrishnan, T.N. (1985). A Manual of Zoology, S.Visvanathan pvt., Chennai.
4. Jordan, E.L and Verma, P.S 2009 (Multi colour revised edition). Invertebrate zoology. S. chand & Company Ltd, New Delhi
5. Kotpal R.L. (2014). Modern Text book of Zoology Invertebrates, Rastogi Publications, Meerut,.
6. Kotpal, R.L 1988-1992 (All series) protozoa, Porifera, Coelanterata, Annalida Arthropoda, Mollusca, Echinodarmata, Aves – Rastogi Publications, Meerut – 250002
7. Nair, N.C Leelavathy, L., Soundara Pandian, N. Murugan, T. and Arumugam, N. (2009). A text book of zoology. Invertebrates, Rastogi publications , New Delhi

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PAPER – II – INVERTEBRATE – II

Practicals:

I. Spotters

Classify give reasons

1. Leech
2. Earth worm
3. Nereis
4. Prawn
5. Fresh water mussel
6. Star fish

II.Draw labeled sketches

1. Transverse section of Nereis
2. Transverse section of Leech
3. Transverse section of Earth worm

III. Biological significance

1. Heteronereis
2. Trochophore larva
3. Peropatus
4. Limulus
5. Bipinnaria larva
6. Nauplius larva
7. Zoea larva
8. Cypris larva
9. Mysis
10. Octopus
11. Leech

IV. Relate structure and function

1. Nereis – Paraposium
2. Prawn – petasma
3. Honeybee – sting apparatus
4. Scorpion – book – lung
5. Star fish – tube foot

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SEMESTER-III

பருவம் **III**

தமிழ் – தாள் **- 3**

CODE: 16TIED31 **Credits:3 (2L:1T:0P)**

Hours: 4/Week

நோக்கங்கள்: -

1. தமிழ் மொழியின் வரலாற்றை அறிவியல் கண்ணோட்டத்துடனும் மொழிக்குடும்மங்களின் அடிப்படையுலும் விளக்குதல்
2. சங்க இலக்கியத்தை வழி மாணவர்களிக்கு பண்டைய மக்களின் வாழ்க்கை நிலையை அறியச் செய்தல்
3. படைப்பாற்றல் திறனை வளர்த்தல்
4. பயன்பாட்டு தமிழ் வழியாக மாணவர்களுக்கு எழுதும் திறன் பேச்சு திறனை வளர்த்தல்

அலகு -1 நாட்டுப்புறவியல்: -

நாட்டுப்புற இலக்கியம் – தோற்றம் – வளர்ச்சி – ஏட்டுயிலக்கியத்தில் நாட்டுப்புறத்தாக்கம் – நாட்டுப்புறக் கலைகள் – நாட்டுப்புற நம்பிக்கைகள் – பழமொழிகள்

அலகு 2 சிற்றிலக்கியங்கள்: -

சிற்றிலக்கியங்கள் – வகை – பரணி – கலிங்கத்துப்பரணி – குற்றாலக்குறவஞ்சி – பிள்ளைத்தமிழ் – மீனாட்சியம்மை பிள்ளைத்தமிழ் – தமிழ் விடுத்தூது – நந்திகலம்பம் – முக்கூடற்பள்ளு

அலகு – 3 இக்கால இலக்கியம்

புதுக்கவிதை – தோற்றம் – வளர்ச்சி – வகைகள் – ஆசிரியர்கள்

1. குக்கூ – மீரா
2. தீவெளி – லதா

அலகு – 4 இலக்கணம்

இலக்கணம் – வகைகள் – எழுத்து – சொல்

1. எழுதுது இலக்கணம்
2. சொல் இலக்கணம்

அலகு – 5 பயன்பாட்டுத் தமிழ்: -

1. சேகரித்தல் – வரையறை – பண்புகள் – மொழி ஆளுமை – மாதிரிகள் – செய்தி சேகரித்தலில் தொலைக்காட்சியின் பங்கு – பயிற்சிகள்
2. நேர்க்காணல் – வரையறை – நோக்கம் – ஆயத்தம் – வகைகள் – பயிற்சிகள்

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Appreciate the culture and heritage through folk tales.

CO2: Analyze the Tamil ‘sitrilakkiyam’

CO3: Develop their creative writing and innovative poetry.

CO4: Analyze the grammatical rules.

CO5: Improve their functional language skills.

பார்வை நூல்கள்: -

- முனைவர். சு. சக்திவேல் – நாட்டுப்புறவியல் ஆய்வு, மாணிக்கவாசகர் பதிப்பகம்
- முனைவர்.சி. பாலசுப்பிரமணியன் – தமிழ் இலக்கிய வரலாறு, பாரி நிலையம்
- முனைவர்.பொற்கோ – தமிழை நீங்களும் தவறு இல்லாமல் எழுதலாம்
- கா.பட்டாபிராமன் – மொழிப் பயன்பாடு, நீயு செஞ்சுரி புக் வுவஸ்

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SEMESTER –III

HINDI – PAPER-3

CODE: 16IHED31 **Credits: 3 (2L: 1T: 0P)**

Hours: 4/Week

Objectives: Students develop proficiency in Hindi which equips them to

1. enable the students to acquire basic skills in functional language.
2. develop independent reading skills and reading for appreciating literary works.
3. internalise grammar rules so as to facilitate fluency in speech and writing .
4. develop functional and creative skills in language.
5. develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode:

Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit - I: Functional Language:

a) Letter Drafting-Types of letters-E mails-language of letters-letters of famous people-exercises.
b) Essay writing- Characteristics –Definition-Format-format of essay-types of essays (literary, scientific etc)-models, exercises

Reference: A Handbook of Writing Activities, Prasaranga, University of Bangalore.

Unit - II: Translation from English to Hindi

References : Anuvad Vignan-Bholanath Tiwari

a) About Translation by Peter Newmark, MultiLingual Motters, Clavedon, UK. b) Aspect of Translation by K V V L Narasimha Rao, CIIL, Mysore

Unit - III: Medieval Literature :

Text- **Pracheen evam madhyakaleen Hindi Kavya**

Prof Poornachand Tandan (Ed.) Published by Rajpal and sons, Kashmiri gate, Delhi 110006. Following poets' work have been prescribed for study **Bihari, Ghananand, Dev** (One poem of each poet)

Unit - IV: Novel

Subhah, Dopahar, Sham by Kamaleshwar, Published by Rajpal and sons, Kashmiri gate, Delhi

Sessional work :

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Improve their letter writing skill in Hindi

CO2: Develop their translation skills from their mother tongue to Hindi.

CO3: Interpret the thoughts and ideas of medieval literature.

CO4: Appreciate the novels and its novel ideas.

CO5: Analyze the grammatical rules.

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SEMESTER – III

ENGLISH – PAPER - 3

CODE: 16IEED31 **Credits: 3 (2L: 1T: 0P)**

Hours: 4/Week

Objectives: Students develop proficiency in English which equips them to

1. understand the demands of audience, subject, situation and purpose and the
2. use of language for effective communication.
3. analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
4. examine authentic literary and non-literary texts and develop insight and appreciation.
5. gain an understanding of study and reference skills.
6. plan, draft, edit and present a piece of writing.

Unit I : Grammar

Clauses : Noun Clause- Reported Speech and Change of Voice – Phrasal verb - Prepositional phrases.

Unit II : Comprehension Skills

Extracts from literary, scientific and educational journals.

Unit III : Advanced Writing Skills

Writing advertisement copy; Writing a project proposal, Writing Resume and writing a report, sending an application.

Unit IV : Skills of Communication

Presenting oneself at an interview, participating in group discussion.

Unit V : Literature – Short Poems

On His Blindness	- John Milton
The Village Schoolmaster	- Oliver Goldsmith
The Daffodils	- William Wordsworth
Night and Death	- Joseph Blanco White
The Ballad of Father Gilligan	- W.B.Yeats

Unit V: Composition

Letter writing: Personal, Business Letters - Hints development

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Utilize instructions on fundamentals of grammar.

CO2: Examine the difference between poetic language and the language of the prose.

CO3: Develop their own style of writing after studying advanced skills of writing.

CO4: Classify different types of letter based on their need.

CO5: Conclude the textual content of poetry.

Suggested Readings:

- Calkins, L (1994). *The Arts of Teaching Writing*. Heinemann
- Chan. et al. (1997*) Professional Writing Skills*, San Anselma, CA
- Fiderer, A. (1994) *Teaching Writing: A Workshop Approach*. Scholastic.
- Block, C.C.(1997). *Teaching the Language Arts*, 2nd Ed. Allyn and Bacon
- Mckay. et al. (1995). *The Communication Skills Book*, 2nd Ed. New Harbinger Publications**.**

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SEMESTER – III
EDUCATION IN CONTEMPORARY INDIA

CODE: 16CIED31 **Credits: 4 (3L: 1T: 0P)**
Hours: 5/Week

Objectives: On completion of the course, the student-teachers will be able to

1. understand the concepts of education and its objectives.
2. recognize major constitutional provisions for education.
3. acquire knowledge of universalisation of elementary education, RMSA.
4. understand the meaning and different types of Non- formal Education programmes in India.
5. understand the importance of values and Classify the hierarchy of values.
6. understand the need for value oriented education at all levels.

UNIT-I: Education Problems in Contemporary Indian Society

Education – Meaning. Aims and Objectives. Nature and Scope. Purpose and Process of Education. Types of Education. Problems in Contemporary Indian society (in the context of religion, language, race, social stratification) - Education in Pre-Independent India- Education in Post- Independent India.

Unit-II: Indian Constitutional Provisions and Education Commissions

The place of Education in the Indian Constitution- Right to Information Act- National Curriculum Framework (2005)-National Curriculum Framework for Teacher Education (2009) - The role of a teacher with reference to Fundamental rights and duties of the citizens. Recommendations of Education Commissions -Dr. Radha krishnan commission (1948-49), Mudaliar Commission (1952-53) - Indian Education Commission (1964-66)- National Policy of Education(1986)- Ramamurthy Review Committee(1992).

Unit-III: Educational Programmes of Quality Improvement for Education

Universal Elementary Education (UEE) - Sarva Shiksha Abhiyan- Objectives, Achievements and challenges – Right to Education. Rashtriya Madyamik Shiksha Abiyan (RMSA). Samacheer Kalvi.. Operation Black Board - Integrated Child Development services- Transit Schools-Education of Women and Under privileged Sections of Society.

UNIT- IV: Non Formal Education

Non Formal and Adult Education - Functional Literacy, Technology Mission for Literacy, Distance Education – National Open School, Open University and open Learning - National Literacy Mission-Mass Programme of Functional Literacy - Functional Literacy Programme for Farmers

UNIT-V: Value Education

Value: Meaning, Definition and Classification of Values, Importance of values, Hierarchy of Values. Role of Values in shaping the individual's personality. Value Education: Meaning, Objectives and Need of Value Education-Value Education in Schools, Methods of Teaching Values.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Examine the educational problems in contemporary Indian society.

CO2: Differentiate education in pre and post independent India.

CO3: Appraise various Indian Constitutional provisions and education commission.

CO4: Formulate the objectives and need of value education

CO5: Conduct value-based activities in schools and colleges.

References:

- Aggarwal, J.C. (2008). Development of Education System in India, Shipra Publications.
- Annual Report 2008-2009, National Council for Teacher Education. (NCTE), New Delhi.
- Batra, Poonam. (2005). *Voice and Agency of Teachers: The Missing Link in the National Curriculum Framework. 2005*, EPW, October 1-7, pp. 4353.
- Biswa Ranjan Purkait. (1998). Great Educationists and their Philosophies, New Central Book Agency Pvt Ltd,.
- Chaube, S.P. (2013). *Problems of Indian Education*. Agra: Shri Vinod PustakMandir.
- Curriculum Framework for Teacher Education, draft 2006. New Delhi: National Council for Teacher Education (NCTE).
- Deshpande, S. (2004). *Contemporary India: A Sociological View*. New Delhi: Penguin Chapter 5: Caste inequalities in India Today.
- Glenn, L. (1970). *Philosophy and Education*. London: Macmillan Publication.
- Jagannath Mohanty. (2008). Modern Trends in Indian Education, Deep & Deep Publications Pvt Ltd,.
- James C Lawrence, (2010). Educational Philosophy, Rajat Publications.
- Kapila, U. (2009). *Indian Economy since Independence*. New Delhi: Academic Foundation. Chapter 1: Indian Economy at independence.
- Lakshmi, S. (1997). Educational Challenges in the Emerging Indian Society, Sterling Publishers, New Delhi.
- Mohit Chakrabarti. (2004). Value Education Changing perspectives (2nd Edition) New Delhi. Kanishka Publishers.
- Naseema, C. (2003). Human Rights Education, Kanishka Publishers, New Delhi.
- Qureshi, Muniruddin. (2005). *Social Aspects of Education*. New Delhi: Anmol publications pvt. Ltd.

- Rahul Rai. (1996). Human Rights UN Initiatives, Authors Press Publishers of Scholonly Boot, New Delhi.
- Ranganadananda, Swami. (1969). Eternal Values for a changing Society, Bombay, Bharatiya Vidya Bhavan.
- Rao, Digumarti Bhaskara (2013). *Right to Education*. New Delhi: Neelkamal publications pvt. Ltd.
- Swaroop Sarena, N.R.,& Chaturvedi, Shikha. (2012). *Teacher in Emerging Indian Society*. Meerut: Lall Book Depot.
- Vanaja M and Vijaya Bharathi D (2008) Value Oriented Education. Initiatives at the Teacher Education Level, Hyderabed; Neelkamal Publications.
- Working Group Report on Elementary Education and Literacy, XI Five Year Plan, 2007-12. New Delhi: Planning Commission of India.

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SEMESTER – III

TEACHING AND LEARNING – PART 1

CODE: 16CIED32 **Credits: 2(1L: 1T: 0P)**
Hours: 3/Week

Objectives: On completion of the course, the student-teachers will be able to

1. understand the importance of concept of learning and teaching;
2. acquire knowledge about principles and maxims of teaching;
3. acquire knowledge about the task of teaching;
4. understand the skills required for teaching
5. accept and understand the importance of modification in teachers' behaviour;
6. interpret and manage the learning and teaching process effectively;

UNIT-I: Understanding and Management of Teaching and Learning

Teaching: Concept, Meaning and definitions; Nature and characteristics of teaching; the relation of teaching with other similar concepts; Analytical concept of teaching.

Learning: Concept, Meaning and definition, Relationship between teaching and learning. Nature of learning– Learning as a process and learning as an outcome. Types of learning – Factual, association, conceptual, procedural, generalization, attitude, values, skills. Management of learning–Planning, organizing, executing, controlling and quality of learning.

UNIT-II: Teaching and Skills Associated with Teaching

Teaching: Concept, Meaning and definition - teaching as task of specialized professionals- General principles of teaching; psychological principles of teaching and maxims of teaching;

variables involved with teaching task - Phases and Operations of teaching task-The pre-active phase, interactive phase and post-active phase. Levels of teaching task- Memory level of teaching, understanding level and reflective level of teaching and skills associated involved in the three phases of teaching.

UNIT-III: Modification in Teacher Behaviour

Introduction: Modification of teacher behaviour, simulation teaching, t-group training, Interaction Analysis, Action Research, Micro teaching with special reference to components of various teaching skills.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Execute the skills required for teaching

CO2: Examine the knowledge about the principles of teaching

CO3: Organizing the learning and teaching process effectively

CO4: Appraise the importance of modification in teacher's behavior

CO5: Implement the strategies of teaching methods in classroom.

References:

- Bob Burkill., & Ray Eaton. (2011*). Developing Teaching and Learning*. London: Cambridge University Press.
- Derek, Rowntree. (1986).*Teaching through self-instruction*. London: Kogan page.
- Jaya Pillai, K. (1985). Effective teaching. Madurai: publishing division, Madurai Kamarajar University.
- Kulkarni,S.S.(1986*). Introduction to Educational technology.* Bombay: Oxford and IBH Publishing Co.
- Kumaraswamy Pillai, K. (198*0). Curriculum, Teaching and Evaluation*. Annamalai Nagar: Sivakami Printers.
- Mangal,S.K.(1986*). Fundamentals of Educational Technology*. Ludhiana: Prakash Brothers.
- NCTE. (1998*). Competency Based and Commitment Oriented Teacher Education for Quality School Education*. New Delhi: NCTE Initiation Document 98/21.
- Ramesh Varma., & Suresh Sharma. (1998*). Modern Trends in Teaching Technology*. New Delhi: Anmol Publications.
- Sampath, K. (1981*). Introduction to Educational Technology*. New Delhi: Sterling Publishing Pvt. Ltd.
- Sharma Prem Latha. (2006). *Learning Readiness*. New Delhi: Roshan Offset Printers.
- Sharma, Motilal. (1985). *Systems Approach: Its Application in Education*. Bombay: Himalaya Publishing House.
- Sharma, R.A. (1991). *Technology of Teaching*. Meerut: R.Lall Book Depot.
- Sharma,R.A. (1982*). Programmed Instruction and Instructional Technology.* Meerut: International Publishing House.
- Siddiqui, M.H., & Khan, M.S. (1991*). Models of Teaching:Theory and Research.* New Delhi: Ashish Publishing House.
- Thomas, Mathew. (2009). *Effective Teaching*. New Delhi: S. Chand and Company.

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SEMSTER-III

CHEMISTRY – PAPER-III

CHEMICAL KINETICS AND PHASE RULE

CODE: 16CIED33 **Credits: 4 (3L: 0T: 1P)**

Hours: 5/Week

Course objective: To know about chemical kinetics, catalysis rate determination, phases and its concepts: components, degrees of freedom, phase diagram.

Unit-1: Phase Equilibria-I

Phase Rule: Concepts of phase, component and degrees of freedom, with examples. Gibb's phase rule phase diagram and application of phase rule: *One-component system*- Water and sulphur systems. *Two component system*- Simple eutectic: Lead-silver system.

Unit-2: Phase Equilibria-II

Distribution law statement and limitations applications to simple systems involving association, dissociation and complex formation. Solid-liquid equilibria -Binary systems. Theory of fractional crystallization Binary systems forming salt hydrates $FeCl_3$ - freezing mixtures NaCl, $CaCl_2$.

Unit-3: Chemical Kinetics-I

Rate of a reaction - Rate equation- Rate constant, Order and Molecularity - Methods of rate measurement. Derivation of kinetic equation for rate constants of I, II order reactions - Third and zero order reactions and examples (No derivation of rate constant). Rate determining step and mechanism of elemental process - Arrhenius law- activation energy.

Unit 4: Chemical Kinetics-II

Collision theory of reaction rates, collision cross section, collision number. Effect of solvent and ionic strength on reaction rates. Unimolecular reactions steady state treatment Lindemann hypothesis Chain reaction.

Unit 5: Chemical Kinetics-III

Homogeneous and Heterogenous Catalysis - definition - examples and differences. Reactions in gases and in solutions (Acid, base and Wilkinson's catalysts). Enzyme catalysis elementary of the principle of the activated complex using steady state treatment Michaelis - Menten kinetics.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the various concepts of degrees of freedom

CO2: Interpret the theory of fractional crystallization and binary systems.

CO3: Develop the concepts of chemical kinetics.

CO4: Prove the theory of catalysis rate determination.

CO5: Identify the concepts of chemical kinetics.

Text Books:

- P.L. Soni, " Text Book of Physical Chemistry" Sultan Chand & sons, 12th edition, **2010**
- B. R. Puri, L. R. Sharma, Pathania, "principle of Physical Chemistry" Vishal Publishing & Co., 46th edition **2013**

Reference Books:

- Kundu and Jain, "Physical Chemistry" S. Chand, 6th edition, **2011**
- S. Glasstone, "Text Book of Physical Chemistry" –Macmillan. 7th edition **2012**

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CHEMISTRY
PRACTICAL-III

Determination of the order of the following reactions.

1. Iodination of acetone
2. Saponification of an ester (ethyl acetate)
3. Acid catalyzed hydrolysis of an ester (ethyl acetate)

Distribution Law

4. Iodination of carbon tetra chloride
5. Saponification of an ester (ethyl acetate)
6. Acid catalyzed hydrolysis of an ester (ethyl acetate)

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SEMESTER-III

BOTANY – PAPER-3

BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS

Code: 16EIED34 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: Enable the Students to

1. understand the salient features of Bryophytes, Pteridophytes and Gymnosperms.
2. study the structure and reproduction of various genera mentioned in the syllabus.
3. study the morphology, reproduction and life history of the various genera.
4. study the classification for Bryophytes, Pteridophytes and Gymnosperms.

Unit – I – Bryophytes

Bryophytes – General Characteristics, Classification – Liverworts (Stotler et. al., 2009), hornworts (Renzaglia et al., 2009), and Mosses (Goffinet et al., 2009).

Unit - II

Morphology, Structure, Reproduction and life history of the following genera: *Riccia, Marchantia, Anthoceros* and *Polytrichum.* Economic importance of Brypohytes.

Unit III - Pteridophytes

Pteridophytes – General characteristics and classification by Smith; Morphology, Structure, Reproduction and life-history of the following genera: *Psilotum, Lycopodium, Selaginella* and *Equisetum.*

Unit - IV

Morphology, structure, Reproduction and life-history of *Adiantum, Marsilea*; Stelar evolution in Pteridophytes; Heterospory and origin of seed habit.

Unit V - Gymnosperms

Gymnosperms – General characteristics and classification of Gymnosperms by Sporne; Morphology, structure, mode of reproduction and life-history of the following genera: *Cycas, Pinus* and *Gnetum.*

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the salient features of Bryophytes, Pteridophytes and Gymnosperms.

CO2: Gain the knowledge of the structure and reproduction of various genera mentioned in the syllabus.

CO3: Analyze the morphology, reproduction, and life history of the various genera.

CO4: Distinguish the classification for Bryophytes, Pteridophytes and Gymnosperms.

CO5: Understand the economic importance of Bryophytes, Pteridophytes and Gymnosperms.

Practical –III

BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS BRYOPHYTES

Riccia, Marchantia, Anthoceros and *Polytrichum (Slide)*

Pteridophytes

Psilotum - Demonstration only (Bottle specimen)

Lycopodium - Stem and Cone only

Selaginella - Stem and Cone only

Equisetum - Stem, cone slide Demonstration only

Adiantum - Rachis, Sorus

Marsilea - Stem, Sporocarp slides

Gymnosperms

Cycas Rachis, Leaflet – T.S.;

Coralloid root, male cone microsporophyll, Megasporophyll – Demonstration only

Pinus - Needle – T.S., Young stem – T.S.; Male & Female cone – Demonstration only

Gnetum - Stem –T.S.; Male & Female Strobilus – Demonstration only

References:

BRYOPHYTES

1. Chopra, R.N. and Kumara, P.K. (1988). *Biology of Bryophytes*. Wiley Eastern Ltd., New Delhi.
2. Jeyaraman, (1978). *Indiyavin liverwortugal* (In Tamil). Tamil Nadu Textbook society, Madras.
3. Palaniyappan, S. (1988). *Bryophyta* (In Tamil). T.K. Publishing House, Chennai.
4. Prem, P. (1981). *Bryophytes: Morphology, Growth and differentiation*. Atma Ram and Sons, New Delhi.
5. Rashid, A. (1998). *An Introduction to Bryophyta*. Vikas Publishing House (P) Ltd., New Delhi.
6. Smith, G.M. (1955). *Cryptogamic Botany Vol. II Bryophytes and Pteridophytes* (2nd edn.). Tata McGraw Hill Publishing Co., New Delhi.
7. Srivastava, N.N., (1996). *Bryophyta*. Pradeep Prakashan, Meerut.

8. Vashista, B.R. (1983). *Botany for Degree Students – Bryophyta.* S. Chand and Company Ltd., New Delhi.

PTERIDOPHYTES

1. Rashhed, A. (1999). *An Introduction to Pteridophyta*. Vikas Publishing House (P) Ltd., New Delhi.
2. Sharma, O.P. (1990). *Textbook of Pteridophyta*. MacMillan India Ltd., New Delhi.
3. Smith, G.M. (1955). *Cryptogamic Botany Vol. II Bryophytes and Pteridophytes* (2nd Edn.). Tata McGraw-Hill Publishing Co., New Delhi.
4. Sporne, K.R. (1970). *The Morphology of Pteridophytes* (The Structure of Ferns and Allied Plants). Hutchinson University Library, London.
5. Sundara Rajan, S. (1994). *Introduction to Pteridophyta*. New Age International Publishers Ltd., Wiley Eastern Ltd., New Delhi.
6. Vashista, P.C. (1997). *Botany for Degree Students Pteridophyta*. S. Chand and Company Ltd., New Delhi.

GYMNOSPERMS

1. Bhatnagar, S.P. and Alok M. (1997). *Gymnosperms*. New Age International (P) Ltd., Publisher, New Delhi.
2. Coulter, J.M. and Chamberlain, C.J. (1964). *Morphology of Gymnosperms*. Central Book Depot, Allahabad.
3. Sharma, O.P. (1997). *Gymnosperms*. Pragati Prakashan, Meerut.
4. Sporne, K.R. (1971). *The Morphology of Gymnosperms* (The Structure and Evolution of Primitive seed Plants). Hutchinson University Library, London.
5. Srivastava, H.N. (1998). *Gymnosperms*. Pradeep Publications, Jalandhar.
6. Vashishta, P.C. (1996). *Botany for Degree Students-Gymnosperms* (2nd Edn.,). S.Chand and Company Ltd., New Delhi.

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SEMESTER-III

ZOOLOGY – PAPER-III

CHORDATA

CODE: 16EIED35 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: Enable the Students to

1. To enlighten the student about the diverse forms of Invertebrate animals which belong to 5 major phyla present around us.
2. To help our student to distinguish various vertebrate animals and to know the evolutionary sequence of them.
3. To understand Habitat, Adaptation organization and taxonomic status of chordata
4. Explaining the basic aspects of classification, structural and functional details of Invertebrates

Unit – I

Prochordata: General characters of Prochordata and its classification with examples. Detailed Study: Amphioxus. Retrogressive metamorphosis in Ascidian.
Vertebrata: General characters of Vertebrata and its classification up to class with examples

Unit – II

Class Pisces: General characters and classification up to orders with examples. Detailed study: Shark Types of a scales and fins – Accessory respiratory organs – Air bladder – Parental care – Migration – economic importance.
Class Amphibia: General characters and classification up to orders with examples. Detailed study: Frog Parental care in Amphibia.

Unit – III

Class Reptilia: General characters and classification up to orders with examples. Detailed study: *Calotes* Identification of poisonous and non-poisonous snakes of South India, Poison apparatus and biting mechanism of poisonous snakes

Unit – IV

Class Aves:General characters and classification up to orders with examples. Detailed Study: Pigeon Flightless Birds and their distribution, Migration of birds, Flight adaptations in birds.

Unit – V

Class Mammalia: General characters and classification up to orders with examples. Detailed Study: Rabbit Monotremes and Marsupials, Aquatic Mammals, Dentition in Mammals

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Define the general characteristics of Chordates.

CO2: Analyze various animals coming under Chordates.

CO3: Recognize the animals belong to its Phylum.

CO4: Describe the Characters of Chordates.

CO5: Differentiate the various vertebrate animals.

References:

1. Ayyar. E.M., Anantha Krishnan T.N. 1995. Manual of Zoology Vol.II, Part I & II. (Chordata), S. Viswanathan Pvt. Ltd., Chennai.
2. Dhami, P.S and Dhami, J.K. 1982. Chordate Zoology. R.Chand & co Publishers, New Delhi.
3. Kotpal, R.L.1998. Modern Text Book of Zoology - Vertebrata, Rastogi and Company, Meerut, India.
4. Thangamani, T. and Arumugam, N. 2009. A text book of Chordates. Saras Publications
5. Jordon E and Verma P.S. 1995. Chordate Zoology elements of animal physiology. S.Chand & Co.New Delhi.

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PRACTICAL – III

PAPER- III - CHORDATA

Practicals

Spotters

1. Amphioxus
2. Ascidian
3. Balanoglossus
4. Shark
5. Ray
6. Catla
7. Salamander
8. Frog
9. Naja naja
10. Viper
11. Pigeon
12. Owl
13. Quil feather
14. Bat
15. Dentition – Rabbit, Dog & Man

Mountings:

Placoid scales, cycloid / ctenoid scales
Osteology
Frog:
Skull and Lower Jaw
Pelvic girdle
Pectoral girdle
Rabbit:
Skull and Lower Jaw
Pelvic girdle
Pectoral girdle

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SEMESTER-IV

பருவம் **IV**

தமிழ் – தாள் **- 4**

CODE: 16TIED41 **Credits: 3 (2L:1T:0P)**

Hours: 4/Week

நோக்கங்கள்: -

1. தமிழ் மொழியின் வரலாற்றை அறிவியல் கண்ணோட்டத்துடனும் மொழிக்குடும்மங்களின் அடிப்படையுலும் விளக்குதல்
2. சங்க இலக்கியத்தை வழி மாணவர்களிக்கு பண்டைய மக்களின் வாழ்க்கை நிலையை அறியச் செய்தல்
3. படைப்பாற்றல் திறனை வளர்த்தல்
4. பயன்பாட்டு தமிழ் வழியாக மாணவர்களுக்கு எழுதும் திறன் பேச்சு திறனை வளர்த்தல்

அலகு – 1 தமிழ்மொழி கற்பித்தலின் நோக்கங்களும் குறிக்கோள்களும்: -

பொதுநோக்கம் – வெளியிடும் கருவி – பட்டறிவை எடுத்தியம்பல் – செயலாற்றல் – அறிவுகளஞ்சியவாயில் – அடிப்படை மொழித்திறன்கள் – இலக்கிய இன்பம் – படைப்பாற்றல் – கற்பனையாற்றல் – அழகுணராற்றலை வளர்த்தல் – சமூகப் பண்பாட்டு வளர்சிசி – சமுகமரபுகளைப் பேணுதல்

அலகு – 2 காப்பியங்கள்: -

மணிமேகலை – பவத்திறம் அறுக எனப் பாவை நோற்றகாதை முழுவதும் கம்பராமாயணம் – மந்தரைச் சுழ்ச்சிபடலம்

அலகு – 3 இக்கால இலக்கியம்

நாவல் – தோற்றம் – வளர்ச்சி – ஆசிரியர்கள்
ஒண்பது ரூபாய் நோட்டு (நாவல்)
ஈக்காடுதாங்கள் – சென்னை – 17

அலகு 4 உரைநடை: -

அறிவியல் தமிழ் உலகம் – S.V.சண்முகம்

அலகு – 5 பயண்பாட்டுத்தமிழ் : -

பேச்சுத்திறன் – விளக்கம் – பேச்சுத்திறனின் அடிப்படைகள் – வகைகள் – மேடைப்பேச்சு – உரையாடல் – குழுவாக உரையாடல் – பயிற்சிகள் - தலைவர்களின் மேடைப்பேச்சுகள் – பெரியார் – அண்ணா – கலைஞ்ர்

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Enhance their appreciation skills.

CO2: Justify the contemporary social issueses through studying Tamil Epics.

CO3: Analyze sangam literature incidents and stories.

CO4: Improve their technological knowledge through the novel “Ariviyal tamil ulagam”

CO5: Develop their stage performance through the study of great speakers’ experiences.

பார்வை நூல்கள்: -

- பரந்தாமனார் அ.சி.நல்லதமிழ் எழுத வேண்டிமா?பாரி நிலையம்,சென்னை – 600018
- பட்டா பிராமன். கா – மொழிப்பயன்பாடு – நீயுசெஞ்சுரி புக் வுவஸ்
- சுப்புரெட்டியார்.ந – “தமிழ் பயிற்று முறை”, மெய்யப்பன் பதிப்பகம், ஐந்தாம் பதிப்பு 2006
- இரவிச்சந்திரன்.சு – “செய்யுள் திரட்டு:, வேல்ஸ் பல்கலைக்கழகம், முதற் பதிப்பு

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SEMESTER – IV

HINDI – PAPER 4

CODE: 16IHED41 **Credits: 3 (2L:1T:0P)**

Hours: 4/Week

Objectives: Students develop proficiency in Hindi which equips them to

1. enable the students to acquire basic skills in functional language.
2. develop independent reading skills and reading for appreciating literary works.
3. internalise grammar rules so as to facilitate fluency in speech and writing .
4. develop functional and creative skills in language.
5. develop values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Transaction mode :

Lecture cum discussion, group discussion; panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit - I: Functional Language:

Précis Writing: Characteristics-definition-steps to précis writing- models-exercises

Book Reviewing-characteristics-definition-format-models-exercises

Reference: A Handbook of Writing Activities, Prasaranga, University of Bangalore.

Unit - II: Technical Writing

Definition-characteristics-format-models-Language used in the writing-Terminology-Process of writing-planning of document- Styles of writing-Techniques of writing-exercises

Reference: (a) Technical Writing by Richard W.Smith, Barnes and Noble Inc., New York, (b) Technical Report Writing Today –Daniel G.Riordan, 19-A, Ansari Road, New Delhi 110 002.

Unit - III: Ancient Poetry:

Text- **Pracheen evam madhyakaleen Hindi Kavya**, Prof Poornachand Tandan (Ed.) Published by Rajpal and sons, Kashmiri gate, Delhi-110006.
Following poets' work have been prescribed for study Kabir, and Vidyapathi.

Unit - IV: Drama

Malava Kumar Bhoj by Dr.Ramkumar Varma, Published by Rajpal and sons, Kashmiri gate, Delhi -06

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Develop independent reading skills and reading for appreciating literary works.

CO2: Internalize the grammar rules to facilitate fluency in speech and writing.

CO3: Apply the basic skills of functional language in their creative writing.

CO4: Develop functional and creative skills in language.

CO5: Respect the values of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Sessional work:

In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given .

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SEMESTER – IV

ENGLISH – PAPER - 4

CODE: 16IEED41 **Credits: 3 (2L: 1T: 0P)**

Hours: 4/Week

Objectives: Students develop proficiency in English which equips them to

1. understand the demands of audience, subject, situation and purpose and the
2. use of language for effective communication.
3. analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
4. examine authentic literary and non literary texts and develop insight and appreciation.
5. gain an understanding of study and reference skills.
6. plan, draft, edit and present a piece of writing.

Unit I : Grammar

Conditional Clauses - Simple, Complex, Compound - Idioms and phrases

Unit II : Creative Skills in Writing

Writing dialogues - Writing poems - Writing abstracts

Unit III : Literature – Prose

The Sky is the Limit - Kalpana Chawla

The Challenge of our Time - E. M. Forster

Human Rights - Sivagami Paramasivam

Unit IV : Literature and Short Stories

The Gateman's Gift - R.K. Narayan

The Ant and the Grasshopper - W. Somerset Maugham

How much land does a man need - Leo Tolstoy

The Dying Detective - Sir Arthur Conan Doyle

Unit V : Advanced Skill of Communication

Verbal and non-verbal communication – Creative thinking and speaking – Speaking about future plans

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Build their skills in English language without any grammatical errors.

CO2: Develop functional and creative skills in language.

CO3: Discuss the pros and cons of Indian literature.

CO4: Gain their knowledge though Indian short stories and literature.

CO5: Improve their advanced skill of communication.

Suggested Readings:

- Merrriam, E. (1964). It Doesn't Always Have to Rhyme. Atheneum.
- Hyland, Ken (2004) Second Language Writing. University of Michigan Press.
- Graves,D (1992). Explore Poetry: The reading /writing teacher's companion. Heinemann
- Stone Douglas (1999). Difficult conversations: How to discuss what Matters Most, New York: Penguin Books.
- Gabor Don (2001). How to start a Conversation and Make Friends, New York: Fireside.
- Subramanian.S.Dr. *Word of Wisdom. An Anthology of Modern Prose*. Anu Chitra Pub., Chennai. 2003. P.
- Subramanian.A.E. *Gifts to Prosperity. An Anthology of Modern Short Stories*. Anu Chitra Pub., Chennai. 2003.

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SEMESTER – IV

TEACHING AND LEARNING – PART II

CODE: 16CIED41 **Credits: 2 (1L: 1T: 0P)**

Hours: 3/Week

Objectives: On completion of the course, the student-teachers will be able to

1. understand the basic concepts of Educational Psychology.
2. explain the role of heredity and environment in the development of an individual.
3. recognize the importance of motivation and its role in learning.
4. describe the nature and types of learning.
5. identify the types of learning disabilities

UNIT-I: Basics of Educational Psychology

Definition, meaning, nature and scope of Educational Psychology - The focal areas of Educational Psychology: The learner, learning experience, learning process, learning situation and teacher – Methods of educational psychology: Concept of method and approaches-Methods of collecting scientific data: Interviews - Questionnaire- Case studies- Observation- participative and non-participative- Clinical method- Introspection- its merits and demerits. Approaches: Cross sectional design- Longitudinal design- Sequential design- its merits and demerits- Significance of Knowledge about Educational Psychology for teachers.

UNIT-II: Theoretical Perspectives of development

Approaches to theories of development – Social Cognition- Vygotsky social formation of mind. Constructivist: Piaget's theory of cognitive development. Moral: Kohlberg's theory of moral development. Psycho sexual: Freud theory of development- Psycho social: Erickson's theory- merits and demerits.

UNIT-III: Motivation and Learning

Motivation: Definition, meaning and concept of motivation – Types of Motives: Physiological and Psychological – Intrinsic and extrinsic motivation – Motivation Cycle

– Maslow's Hierarchy of Needs – Level of aspiration - Achievement Motivation – Role of Rewards and Punishments – Attention : Factors of attention – types: voluntary, involuntary - Inattention and Distraction - Span of Attention - Interest : Factors and Types of Interest.

Learning: Definition, concept and nature of learning - Types of learning : Perceptual and conceptual - Learning theories : Trial and Error, classical and operant conditioning, learning by insight, information processing theory – constructivism in learning - Factors affecting learning – learning curve – Transfer of learning - Remembering and Forgetting- Theories of forgetting – causes of forgetting.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Value the focal areas of educational psychology

CO2: Analyze the different perspectives of development and growth.

CO3: Appraise the theories of development.

CO4: Distinguish the types of motivation and learning theories.

CO5: Find the solution for learning disabilities.

References:

- Baron, Robert A. (2007). Psychology, A.I.T.B.S Publishers, New Delhi, 2007.
- Berk, Laura E. (2010).*Child Development*. New Delhi: PHI Learning Private Limited.
- Bhatia, H.R. (2008). Educational Psychology, Pearson Prentice Hall, New Delhi.
- Chaube,S.P. (2011). *Developmental Psychology*. New Delhi: Neelkamal Publishing Pvt. Ltd.
- Dash, B.N. (2007). Educational Psychology, Neelkamal Publications (P) Ltd, New Delhi.
- Dinkmeyer, Don C. (1965). *Child Development: The Emerging Self*. New Delhi: Prentice Hall of India Pvt. Limited.
- Dumville, Benjamin. (2001) .*Child Psychology.* New Delhi: Sports Publications.
- Human Learning and Memory – E book
- Hurlock, Elizabeth B. (2005). *Developmental Psychology – A life span approach*. New Delhi: Tata McGraw Hill Publishing Company Limited.
- Hurlock, Elizabeth B. (2006). Child Growth and development, Tata Mc Graw Hill Pvt Company, Delhi.
- Mahmud, Jafar. (2011). *Developmental Psychology*. New Delhi: A.P.H. Publishing Corporation.
- Mangal, S.K. (2008). General Psychology, Sterling Publishers (P) Ltd, New Delhi.
- Manivannan, M. (2011). *Psychology of Learning and Human Development*. New Delhi: Neelkamal Publications Pvt. Limited.
- Murthu, K.S. (2008). *Child Psychology: Anti social behaviour.* New Delhi: Cyber Tech Publications.
- Robert A.Baron, (2007). Psychology, A.I.T.B.S Publishers, New Delhi.

- Santrock, John W. (2007). Adolescence, Tata Mc Graw Hill, New Delhi.
- Schaffer, Rudolph H. (2004).*Child Psychology*. New Delhi: Neelkamal Publications Pvt. Limited.
- Stella Reynolds. (2006). Educational Psychology, Lotus Press, New Delhi.

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SEMESTER – IV

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

CODE: 16CIED42 **Credits: 4 (3L: 0.5T: 0.5P)**

Hours: 5/Week

Objectives: On completion of the course, the student-teachers will be able to

1. understand the concept of Information and Communication Technology;
2. develop insight into knowledge about new developments in ICT;
3. gain enriched learning experiences in using ICT.

UNIT-I: ICT Perspectives

ICT: Concept, Objectives, Need and Importance of ICT – Characteristics and Scope of Information and Communication Technology – paradigm shift in education due to the influences of ICT – challenges in integrating ICT in school education – Affordability for ICT equipped classroom.

UNIT-II: New Developments in ICT

Recent developments in the area of ICT – Interactive video – Interactive White Board – video-conferencing – M-learning, Social Media – Community Radio: Gyan Darshan, Gyanvani, Sakshat Portal, E-Gyankosh, Blog, MOOC, Whatsapp, Facebook, Twitter, etc. Recent experiments in the third world countries and pointers for India with reference to Education.

UNIT-III: ICT Enabled Learning Experiences - Computer Based

Application of ICT for enriching classroom experiences in learning – Application and use of multimedia educational software for classroom situation - Project based learning using computers, Technology aided learning: Computer Aided Instruction, Computer managed Instruction, Computer mediated Instruction – Computer Based Testing and Evaluation, Computer Managed Testing and Evaluation, etc.

UNIT-IV: ICT Enabled learning experiences - Internet Based

Use of internet based media for enhanced training, learning and testing– Online teaching/ Tutoring, Remote classrooms and Resource centres– Online academic and teaching material transaction line dispatching soft copies of teaching-learning material, e-books, Submission of assignments, Projects and other materials by the learners - Online Test/ Examination and Evaluation, legal and ethical issues – copyright, Hacking, Netiquettes, cybercrimes, students safety on the net.

UNIT-V: ICT Enabled Learning Experiences – web Based

Web based learning, Web Services: Email – E-Chat- online forums, blog, wiki, E-Library. Academic E-Resources: E-Journals, on line dictionary, Virtual tools, virtual learning-Environment , virtual labs, Tele-teaching, Tele-Conferencing, Video-Conferencing.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Relate the influences and challenges in integrating ICT.

CO2: Examine recent developments in ICT.

CO3: Criticize ICT enabled learning experience.

CO4: Support Web based ICT learning experience.

CO5: Enrich their learning experience in ICT through internet.

References:

- Aggarwal J.C. (2000). *Innovation in Educational Technology*. New Delhi: Vikas Publishing House.
- Aggarwal J.C. (2013). *Modern Learning in Educational Technology*. New Delhi Black Prints.
- Aggarwal. D.D. (2004). *Educational Technology*. New Delhi: Sarup Publishing House.
- Bharihok D. (2000). *Fundamentals of Information Technology*. New Delhi: Pentagon Press.
- Bhattachary S.P. (1994). *Models of Teaching*. Regency Publications
- Byran P. (1997). *Discover the Internet Comdex Computer*. New Delhi: Dream Tech Publishing.
- Conrad K. (2001). *Instructional Design for Web Based Training*. HRD Press.
- Crouton T. E. (1962). *Programmed Learning and Computer Based Instruction*. New Work.
- Mrunalini, T., & Ramakrishna, A. (2014), *ICT in Education*. Hyderabad: Neelkamal Publications.

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SEMSTER-IV

CHEMISTRY – PAPER-IV

MOLECULAR REARRANGEMENS AND STERO CHEMISTRY

CODE: 16CIED43 **Credits: 4 (3L: 0T: 1P)**

Hours: 5/Week

Course objective: To understands about what is isomers their classification conformational analysis and the mechanism of important rearrangement

Unit-I: Stereoisomerism

Definition – classification into optical and geometrical isomerism. Optical isomerism: optical activity – conditions for optical activity – asymmetric center – chirality – methods of racemisation and resolution – asymmetric synthesis – (partial and absolute) – Walden inversion.

Unit-II: Absolute configuration

Cahn – Ingold – Prelog rules, R-S notations for optical isomers with one and two asymmetric carbon atoms.

Unit-III: Geometrical isomerism

Cis, *trans* and E, Z notations – geometrical isomerism in maleic and fumaric acid – physical and chemical methods of distinguishing geometrical isomers.

Unit-IV: Conformational analysis

Conformers-dihedral angle – conformational analysis of ethane and n-butane – energy diagram – conformers of cyclohexane – boat and chair forms.

Unit-V: Molecular rearrangements

Pinacol-Pinacolone, Wagner Meerwein, Wolff, Beckmann, Hofmann, Benzilic acid, Cope and Claisen rearrangements.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Recognize and comment on different synthetic strategies and methods for stereo control when faced with a synthetic scheme.

CO2: Predict the conformational preferences of common organic structures based on steric and electronic interactions.

CO3: Describe stereochemical and conformational structure on the chemical reactivity and on the mechanisms of organic reactions.

CO4: Draw mechanisms for reactions involving heterocycles as starting materials, intermediates, and products.

CO5: Analyze the molecular rearrangements.

Text books:

- L. Finar. "Organic chemistry: Stereochemisty and the Chemistry of Natural Products. Vols. II, Pearson education, London 5th edition, **1975**.
- P. S. Kalsi, "Stereochemistry: Conformation and Mechanism" New age international Pvt ltd. 6th edition **2005**

Reference Books:

- Robert Thornton Morrison, Robert Neilson Boyd, "Organic Chemistry" Ashok K. Ghosh 10th edition, **2013**
- Dr. Jagadamba singh, Dr. L. D. S. Yadav, "Advanced Organic Chemistry" Pragati Prakashan, 7th Edition, **2011.**

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CHEMISTRY
PRACTICAL-IV

Complexometric titration

1. Estimation of Magnesium
2. Estimation of Calcium

Demonstration Experiment

3. Estimation of Chloride using Silver nitrate

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SEMESTER-IV

BOTANY – PAPER - IV

TAXONOMY, PLANT PHYSIOLOGY & PLANT BIOCHEMISTRY

Code: 16EIED44 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

1. impart knowledge on botanical nomenclature, classifications, merits and demerits of various systems of classifications.
2. understand the systematics of the selected families of the flowering plants with their economic importance.
3. understand the metabolic activities of plants
4. understand the role of enzymes in various metabolic activities of plants

Unit – I

Binomial Nomenclature – ICBN rules – taxonomic types. Systems of Classification – Bentham and Hooker classification – Merits and demerits. Study on Herbarium Techniques. A detailed study of the following families with their economic importance – Annonaceae, Anacardiaceae, Leguminosae, Cucurbitaceae, Rubiaceae, Solanaceae, Euphorbiaceae, and Poaceae.

Unit – II

Plant - Water relationship: structure and properties and significance of water - osmotic and non-osmotic uptake of water. Ascent of sap-cohesion theory: root pressure, transpiration, physiology of stomatal action, Translocation of solutes and assimilates. Mass flow, Membrane permeability mineral uptake: Passive and active. Role of major and Minor elements, mineral deficiency symptoms.

Unit - III

Photosynthesis: Absorption spectrum, Action spectrum, role of pigments, photosystems I & II, Photophosphorylation, Carbon Assimilation: Calvin cycle, Hatch & Slack pathway, CAM pathway. photorespiration. Respiration: Aerobic and anaerobic. Glycolysis, Kreb's Cycle and oxidative phosphorylation, energetics of respiration.

Unit - IV

Plant Growth regulatory substances; auxins, gibberellins, cytokinins, ethylene and abscissic acid - their chemical nature, physiological effects and function. Role of hormones in flowering, senescence and abscission- Photoperiodism, vernalization and seed dormancy.

Unit -V

Biochemistry: Enzymes - Nature and properties. Mechanism of enzyme action-factors affecting Enzyme action, substrate concentration – inhibitors, cofactors. Structure, classification and functions of carbohydrates, lipids and Proteins. Secondary metabolites – alkaloids, flavonoids, terpenoids and anthocyanins.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Impart knowledge on botanical nomenclature, classifications, merits and demerits of various systems of classifications.

CO2: Understand the systematics of the selected families of the flowering plants with their economic importance.

CO3: Analyze the metabolic activities of plants.

CO4: Classify the role of enzymes in various metabolic activities of plants.

CO5: Understand the plant physiology.

References:

PLANT PHYSIOLOGY

- Devlin, R.M. (1969). Plant Physiology. Holt, Rinehart & Winston & Affiliated East West Press (P) Ltd., New Delhi.
- Dulsy Fatima, R.P. et. al., (1994). *Elements of Biochemistry*. Saras Publications, Nagercoil, Tamilnadu.
- Jain, V.K. (1990). *Fundamentals of Plant Physiology*. S. Chand & Co., New Delhi.
- Noggle, R. and Fritz (1989). Introductory Plant Physiology. Prentice Hall of India.
- Pandey, S.N. (1991). *Plant Physiology*. Vikas Publishing House (P) Ltd., New Delhi.
- Periyasamy, K. (1978). *Cell Iyakka Viyal* (Cell Physiology). Tamilnadu text Book Society, Chennai.
- Salisbury, F.B. and Ross, C.W. (1999). *Plant Physiology*. CBS Publishers and Printers, New Delhi.
- Saraswathy and Rangamannar (1973). *Thaavara Valarchithai Martram* (Metabolism & Biosynthesis). Tamilnadu Text Book society, Chennai.

BIOCHEMISTRY

- Day, P.M. and Harborne, J.B. (2000). *Plant Biochemistry*. Harcourt Asia (P) Ltd., India & Academic Press, Singapore.
- Jain, J.L. (1998). *Fundamentals of Biochemistry*. S. Chand & Co., New Delhi.
- Jayaraman, J. (1981). *Laboratory Manual of Biochemistry*. Wiley Eastern Ltd., New Delhi.
- Lehninger, A.L. (1984). *Biochemistry* (2nd Edition). Kalyani Publishers, Ludhiana, New Delhi.
- Plummer, D.T. (1988). *An Introduction to Practical Biochemistry* (3rd Edn.,). Tata McGraw Hill Publishing Co., Ltd., New Delhi.
- Srivastava, H.S. (1990). *Elements of Biochemistry*. Rastogi Publications, Meerut, India.
- Stryer, L. (1989). *Biochemistrty.* W.H. Freeman & Co., New York, San Francisco.
- Wilson, K. and Walker, J. (1994). *Principles and Techniques of Practical Biochemistry* (4th Edition). Cambridge University Press, U.K.

TAXONOMY

- Gurcharan Singh (1999). *Plant Systematics - Theory & Practice*. Oxford & IBH Publishing Co. (P) Ltd., New Delhi.
- Jaques, H.E. (1999). *Plant Families-How to know them?*. Agro Botanical Publishers (India), Bikaner.
- Jefferey, C. (1968). *An Introduction to Plant Taxonomy*. J.A. Churchill, London.
- Lawrence, G.H.M. (1953). *Taxonomy of Vascular Plants*. Oxford & IBH Publishers, New Delhi.
- Lawrence, G.H.M. (1955). An Introduction to Plant Taxonomy. The Central Book Depot, Allahabad.
- Mathews, K.M. (1987-90). Flora of Tamilnadu Carnatic (1-4vols.) Rapinat Herbarium, Trichy.
- Mathur, R.C. (1970). *Systematic Botany* (Angiosperms). Agra Book Stores, Lucknow.
- Mitra, J.N. (1964). *An Introduction to Systematic Botany & Ecology*. The World Press (P) Ltd., Calcutta.
- Naik, V.N. (1996). *Taxonomy of Angiosperms* (9th Ed.). Tata McGraw-Hill Publishing Co., (P) Ltd., New Delhi.
- Narayanaswamy, R.V. and Rao, K.N. (1976). *Outlines of Botany*. S. Viswanathan Printers & Publishers, Chennai.
- Palaniyappan, S. (2000). *Angiospermgalin Vagaippadu* (*Taxonomy of Angiosperms*). V.K. Publishing House, Chennai.
- Pandey, B.P. (1997). *Taxonomy of Angiosperms*. S. Chand & Company Pvt. Ltd., New Delhi.
- Porter, C.L. (1967). *Taxonomy of flowering Plants*. Eurasia Publishing House, New Delhi.
- Ramaswami, S.N., Lakshminarayana, S. and Venkateswaralu, V. (1976). *Taxonomy* (*Systematic Botany*) *for Degree Course*. Maruthi Book Depot, Guntur, Hyderabad.
- Sharma. O.P. (2007). *Plant Taxonomy*. Tata McGraw–Hill Publishing Co., New Delhi.
- Singh, V. and Singh, D.K. (1983). *Taxonomy of Angiosperms*. Rastogi Publications, Meerut.
- Sivarajan V.V. (1993). *Introduction to the Principles of Plant Taxonomy* (2nd Edn.). N.K.P. Robson (Ed.). Oxford & IBH Publishing Co. (P) Ltd., New Delhi.
- Subramaniyan, N.S. (1999). *Laboratory Manual of Plant Taxonomy* (2nd Ed.). Tata McGraw-Hill Publishing Co., New Delhi.
- Vashista, P.C. (1997). *Taxonomy of Angiosperms*. S. Chand & Company Pvt.Ltd., New Delhi.

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PRACTICAL - IV

PAPER – IV: TAXONOMY, PLANT PHYSIOLOGY & PLANT BIOCHEMISTRY

1. Training in dissection, observation, identification and sketching of floral parts of plants belonging to the families mentioned in the syllabus along with floral diagrams and floral formula.
2. Description of plants in technical terms. Field study flora.

3. Submission of 25 Herbarium specimens.
4. Economic plants covered in theory part in taxonomy and economic botany and their importance.
5. Determination of osmotic pressure of onion/Rheo leaf.
6. Effect of light intensity on transpiration using Ganong's potometer.
7. Determination of stomatal frequency and estimation of transpiration rate.
8. Determination of absorption and transpiration ratio in plants.
9. Measurement of respiration rate using germinating seeds and flower-buds with simple respiroscope.
10. Separation of plant pigments by paper chromatography.
11. Determination of photosynthetic rate in water plants under different CO_2 concentrations.

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SEMESTER-IV

ZOOLOGY – PAPER - IV

DEVELOPMENTAL BIOLOGY

CODE: 16EIED45 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

1. provide understanding of the processes of early embryonic development.
2. to analyze the mechanisms of development by experimental manipulation of developing embryos.
3. to review current developments in the field of embryology.

Unit - I: The Germ Cell

Outlines of origin - spermatogenesis and oogenesis in frog, bird and mammal - Comparative study of vertebrate and invertebrate sperms and eggs - viability of gamete cells - influence of yolk - polarity - symmetry - Egg membranes.

Unit - II: Fertilization

Mechanics - Physiology - Theories of fertilization - Parthenogenesis: Natural - Artificial - Experiments on artificial parthenogenesis and its findings

Unit – III: Early Embryonic Development

Cleavage and Gastrulation: General Principles - Outlines of their physiology - Comparative study in Amphioxus, frog, chick and mammals. Experimental works of Speeman and Mangold - Factors influencing cleavage - Fate map.

Unit – IV: Organogeny

Development of brain, eye and ear in frog - Embryonic Adaptations: Embryonic membranes and their functions - Placentation in mammals. Regeneration: regeneration in invertebrates and vertebrates.

Unit – V: Human Reproduction

Puberty - Menstrual cycle - Menopause - Pregnancy and related problems - Parturition - Lactation - Development and differentiation - Contraception - its merits and family welfare. Reproductive Technology: Monitoring of estrus cycle - Artificial insemination - Cryopreservation - IVF - Embryo transfer - Test tube babies.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the processes of early embryonic development.

CO2: Analyze the mechanisms of development by experimental manipulation of developing embryos.

CO3: Analyze the basic concept of fertilization.

CO4: Review current developments in the field of embryology.

CO5: Gain the knowledge about human reproduction.

References

- Arora, M. P. (1985). Chordate Embryology. New Delhi: ATMA RAM sons.
- Balinsky, B.I. (1981). Introduction to Embryology. Philadelphia: Saunders.
- Jam, P.C., 1998. Elements of Developmental Biology. Vishal Publication, Delhi.
- Majumdar, N.N. (1990). Text book of vertebrate embryology. New Delhi: Tata McGraw-Hill Publishing Company Ltd.,
- McEwen, R.S. (1969). Vertebrate Embryology. New Delhi: Oxford and IBH Publishing Co.,
- Nelson, O.E. (1953). Comparative Embryology of the vertebrates. New York: McGraw Hill Book company, Inc.,
- Raven, P. (1959). Developmental Physiology. New York: Pergamon Press.
- Rugh, R., (1951). The Frog. Tata McGraw-Hill publishing Company Ltd, New Delhi.
- Verma , P.S., V.K. Agarwal and Tyagi. (1995). Chordate embryology. New Delhi: S. Chand & Co.,

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PRACTICAL – IV

PAPER – IV: DEVELOPMENTAL BIOLOGY

Study of the following prepared slides, museum specimens and materials.

1. Sections of testis and ovary showing the maturation stages of gametes.
2. Slides of mammalian Sperm and Ovum.
3. Study of Egg types – Frog’s egg, Hen’s egg.
4. Slides of cleavage stages, blastula, gastrula and neurula of frog.

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SEMESTER – V

PLANNING FOR ASSESSMENT AND EVALUATION

CODE: 16CIED51 **Credits: 4 (3L: 0.5T: 0.5P)**
Hours: 5/Week

Objectives: On completion of the course, the student-teachers will be able to

1. define the concepts related to educational measurement, assessment and evaluation.
2. explain and use the different types evaluation.
3. use taxonomy of Educational Objectives and develop skills of writing instructional objectives.
4. explain and use different types of tests to assess learning.
5. construct blue print and develop skills of planning and administering class room tests.

UNIT-I: Measurement and Evaluation

Meaning and definition of Measurement, Assessment and Evaluation. Relationship among Measurement Assessment and Evaluation. Need and importance, Principles – Uses of Evaluation.

UNIT-II: Types of Evaluation

Types of Evaluation — Internal and External, Formal and Informal, Continuous Comprehensive Evaluation, Formative and Summative, Norm Referenced and Criterion Referenced.

UNIT-III: Recent Reforms in Examination Practices

Innovative Examination Practices – Spot Valuation, Flying Squad, Dummy Numbers. Computerisation in Examination Practices – On line Examination and Publication of results. Credit system - Semester and Public examination – Choice Based Credit System (CBCS) – Continuous and Comprehensive Evaluation (CCE) - Open Book Examinations.

UNIT-IV: Educational and Psychological Tests

Tests – Purpose – Objectives– need and Importance of conducting different types of tests - Achievement test, Diagnosis test, Prognostic test, Intelligence test, Aptitude test, Attitude test and Personality test. Testing Methods – Oral, Written and Performance Test.

UNIT V - Planning for Constructing Achievement Tests

Various types of test items – Objective type test items - Completion, Matching, Two Choice, Multiple Choice and others - Subjective type test items – Essay and Short Answer - Question Bank. Steps in test construction – Table of specifications, Blue Print – Item Writing – Revising Items - Scoring – Marking, Grading - Item Analysis– Interpretation and Follow Up. Characteristics of a good measuring instrument – validity, reliability, feasibility and objectivity.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Use different types of test to assess learning

CO2: Appraise the concept related to educational measurement

CO3: Use different types of evaluation.

CO4: Construct blueprint and administering classroom test.

CO5: Differentiate the various types of Evaluation.

References:

- Agarwal, J.C. (2009). Essentials of Educational System, Vikas Publishers House Pvt Ltd, New Delhi.
- Bhattia, K.K. (2008). Measurement & Evaluation in Education, Tandon Publications, Ludhiana.
- George, David. (2008). Trends in Measurement & Evaluation techniques, Common Wealth Publishers, New Delhi.
- Goswami, Marami. (2011). Measurement & Evaluation in Psychology and Education, Neelkamal Publication, New Delhi.
- Linn, Robert L. (2008). Measurement & Assessment in Teaching, Dorling Kuderslay, New Delhi.
- Mangal, S.K. (2009). Statistics in Psychology and Education, PHI Learning Pvt Ltd, New Delhi.
- Metha, D.D. (2006). Educational Measurement & Evaluation, Tandon Publications, Ludhiyana.
- Mrunalini, T. (2010). Educational Evaluation, Neelkamal Publications, New Delhi.
- Sidhu, K.S. (2007). New approaches to measurement & Evaluation, Sterling Publishers Pvt Ltd, New Delhi.
- Singh, Raj, (2008). Techniques of Measurement & Evaluation, Common Wealth Publishers, New Delhi.
- Smith, D. (2007). History of Measurement & Evaluation, Common Wealth Publishers, New Delhi.
- Smith, D. (2008). Theory of Educational Measurement, Common Wealth Publishers, New Delhi.
- Walton, John.A. (2008). Educational Objectives & Achievement testing, Common Wealth Publishers, New Delhi.

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SEMESTER – V
PEDAGOGY OF PHYSICAL SCIENCE – P1

CODE: 16CIED52 **Credits: 4 (3L: 0.5T: 0.5P)**
Hours: 5/Week

Objectives: On completion of the course, the student-teachers will be able to

1. know the nature and scope of Physical Science;
2. understand the aims and objectives of teaching Physical Science;
3. list and classify the diversified needs of students;
4. explain the methods of teaching Physical Science;
5. understand and identify various teaching aids;
6. implement the knowledge of Learner Controlled Instruction, Co operative and Collaborative Learning effectively for better curriculum transaction.

UNIT-I: Nature and Scope of Physical Science
Science as a product and a process: a body of knowledge, a way of investigation, a way of thinking – Characteristics of a person with scientific attitude – Interdisciplinary Approach-Implications of the nature of Science for a Science teacher.

UNIT-II: Objectives of Teaching Physical Science and Teaching skills
Need and significance of teaching Physical Science -Aims: practical, social, disciplinary and cultural - Teaching objectives: General Learning Outcomes(G.L.O's) and behavioral or Specific Learning Outcomes (S.L.O's) relating to the cognitive, affective and psychomotor domain based on Taxonomy of Educational Objectives, Anderson revised taxonomy. Teaching skills: Micro teaching: Origin, Need, Phases, Definition, Characteristics, Process, Cycle, A Plan of action, Advantage of Micro teaching and its Uses-Skills : Explaining, Questioning , Blackboard usage, probing question, Reinforcement, Stimulus variation -Link lesson.

UNIT-III: Methods of Teaching Physical Science
Teacher and Student centered Methods- Lecture method- Lecture Demonstration method-Heuristic method- Project method- Biographical method- Inductive-deductive method- Historical method-Assignment method- Significance of employing different methods in teaching of Physical Science.

UNIT-IV: Teaching Aids
Concept of Teaching Aids- Importance of using aids in the teaching of Physical Science- Edgar Dale's Cone of Experience- Principles for selection of Teaching Aids- Classification of Teaching Aids- Visual Aids- Chalkboard, Bulletin Board, Flannel Board, Chart, Flash Cards, Posters, Models, Specimens, Objects, Diorama, Graphs, Filmstrip Projector, Slide Projector, Epidiascope, Overhead Projector- Audio Aids- Radio, Tape Recorder, Audio-Visual Aids-Television, Computer, Documentaries, Motion Pictures – Criteria for selection of appropriate teaching aids.

UNIT-V: Exploring learner
Focusing on Interest, Attitudes, and Motivation of students. Developing listening, and questioning skill among teachers and students. Negotiating with learner's meaning- initial assessment (Entry behavior)- methods of negotiations- process of negotiating goals and targets-

advantages of negotiation. Exit behavior. Grouping students based on ability. Individual difference – meaning, identification of gifted and slow learner. Enrichment and remedial teaching methods for differently abled students. Activities to enrich physical science learning – Techniques to tackle individually different students: Assistive learning, supplementary text material, summer programmes, correspondence course.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Classify the diversified needs of learners

CO2: Adopt the methods of teaching physical science

CO3: Identify and use the various teaching aids.

CO4: Implement the Learner controlled instructions.

CO5: Explore the innovative technologies in teaching learning process.

References:

- Anderson, R.D et. al.(1992). *Issues of Curriculum Reform in Science, Mathematics and Higher Order Thinking- Across the Disciplines- The Curriculum Reform Project.* U.S.A.: University of Colorado.
- Carin., & Sund.R. (1989). *Teaching Modern Science.*U.S.A : Merill Publishing Co.
- Chauhan, S.S. (1985). *Innovation in Teaching and Learning Process*. New Delhi: Vikas Publishing House.
- Gupta,S.K.(1985). *Training of Physical Science in Secondary Schools*. New Delhi: Sterling Publication (Pvt) Limited.
- Harms, N., & Yager, R. (1981). *What Research Says to the Science Teacher? Vol. 3*, U.S.A: National Science Teachers Association.
- Heiss, Oboum., & Hoffman.(1961).*Modern Science Teaching.* New York: Macmillan & Co, Limited.
- Husen, T., & Keeves, J.P., (Ed.). (1991). *Issues in Science Education.* London: Pergamon Press.
- Jenkins, E.W. (2000). *Innovations in Science and Technology Education. Vol. VII*, Paris: UNESCO.
- Joseph.(1966). *The Teaching of Science.* London: Harvard University Press.
- Khana, S.D., Sexena, V.R. Lamba, T.P., & Murthy, V. (1976). *Technology of Teaching*. Doaba Publishing House.
- Mangal S.K., & Uma Mangal. (1999). *Essentials of Educational Technology*. New Delhi: PHI Learning (P) Ltd.
- Natrajan,C. (Ed.). (1997). *Activity Based Foundation Course on Science Technology and Society*. Mumbai: HomiBhaba Centre for Science Education.
- Nayak. (2003). *Teaching of Physics*. New Delhi: APH Publications.
- Owen, C.B. (1966). *Method of Science Mastery*. English Language Society and Macmillan Company Limited.
- Pandey. (2003). *Major Issues in Science Teaching*. New Delhi: Sumit Publications.
- Paneerselvam, A., & Rajendiran,K. (2005). *Teaching of Physical Science*. Chennai:

Shantha Publication.

- PanneerSelvam, A. (1976). *Teaching of Physical Science (Tamil*). Chennai: Government of Tamil Nadu.
- Doals House.
- SonikaRajan. (2012). *Methodology of Teaching Science.*New Delhi:Dorling Kindersley (India) Pvt.Ltd.
- Thurber,W.A., &Collette,A.T.(1964). *Teaching Science in Today's Secondary School*. NewDelhi: Prentice Hall of India Private Limited.
- Williams, B., (1999*). Internet for Teachers.* London: John Wiley & Sons.
- Yadav, M.S. (2003). *Teaching of Science*. New Delhi: Anmol Publications.

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SEMESTER – V
PEDAGOGY OF BIOLOGICAL SCIENCE – P1

CODE: 16EIED54 **Credits: 4 (3L: 0.5T: 0.5P)**
Hours: 5/Week

Objectives: On completion of the course, the student-teachers will be able to

1. explain the nature and scope of biological science;
2. acquire knowledge about aims and objectives of teaching of biological science;
3. explore the need of the learners;
4. recognize the new trends in curriculum transaction;
5. organize the teaching aids to support learning;
6. integrate the Learner Controlled Instruction:- Co operative and Collaborative Learning effectively for better curriculum transaction.

UNIT-I: Nature, Scope and Place of Biological Science
Introduction- Development of science education after Independence, National Policy on Education, and relationship of biology with other branches of science. The importance of **Biological Science** as a subject of study – Interdisciplinary approach – need and current trends - Its history and development –Science education in India –National Knowledge Commission on Science Education. Bio Science and society – origin of life and biodiversity.

UNIT-II: Objectives of Teaching Biological Science and Teaching skills
Need and significance of teaching Biological Science -Aims: practical, social, disciplinary and cultural - Teaching objectives: General Learning Outcomes(G.L.O's) and behavioral or Specific Learning Outcomes (S.L.O's) relating to the cognitive, affective and psychomotor domain based on Taxonomy of Educational Objectives, Anderson revised taxonomy. Teaching skills: Micro teaching: Origin, Need, Phases, Definition, Characteristics, Process, Cycle, A Plan of action, Advantage of Micro teaching and its Uses-Skills : Explaining, Questioning , Blackboard usage, probing question, Reinforcement, Stimulus variation -Link lesson.

UNIT-III: Methods of Teaching Biological Science
Introduction: i) Teacher Centered Method ii) Pupil Centered Method Teacher Centered Method- Lecture Method; Lecture Demonstration Method, Discussion Method, Supervised Study Method. Pupil Centered Method – Problem-Solving method, Project Method, Inductive and Deductive Method, Heuristic method, Discovery Method, Demonstration Method, Story Telling Method.

UNIT-IV: Instructional Aids
Introduction: Meaning, importance & Advantages of using Instructional Aids – Edgar Dale's Cone of Learning Experience – Principles of selection and uses of Teaching Aids - Projective and Non Projective aids – current trends in educational technology – Different types of Boards, Charts, models, Objects, Specimens, slides, transparencies, films, filmstrips, motion pictures, documentaries, graphs, LCD projectors, Computer Aided Instructions, Animations, Power Point Presentations, interactive board, interactive video, Smart Board, internet usage, smart classroom.
Museum: The place and importance of school and public museums – Preparation of museum materials – dry and wet mounts, injected specimens

UNIT-V: Exploring learners

Focusing on Interest, Attitudes, and Motivation of students. Developing listening, and questioning skill among teachers and students. Negotiating with learner's meaning- initial assessment (Entry behavior)- methods of negotiations- process of negotiating goals and targets- advantages of negotiation. Exit behavior. Grouping students based on ability. Individual difference – meaning, identification of gifted and slow learner. Enrichment and remedial teaching methods for differently abled students. Activities to enrich biological science learning – Techniques to tackle individually different students: Assistive learning, supplementary text material, summer programmes, correspondence course.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Classify the diversified needs of learners

CO2: Adopt the methods of teaching biological science

CO3: Identify and use the various teaching aids.

CO4: Implement the Learner controlled instructions.

CO5: Explore the innovative technologies in teaching learning process.

References:

- Aggarwal .D.D. (2008).*Modern Method of Teaching Biology*. New Delhi: Karanpaper backs.
- Arulselvi, E. (2007).*Teaching of Science*. Chennai: Saradha Publication.
- Bhandala, Chadha., & Khanna. (1985).*Teaching Of Science.*New Delhi: PrakashBrothers Educational Publishers.
- Bhatnakar,A.D. (2004). *Teaching of Science*. Meerut: Surya Publications.
- Buffaloe, Neal.,&Throneberry, J. B. (1972). *Principles of Biologyteaching.* New Delhi: Prentice – Hall of India Limited.
- Frost Jenny., & Turner Tony. (2005).*Learning to teach Science inSecondary school.*New York: Routledge Palmer Publication.
- Garrett. (1979). *Statistics in Psychology and Education*. Bombay: Vakils, Feffer and Simons Ltd.
- Green, T. L. (1965). *The teaching of biology in tropical secondary schools.* London: Oxford University Press.
- Harms, N., &Yager, R. (1981). *What research says to the scienceteacher* (Vol. 3). Washingdon: National Science Teachers Association.
- Heiss. E. D., Obown, S., &Hoftman, C. W. (1961). *Modern scienceteaching.*New Delhi: Macmillian Company Press.
- Khana, S.D,et al. (1976). *Technology of science teaching.*New Delhi: Doaba House. Natrajan, C. (1997). *Activity based foundation course on sciencetechnology and society.* Mumbai: Homi Bhaba Centre for Science Education.
- Korde., & Sawant.(1980).*Science and Scientific Method.*New Delhi: Himalaya Publishing House.

- Passi, B. K. (1976). *Becoming a Better Teacher*: Micro teaching approach. Ahemedabad: Sahitya Mudranalaya.
- Prasad Janardhan. (1999).*Practical aspects in Teaching of Science*. New Delhi: Kanishka Publication.
- Saunders, H. N. (1967). *The teaching of general science in tropicalsecondary school*. London: Oxford University Press.
- Sharma, Jagdish. (2006).*Models of Teaching Science*. Jaipur: Raj Publishing House.
- Veena Rani Pandey. (2004).*Major Issues in Science Teaching.* Summit Enterprises.

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SEMSTER-V
CHEMISTRY – PAPER-V
SOLID STATE CHEMISTRY

CODE: 16CIED53 **Credits: 4 (3L: 0T: 1P)**
Hours: 5/Week

Course objective: To learn about nuclear components, nuclear energy, forces, nuclear reactors, nuclear power projects in India and various countries and to understand solid structure, crystals types, X-ray diffraction, semi conductors and solid defects

Unit – I: Introduction

The nucleus – subatomic particles- nuclear force- mass defect- packing fraction – Binding energy - n/p ratios in stable and metastable nuclei –Nuclear shell model the liquid drop model –nuclear isomerism- isotopes, isobars, isotones – mirror nuclelli magic numbers

Unit – II: Fragmentation and assay

Nuclear fission – fission fragments and their mass distribution – fission energy – Theory of fission Nuclear reactors – Fast Breeder reactors - atomic power projects in India Nuclear fusion – Nuclear fusion in Sun's atmosphere Detection and determination of activity by G.M counter and Scintillation counter.

Unit –III: Tracer techniques

Radioactive Tracers: - Principles of separation of isotopes- uses in analytical chemistry, reaction mechanism and agriculture – radio carbon dating
Artificial radioactivity- Transmutation of elements – cyclotron – induced radioactivity- Q values of nuclear reactions.

Unit – IV: Solid state I

Crystalline and amorphous solids- Elements of symmetry of a crystal – unit cell – Bravais lattices – miller indices – Bragg's law - X- ray diffraction of crystals – structure of NaCl, CsCl diamond, Graphite zinc and Futile – radius ratio rule

Unit – V: Solid state II

Defects in solids-Band Theory – Semiconductors – p-type and n- type semiconductors – applications – Solid state electrolytes- Types of magnetic behaviour – Dia, Para, Ferro, Antiferro and ferrimagnetism**.**

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Define Atomic nucleus, Isotopes, Types of isotopes and Nuclear isomers
CO2: Classify different types of Nuclear reactions, stability of Nucleus, Nuclear forces and Emission of alpha, beta, and gamma rays
CO3: Analyze radioactivity, Nuclear fission, Nuclear fusion, Nuclear reactors, and breeder reactors
CO4: Clarify about rate of radioactive decay, half-life period and activity of Radioactive substance

CO5: Describe general characteristics of solid state.

Text Books:

- Antony R. West, "Solid State Chemistry" Wiley edition, 7th edition, **2011**
- H. J Arnikar: "Essentials of nuclear Chemistry" New Age International Pvt. Limited. 5th edition, **2014**

Reference Books:

- R. Gopalan, "Elements of nuclear Chemistry" S. Viswanathan & Co., 7th edition, **2009.**
- A. F. Wells "Structural Inorganic Chemistry" Oxford University Press, 11th edition, **2009.**
- Phillips F. C. "An introduction to crystallography" Longmans Green, New York., 7th edition, **2012**

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CHEMISTRY
PRACTICAL-V

1. Preparation of Ferrous ammonium sulphate.
2. Preparation of tetraamminecopper(II) sulphate.
3. Preparation of potassium trioxalatoluminate.
4. Preparation of potassium trioxalatochromate

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SEMESTER-V
BOTANY – PAPER - V
PLANT PATHOLOGY & PALEOBOTANY

Code: 16EIED55 **Credits: 4 (2L:1T:1P)**
Hours: 6/Week

Objectives: To enable students to

1. understand plant pathogenesis, classification and host-parasite interaction.
2. study plant diseases in crops and their management, significant contributions of plant pathologists and usage of various techniques in plant protection.
3. impart knowledge on distribution, classification, structure, physiology, reproduction and function of lichens and significance of ectomycorrhiza and endomycorrhiza.

Unit - I

Plant Pathology: History, losses due to pathogens, importance of study of Plant pathology; Classification of plant diseases based on; (a) Major causal agents - biotic and abiotic, (b) General Symptoms. Process of infection and pathogenesis: (a) Penetration and entry of pathogen into host tissue – mechanical, physiological and enzymatic. (b) Host-parasite interaction, enzymes and toxins in pathogenesis.

Unit - II

Plant Disease Management Chemical means of disease control: Fungicides - Definition, classification, characters of an ideal fungicide; antibiotics and nematicides. Biological Control of Plant Diseases – Definition, Importance, Biological control agents and their role in plant disease control

Unit - III

Study of plant diseases with respect to symptoms, causal organism, disease cycle and their management: (a) Cereals: Rice – blast disease; (b) Vegetables: Brinjal – Little leaf; (c) Fruits: Banana – bacterial leaf blight, Citrus – bacterial canker; (d) Oil seeds: Groundnut – Tikka disease; (e) Sugar yielding: Sugarcane- red rot.

Research in Plant Pathology - Contribution of Indian Plant Pathologists: Rangasami, G Mahadevan, A., Bilgrami, K. S., and Mehrotra, R. S.), Contribution of Research institutes – IARI (Indian Agricultural Research Institute), ICRISAT (International Crop Research Institute for Semi-Arid Tropics)

Unit – IV

Geological time scale – types of fossils and fossilization – impressions, compressions, casts, molds and pertrifications and radio carbon dating.

Unit – V

Brief study of the following fossils:

1. Lepidodendron
2. Calamites
3. Willamsonia

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand plant pathogenesis, classification, and host-parasite interaction.

CO2: Analyze Plant diseases in crops and their management, significant contributions of plant pathologists and usage of various techniques in plant protection.

CO3: Impart knowledge on distribution, classification, structure, physiology,

CO4: Understand the reproduction and function of lichen

CO5: significance of ectomycorrhiza and endomycorrhiza.

References:

- Bap Reddy, D. and Joshi, N.C. (1991). *Plant Protection in India* (Second Edition). Allied Publishers Ltd., New Delhi.
- Bilgrami, K.S. and Dubey, R.C. (1985). T*ext book of Modern Plant Pathology*. Vikas Publishing House Private Limited, New Delhi.
- Mehrotra, R.S. (2003). *Plant Pathology* (Second edition). Tata McGraw-Hill Education, New Delhi.
- Pandey, B.P. (2001). *Plant Pathology*. S. Chand & Company Limited, New Delhi.
- Rangasami, G. and Mahadevan, A. (1998). *Diseases of Crop Plants in India.* Prentice Hall of India Ltd. New Delhi.
- Arnold CA (1947). Introduction to Paleobotany, McGraw Hill
- Shukia A. and Mishra S.P. (1982). Essential of Paleobotany, Vikas Publishing House Pvt. Ltd.

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PRACTICAL - V
PAPER – V: PLANT PATHOLOGY & PALEOBOTANY

Plant Pathology

1. *Alternaria:* Specimens/photographs and tease mounts.
2. *Puccinia*: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts.
3. *Agaricus*: Specimens of button stage and full grown mushroom; Sectioning of gills of *Agaricus*.

PALEOBOTANY

4. *Rhynia*, *Lepidodendron*, *Lepidocarpon*, *Calamites* (slides), *Williamsonia*

Field visit

5. Make suitable micropreparations and identify the diseases mentioned theory with due emphasis on symptoms and causative organisms.
6. A detailed study of diseased specimens included in the theory.

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SEMESTER-V
BOTANY – PAPER – VI
MAJOR-BASED ELECTIVE - I
MEDICAL AND APPLIED BOTANY

CODE: 16EIED5C **Credits: 4 (2L:1T:1P)**
Hours: 6/Week

Objectives: To enable students to

1. understand the importance of the medicinal plant wealth in India and the role of Medicinal plants in human health care.
2. know the medicinally useful plants, Herbal medicine preparation for common diseases and adulterants.
3. understand the importance of biofertilizers and biopesticides
4. understand the techniques involved in the cultivation of edible mushrooms

Unit - I

Medical Botany: Importance and relevance of herbal drugs in Indian Systems of Medicine. Pharmacognosy – aim, scope and branches. Phytochemicals – reserve materials, secretory materials and excretory materials.

Unit - II

Cultivation and marketing of Medicinal plants: *Aloe vera, Cassia senna, Catharanthus roseus, Gloriosa superba* and *Withania somnifera.* Poisonous plants – action and treatments for different types of plant poisons, rejuvenating herbs and medicinal uses of non-flowering plants

Unit - III

Adulteration and substitution of crude drugs – methods, types and identification; botanical description and active principles in the drugs of roots, rhizomes, woods and bark, leaves, flowers and seeds (two examples each/plant part).

Unit - IV

Biofertilizer Technology: biofertilizers – types and importance. Mass cultivation of *Azospirillum*, *Azolla* and *Anabaena*. Rhizobium-legume symbiotic association – mass cultivation and carrier materials. Mycorrhiza – types and importance.

Biopesticides – importance; bacterial (*Bacillus thuringiensis*); Viral (NPV); Fungal (*Trichoderma*).

Unit - V

Mushroom Technology: types and identification of edible and poisonous mushrooms; nutritive value; cultivation of button (*Agaricus bisporus*) and oyster mushroom (*Pleurotos sajorcaju*); harvest and storage methods; mushroom research centres in India.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Analyze the importance of medicinal plants in human health care.

CO2: Examine the adulteration and substitution of plants in food, medicine etc.

CO3: Synthesize the importance of bio-fertilizers and bio-pesticides in growing medicinal plants.

CO4: Understand the techniques involved in the cultivation of edible mushrooms.

CO5: Differentiate poisonous and edible mushrooms.

References:

- Agarwal, O.P. (2014). Organic *Chemistry Natural Products, Vol. II*. Krishna Prakashan Media (P) Ltd., Meerut.
- Alice, D., Muthusamy and Yesuraja, M. (1999). *Mushroom Culture*. Agricultural College, Research Institute Publications, Madurai.
- Chopra, R.N., Badhuvar, R.L. and Gosh, G. (1965). *Poisonous Plants of India*. CSIR Publications, New Delhi.
- Chopra, R.N., Chopra, I.C., Handa, K.L. and Kapur, L.D. (1994). *Indigenous Drugs of India*. IBH Publishing Co. Pvt. Ltd., New Delhi.
- Gamble, J. S. and Fisher, C.E.C. (1915-1938). *Flora of the Presidency of Madras*. Adlard & Son Ltd., London.
- Marimuthu, T. (1991). *Oyster Mushroom.* Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
- Mathew, K.M. (1988). *Flora of the Tamilnadu Carnatic*. Rapinat Herbarium, Tiruchirappalli.
- Nair, N.C. and Henry, A.M. (1983). *Flora of Tamil Nadu, India*. Botanical Survey of India.
- Nita Bhal (2000). *Handbook on Mushrooms Vol. I and II* (2nd Ed.). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- Pathak, V.N. and Yadav, N. (1998). *Mushroom Production and Processing Technology*. Agrobios, Jodhpur.
- Somasundaram, S. (1997). *Medicinal Botany* (*Maruthuva Thavaraviyal*) (Tamil Medium Book). Elangovan Publishers, Tirunelveli.
- Srivastava, A.K. (2006). *Medicinal Plants*. International Book distributiors, Dehradun.
- Subba Rao, N.S. (2000). *Soil Microbiology*. Oxford and IBH Publishing Co.Ltd., New Delhi.

- Tripathi, D.P. 2005. *Mushroom Cultivation*. Oxford & IBH Publishing Co.Pvt. Ltd., New Delhi.
- Varma, A. and Hock, B. (1995). *Mycorrhiza*. Springer–Verlag, Berlin.
- Yaaco Vokan (1994). *Azospirillum/Plant Associations.* CRC Press, Boca Raton, FL.

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PRACTICAL – VI
MAJOR-BASED ELECTIVE – I
PAPER – VI: MEDICAL AND APPLIED BOTANY

1. Identification of herbal plants in India, especially Cultivation of Medicinal plants namely, Aloe vera, Cassia senna, Catharanthus roseus, Gloriosa superba and Withania somnifera.
2. Identification of Poisonous plants, various action and treatments for different types of plant poisons.
3. Identification of rejuvenating herbs and medicinal uses of non-flowering plants
4. Identification of the drugs from various parts of the plant like roots, rhizomes, woods and bark, leaves, flowers and seeds.
5. Method of cultivation in Azospirillum, Azolla, Anabaena and Mycorrhiza.
6. Identification of edible and poisonous mushrooms with the nutritive value.
7. Cultivation of button (*Agaricus bisporus*) and oyster mushroom (*Pleurotos sajorcaju*);
8. Methods involved in harvest and storage methods of edible mushrooms.

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SEMESTER-V
BOTANY – PAPER – VI
MAJOR–BASED ELECTIVE – II
PLANT BIOTECHNOLOGY AND BIOINFORMATICS

CODE: 16EIED5D **Credits: 4 (2L:1T:1P)**
Hours: 6/Week

Objectives: To enable students to

1. To comprehend the advances made in the field of plant biotechnology; and bioinformatics
2. To understand how mere jumbling of genes results in the creation of new organisms

Unit - I

Biotechnology: definition and scope. Tissue culture: sterilization methods, media preparation (MS basal medium); use of different explants types; materials and callus growth; differentiation; subculturing and hardening.

Unit - II

Plasmids: general features and types; plasmids as vectors - pBR 322, Ti- plasmid; cosmids, phagemids, Lambda-phage; transposons; site directed mutagenesis.

Unit - III

Steps involved in genetic engineering: generation of desired foreign genes by restriction enzymes and cDNA synthesis; joining DNA molecules; transfer of rDNA molecules into bacteria and plants. Southern and Western blotting. PCR technique. Role of *Agrobacterium* in plant genetic engineering.

Unit - IV

Importance and application areas: biomass production - food (single cell proteins); bio-fertilizers. Environmental Biotechnology: Waste treatment – solid (compost), Liquid (industrial effluents), sewage treatment (domestic sewage).

Unit - V

Bioinformatics: History, scope and applications. Types of biological databases. Nucleic acid databases - Genbank, NCBI, EMBL, DDBJ; Primary protein databases - SWISSPROT, TrEMBL; Secondary protein databases - PROSITE, PROFILES, PRINTS, Pfam; Structural classification databases - SCOP, CATH; Literature databases - PubMed, Medline.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the basic concept of Biotechnology.

CO2: Classify the Plasmids features and its types.

CO3: Improve the skills of analyse generic engineering.

CO4: Implement the Biomass production.

CO5: Interpret the biological database for implement new ideas.

References:

1. Arthur, M.L. (2005). Introduction to Bioinformatics (Ed:2). Oxford University Press, New York.
2. Attwood, T.K. and Parrysmith, D.J. (2001). Introduction to Bioinformatics. Pearson Education, New Delhi.
3. Chatterji, A.K. (2011). Introduction to Environmental Biotechnology. Prentice Hall India Pvt., Ltd., New Delhi.
4. Dubey, R.C. (2013). A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi.
5. Gupta, P.K. (1994). Elements of Biotechnology. Restogi Publications, Meerut.
6. Ignacimuthu, S. (1997). Plant Biotechnology. Oxford & IBM Publishing Co., New Delhi.
7. Kalyan Kumar De. (1997). Plant Tissue culture. New central Book Agency, Calcutta.
8. Kumar, H.D. (1991). A Textbook on Biotechnology. East west press, New Delhi.
9. Parihar, P. (2014). A Textbook of Biotechnology. Argobios Publications, Jodhpur
10. Purohit, S.S. (2003). Agricultural Biotechnology. Agrobios Publications, Joshpur.

11. Trevan, M.D., Boffey, S., Goulding, K.H. and Stanbury, P. (1988). Biotechnology – The Biological Principles. Tata Mc Graw Hill Publishing Co., New Delhi.

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PRACTICAL – VI
MAJOR-BASED ELECTIVE – II
PAPER – VI: PLANT BIOTEACHNOLOGY AND BIOINFORMATICS

1. Preparation of different (MS basal medium); use of different explants types
2. Materials and callus growth. Differentiation of the callus.
3. Subculturing and hardening.
4. Identification of plasmids as vectors - pBR 322, Ti- plasmid; cosmids, phagemids, Lambda-phage and transposons.
5. Steps involved in genetic engineering as in Unit – III.
6. Southern and Western blotting. PCR technique. Role of *Agrobacterium* in plant genetic engineering.
7. Biomass production from food (single cell proteins) and bio-fertilizers.
8. Environmental Biotechnology: Waste treatment – solid (compost), Liquid (industrial effluents), sewage treatment (domestic sewage).
9. Nucleic acid databases - Genbank, NCBI, EMBL, DDBJ; Primary protein databases - SWISSPROT, TrEMBL; Secondary protein databases - PROSITE, PROFILES, PRINTS, Pfam; Structural classification databases - SCOP, CATH; Literature databases - PubMed, Medline.

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SEMESTER – V
ZOOLOGY – PAPER – V
CELL BIOLOGY

CODE: 16EIED56 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

1. understand the cell and cellular details with their significance.
2. train the student about the various types of animal cell structures with their characteristic features and detailed functions.
3. facilitate to understand the structure and function of cell.

Unit – I

History of Cell Biology - Tools and Techniques of Cell Biology Cell Fractionraction, Homogenization Centrifugation, Isolation of sub cellular Components. Biochemical Techniques - Chromatography - Electrophoresis and their Application, Tissue Culture and Cell Culture Techniques. Histological Techniques - Staining - Vital Stains - Cytoplasmic and Nuclear Stains Micro Technique - Methods, Microscopes - Types - Light, Phase contrast, SEM, TEM - Units of measurement.

Unit –II

Cell - Cell theory - Viruses -Types and Structure - Bacteria - Bacterial membrane - Ultra structure of Plant & Animal cell - Cytoplasm - Structure and Composition, Function - Extra Cytoplasmic Structure - Cilia Flagella - Cytoplasmic Inclusions.

Unit – III

Cell components - Plasma Membrane Ultra Structure - Different Models - Functions - Ultrastructure, Composition and Function of Endoplasmic reticulam, Ribosomes, Golgi Complex, Lysosomes, Centrioles, Plastids, Chloroplasts, Microtubules & Microfilaments, Mitochondria, and Microsomes.

Unit – IV

Nucleus - Ultrastructure, Composition and Functions - Nuclear Membrane - Nucleoplasm - Chromosomes - Heterochromatin and Euchromatin - Nucleolus - Nucleolus Cycle - DNA and RNAs - Protein Synthesis & regulation.

Unit – V

Cell Divisions and Cell Cycle - Amitosis, Mitosis and Meiosis and their Significance - Cancer, Ageing of Cells and Stem cell studies.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the cell and cellular details with their significance.

CO2: Recognize the cell organelles.

CO3: Distinguish the various types of animal cell structures with their characteristic features and detailed functions.

CO4: Analyze the Characters of cell organelles.

CO5: Identifies the phases of cell division.

References:

- Ambrose, E.J. and Dorothy, M. Easty. (1970). Cell Biology, Thomas Nelson & Sons Burke, Jack. D. (1970). Cell Biology. Calcutta: Scientific Book Agency.
- Cohn, N. S. (1979). Elements of Cytology. New Delhi: Freeman Book Co., 495 pp
- DeRobertis, E.D.P. and E.M.F. DeRobertis. (1988). HonKong: Cell and Molecular Biology, 8th Edition, International Edition, 734pp.
- Giese, A.C. (1979). Cell Physiology. London: Saunders Co., Philadelphia, 609 pp.
- Power, C.B. (1989). Essential of Cytology, Bombay: Himalaya Publishing HouseDowben, R. (1971). Cell Biology. New York: Harper International Edition. Harper and Row Publisher, 565 pp.
- Veer Bala Rastogi. ( ). Introductory cytology. Meerut: Kedar Nath Ram Nath.
- Verma, P.S. and V. K.Agarwal. (1995). Cell and Molecular Biology, 8th Edition. New Delhi: S.Chand & co., 567 pp.
- Loewy, A.G. and P. Sickevitz. (1969). Cell Structure and Function. New Delhi: Amerind Publishing Co., 516 pp.
- Swansen, C.P. and P.L.Webster. (1989). The Cell. New Delhi: Prentice Hall of India Pvt. Ltd., Simplified course - Cell Biology - S.Chand & Company - 2000

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PRACTICAL – V
PAPER – V: CELL BIOLOGY

1. Micrometry - Use of Microscopes, Cameralucida, Stage and Ocular Micrometer.
2. Blood Smear preparation - Differential Count of WBC.
3. Counting of RBC and WBC using Haemocytometer (Demonstration only)
4. Mounting buccal epithelium and observing living cells using vital staining.
5. Mitosis in Onion root tip squash
6. Meiosis in grasshopper testis squash
7. Study of prepared slides of histology
   a) Columnar Epithelium
   b) Ciliated Epithelium
   c) Glandular Epithelium
   d) Areolar Connective tissue
   e) Cartilage T. S.
   f) Bone T. S.
   g) Cardiac muscle
   h) Striated muscle
   a. Non striated muscle
   i) Nervous tissue
   j) Ovary T.S.
   k) Testis

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SEMESTER – VI
EDUCATIONAL MEASUREMENT

CODE: 16CIED61 **Credits: 2 (1L: 0.5T: 0.5P)**
Hours: 3/week

Objectives: On completion of the course, the student-teachers will be able to

1. use different techniques and tools of evaluation.
2. understand the recent trends in examination practices.
3. construct different types of graphs and diagrams.
4. compute measures of central tendency and variation and interpret the results.
5. calculate correlation coefficient and interpret the results.
6. conduct action research

UNIT-I: Tools of Evaluation

Techniques of evaluation – Observation, Interview, Case study, Anecdotal record, Cumulative Record and Socio-metric technique. Check list, Rating scale – different types – errors in rating, Questionnaire

UNIT-II: Statistical Measures, Graphical Representations and measures of correlation

Organisation of Data into Frequency Distribution - Measures of Central Tendency – Arithmetic Mean, Median, Mode – Use and Interpretation - Measures of Variability – Range, Standard Deviation, Average Deviation and Quartile Deviation - Use and Interpretation. - Graphical Representation of Data and their uses: Bar Diagram, Histogram, Frequency Polygon, Cumulative Frequency Graph (Ogive). Correlation – Meaning and Types of Correlation - Interpretation of Co-efficient of Correlation – Rank Difference Method and Product Moment Method, Scatter Plot.

UNIT-III: Action Research and Programme Evaluation

Types of Research – Basic, Applied and Action Research. Action Research: meaning, scope and importance – Steps – Advantages and Limitations. Programme Evaluation: Programme – meaning, scope and importance – Planning for a Programme – Executing the Programme – Evaluating the Programme – Suggesting Steps for improvement.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Appraise different types of Evaluation.

CO2: Experiment Statistical Measures and Interpret.

CO3: Examine the values with graphical representation.

CO4: Execute action research and program evaluation.

CO5: Measure the student's ability with their performance in academics.

References:

- Agarwal, J.C. (2009). Essentials of Educational System, Vikas Publishers House Pvt Ltd, New Delhi.

- Bhattia, K.K. (2008). Measurement & Evaluation in Education, Tandon Publications, Ludhiana.
- George, David. (2008). Trends in Measurement & Evaluation techniques, Common Wealth Publishers, New Delhi.
- Goswami, Marami. (2011). Measurement & Evaluation in Psychology and Education, Neelkamal Publication, New Delhi.
- Linn, Robert L. (2008). Measurement & Assessment in Teaching, Dorling Kuderslay, New Delhi.
- Mangal, S.K. (2009). Statistics in Psychology and Education, PHI Learning Pvt Ltd, New Delhi.
- Metha, D.D. (2006). Educational Measurement & Evaluation, Tandon Publications, Ludhiyana.
- Mrunalini, T. (2010). Educational Evaluation, Neelkamal Publications, New Delhi.
- Sidhu, K.S. (2007). New approaches to measurement & Evaluation, Sterling Publishers Pvt Ltd, New Delhi.
- Singh, Raj, (2008). Techniques of Measurement & Evaluation, Common Wealth Publishers, New Delhi.
- Smith, D. (2007). History of Measurement & Evaluation, Common Wealth Publishers, New Delhi.
- Smith, D. (2008). Theory of Educational Measurement, Common Wealth Publishers, New Delhi.
- Walton, John.A. (2008). Educational Objectives & Achievement testing, Common Wealth Publishers, New Delhi.

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SEMESTER – VI
PEDAGOGY OF PHYSICAL SCIENCE – P2

CODE: 16CIED62 **Credits: 4 (3L: 0.5T: 0.5P)**
Hours: 5/Week

Objectives: On completion of the course, the student-teachers will be able to

1. classify the co-curricular activities in Physical Science;
2. explain the process of evaluation in Physical Science;
3. recognize the significance of planning and teaching Physical Science;
4. explain the importance of classroom climate and acquire the skill of managing the classroom effectively;
5. integrate the picture of an ideal Physical Science teacher;
6. understand the organization of the school plant.

UNIT-I: Evaluation in Physical Science

Concept of Evaluation- Purpose of Evaluation- Continuous and Comprehensive Evaluation- Formative and Summative Evaluation- Achievement tests- Steps in construction- Preparation of Blue print- Preparation of an Achievement Tests in Physical Science - Administering the test- Various types of Test items- Essay type, Short answer type, Objective type: Completion type, Matching type, Multiple Choice- Merits and limitations of Essay, Short answer and Objective type-Item Analysis-Diagnostic Tests- Steps in constructing a Diagnostic test- Teacher made test- Standardized tests.

UNIT-II: Planning and Teaching

Significance of planning for effective teaching- Year Plan: importance and mode of planning- Unit Plan: definition, characteristics, steps in unit planning, importance of unit planning- Lesson Plan: definition, criteria of a good lesson plan, steps involved in lesson planning (Herbartian Steps), advantages of lesson planning.

UNIT-III: Teacher Professionalization and Teacher Commitment

Committed teachers, passionate teachers: Dimension of passion associated with teacher commitment and engagement: Teacher commitment as a passion- teacher – teacher commitment as a unit of time outside the contact hours with students- teacher commitment as focus on the individual needs of students. Teacher commitment as responsibility to impart knowledge, attitudes, values and beliefs- teacher commitment as maintaining ‘ Professional knowledge’- teacher commitment as engagement with school and community- importance of teacher commitment for quality enhancement – ways and means of enhancing teacher commitment for teaching professionalization. Academic and Professional Qualifications for a Science teacher- Qualities of a good Science Teacher- Need for Pre-service and In-service training- Professional development of Science Teachers.

UNIT–IV: Teaching and Learning Difficulties

Individual Differences, Language Problem in Learning , problems in providing laboratory equipments to students expectations, Nature of Subjects, Examination and Grading System –

Difficulties in establishing a culture of evidence, Teaching and Learning Styles – Classroom behaviour of Teacher and Learner – Importance of Effective Instruction.

UNIT-V: ICT and Cybernetics in Education

ICT meaning- growth and origin of ICT - traditional and modern ICT, application of ICT in teaching. Cybernetics- meaning- definition- theory and mechanism- use in the development of instrumental design- application in Physical Science Education- advantages and disadvantages.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Classify the co-curricular activities in Physical science.

CO2: Analyze the significance of planning and teaching Physical Science.

CO3: Develop the skill of managing the classroom effectively.

CO4: Integrate the picture of an ideal Physical Science teacher.

CO5: Understand the organization of the school plant.

References:

- Anderson, R.D et. al.(1992). *Issues of Curriculum Reform in Science, Mathematics and Higher Order Thinking- Across the Disciplines- The Curriculum Reform Project.* U.S.A.: University of Colorado.
- Carin., & Sund.R. (1989). *Teaching Modern Science.*U.S.A : Merill Publishing Co.
- Chauhan, S.S. (1985). *Innovation in Teaching and Learning Process*. New Delhi: Vikas Publishing House.
- Falvery, P., Holbrook, J.,& Conian, D. (1994). *Assessing Students.* Hongkong: Longman Publications.
- Gupta,S.K.(1985). *Training of Physical Science in Secondary Schools*. New Delhi: Sterling Publication (Pvt) Limited.
- Harms, N., & Yager, R. (1981). *What Research Says to the Science Teacher? Vol. 3*, U.S.A: National Science Teachers Association.
- Heiss, Oboum., & Hoffman.(1961).*Modern Science Teaching.* New York: Macmillan & Co, Limited.
- Husen, T., & Keeves, J.P., (Ed.). (1991). *Issues in Science Education.* London: Pergamon Press.
- Jenkins, E.W. (2000). *Innovations in Science and Technology Education. Vol. VII*, Paris: UNESCO.
- Joseph.(1966). *The Teaching of Science.* London: Harvard University Press.
- Khana, S.D., Sexena, V.R. Lamba, T.P., & Murthy, V. (1976). *Technology of Teaching*. Doaba Publishing House.
- Mangal S.K., & Uma Mangal. (1999). *Essentials of Educational Technology*. New Delhi: PHI Learning (P) Ltd.

- Natrajan,C. (Ed.). (1997). *Activity Based Foundation Course on Science Technology and Society*. Mumbai: HomiBhaba Centre for Science Education.
- Nayak. (2003). *Teaching of Physics*. New Delhi: APH Publications.
- Owen, C.B. (1966). *Method of Science Mastery*. English Language Society and Macmillan Company Limited.
- Pandey. (2003). *Major Issues in Science Teaching*. New Delhi: Sumit Publications.
- Paneerselvam, A., & Rajendiran,K. (2005). *Teaching of Physical Science*. Chennai: Shantha Publication.
- PanneerSelvam, A. (1976). *Teaching of Physical Science (Tamil*). Chennai: Government of Tamil Nadu.
- Popham, W.J. (2010). *Classroom Assessment: What teachers need to know (6th ed.)*. New York: Prentice Hall.
- Radha Mohan. (2007). *Innovative Science Teaching for Physical Science Teachers.*New Delhi: Prentice Hall of India Private Limited.
- Rao, C.S.(1968). *Science Teachers Handbook*. American Peace Crops.
- Sampath,K.(1981). *Introduction to Education Technology*. Sterling Publishers.
- Sharma, P.C. (2006). *Modern Science Teaching*. New Delhi: Dhanpat Rai Publications,
- Sharma, R.C. (2009). *Modern Science Teaching*. Meerut: Dhanpat Rai and Sons.
- Siddiqui & Siddiqui. (1985).*Teaching of Science Today and Tomorrow*. New Delhi: Doals House.
- SonikaRajan. (2012). *Methodology of Teaching Science.*New Delhi:Dorling Kindersley (India) Pvt.Ltd.
- Thurber,W.A., &Collette,A.T.(1964). *Teaching Science in Today's Secondary School*. NewDelhi: Prentice Hall of India Private Limited.
- Williams, B., (1999*). Internet for Teachers.* London: John Wiley & Sons.
- Yadav, M.S. (2003). *Teaching of Science*. New Delhi: Anmol Publications.

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SEMESTER – VI
PEDAGOGY OF BIOLOGICAL SCIENCE – P2

CODE: 16EIED64 **Credits: 4 (3L: 0.5T: 0.5P)**
Hours: 5/Week

Objectives: On completion of the course, the student-teachers will be able to

1. appreciate the importance of non scholastic activities in biological science;
2. understand the purpose of evaluation in Biological Science;
3. accept the need for planning before teaching of Biological science;
4. develop interest to enhance the teacher professionalism and teacher commitment as biological science teachers;
5. explain the classroom climate and classroom management;
6. understand the importance of organization and maintenance of the institute.

UNIT-I: Evaluation in Biological Science

Introduction-Concept of evaluation- formative, summative evaluation, construction of achievement tests and its types- Diagnostic, Prognostic tests, criterion and norm referenced tests – Principles of test construction -blue print - question bank- Tools of Evaluation, Written Examination, Online examination- Grading system.

UNIT-II: Planning for Teaching Biological Science

Introduction-Yearly planning in biological science, Importance of unit plan in biological science, Unit formulation in biological science, steps involved in unit planning, Merits and Demerits of unit plan. Major differences between unit plan and lesson plan, Importance of lesson planning-writing instructional objectives and planning for specific behavioural changes, Approaches in writing lesson plan, Herbatian Approach.

Classroom Communication: Types of communication – explaining, modeling and demonstrating. Role of motivation – rewards, praise, feedback and motivating individuals and class as a whole – key principles for effective learning and building positive relationships in classrooms.

UNIT-III: Teacher Professionalization and Teacher Commitment

Introduction-Committed teachers, passionate teachers: Dimension of passion associated with teacher commitment and engagement: Teacher commitment as passion- teacher – teacher commitment as a unit of time outside the contact hours with students- teacher commitment as focus on the individual needs of students. Teacher commitment as responsibility to impart knowledge, attitudes, values and beliefs- teacher commitment as maintaining ‘ Professional knowledge’- teacher commitment as engagement with school and community- importance of teacher commitment for quality enhancement – ways and means of enhancing teacher commitment for teaching professionalization. Need and types of professional growth, role in fostering creativity, equipment maintenance, attending pre - service and in-service training by NCERT and allied agencies. Qualities and competencies of Science teachers - Academic Qualification, Professional training and special qualities required for biology teachers

UNIT–IV: Teaching and Learning Difficulties

Individual differences, Language problem in learning – Nature of subjects, Examination and grading system – Teaching and Learning styles – Classroom behaviour of Teacher and Learner -

Interest and Attitude of students towards learning – Difficulties in Learning Biological Science – Slow learners and gifted learners in Biological Science – Remedial and Enrichment programmes.

UNIT-V: ICT and Cybernetics in Education

ICT meaning- growth and origin of ICT - traditional and modern ICT application of ICT in teaching. Cybernetics- meaning- definition- theory and mechanism- use in the development of instrumental design- application in Biological Science education- advantages and disadvantages.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Classify the co-curricular activities in Biological Science.

CO2: Recognize the significance of planning and teaching Biological Science.

CO3: Interpret the importance of classroom climate and acquire the skill of managing the classroom effectively in co-operative schools.

CO4: Integrate the picture of an ideal Physical Science teacher.

CO5: Understand the organization of the school plant.

References:

- Aggarwal .D.D. (2008).*Modern Method of Teaching Biology*. New Delhi: Karanpaper backs.
- Arulselvi, E. (2007).*Teaching of Science*. Chennai: Saradha Publication.
- Bhandala, Chadha., & Khanna. (1985).*Teaching Of Science.*New Delhi: PrakashBrothers Educational Publishers.
- Bhatnakar,A.D. (2004). *Teaching of Science*. Meerut: Surya Publications.
- Buffaloe, Neal.,&Throneberry, J. B. (1972). *Principles of Biologyteaching.* New Delhi: Prentice – Hall of India Limited.
- Frost Jenny., & Turner Tony. (2005).*Learning to teach Science inSecondary school.*New York: Routledge Palmer Publication.
- Garrett. (1979). *Statistics in Psychology and Education*. Bombay: Vakils, Feffer and Simons Ltd.
- Green, T. L. (1965). *The teaching of biology in tropical secondary schools.* London: Oxford University Press.
- Harms, N., &Yager, R. (1981). *What research says to the scienceteacher* (Vol. 3). Washingdon: National Science Teachers Association.
- Heiss. E. D., Obown, S., &Hoftman, C. W. (1961). *Modern scienceteaching.*New Delhi: Macmillian Company Press.
- Khana, S.D,et al. (1976). *Technology of science teaching.*New Delhi: Doaba House. Natrajan, C. (1997). *Activity based foundation course on sciencetechnology and society.* Mumbai: Homi Bhaba Centre for Science Education.
- Korde., & Sawant.(1980).*Science and Scientific Method.*New Delhi: Himalaya Publishing House.

- Passi, B. K. (1976). *Becoming a Better Teacher*: Micro teaching approach. Ahemedabad: Sahitya Mudranalaya.
- Prasad Janardhan. (1999).*Practical aspects in Teaching of Science*. New Delhi: Kanishka Publication.
- Saunders, H. N. (1967). *The teaching of general science in tropicalsecondary school*. London: Oxford University Press.
- Sharma, Jagdish. (2006).*Models of Teaching Science*. Jaipur: Raj Publishing House.
- Veena Rani Pandey. (2004).*Major Issues in Science Teaching.* Summit Enterprises.

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SEMSTER-VI
CHEMISTRY – PAPER-VI
THEMODYNAMICS AND QUANTUM CHEMISTRY

CODE: 16CIED63 **Credits: 4 (3L: 0T: 1P)**

Hours: 5/Week

Course objective: To know and understand what is quantum mechanics, various fundamental concepts as well as about thermodynamics, different laws in thermodynamics, enthalpy, entropy, free energy various processes

Unit – I: Quantum Mechanics I

Electron and old quantum Theory, Rutherford scattering experiments Rutherford atomic models Quantum Theory of radiation, Photoelectric effect, Bohrs Theory of hydrogen atom alternative explanation for the emission of fine spectrum

Unit – II: Quantum Mechanics II

Dual character of electron debrogile's equation, the Davison Germens experiment Heisenberg uncertainty principle Compton effect, Quantum Mechanics, Schrodinger wave equation (No Derivation) Zeeman effect, Pauli's exclusion principle

Unit –III: Thermodynamics I

Definitions of thermodynamic terms – intensive and extensive variables, isolated, closed and open systems. Thermodynamic processes, cyclic processes, reversible and irreversible processes, thermodynamic functions and their differentials, Zeroth law of thermodynamics. Concepts of heat and work.

Unit – IV: Thermodynamics II

First law of thermodynamics and internal energy (U), enthalpy (H), relation between Cp and Cv Calculations of w,q,dU and dH for expansion of ideal gas under isothermal and adiabatic conditions, for reversible and irreversible processes including free expansion, Joule's law, Joule Thomon coefficient.

Unit – V: Thermodynamics III

Application of first law of thermodynamics – Hess's law of constant heat summation, Enthalpy of solution, enthalpy of dilution, enthalpy of neutralization, enthalpy of ionization and enthalpy of formation of ions. Bond dissociations energy, Born –Haber cycle for calculation of lattice energy, Kirchoff's equation, relation between ΔH and ΔU of a reaction. Spontaneous processes, heat engine, Carnot cycle and its efficiency, statements of second law, Nernst heat theorem, third law of thermodynamic.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Analyze the basic principle of quantum chemistry

CO2: Examine the concept of wave function

CO3: Compare the different laws in thermodynamics.

CO4: Solve the problems in quantum chemistry

CO5: Understand the basic concepts of Quantum mechanics.

Text Books:

- P.W. Atkins, "Physical Chemistry" Oxford publishers, 11th edition, **2009**
- D. A. McQuarrie, "Quantum Chemistry" University Science Books, Mil Valley, California, 7th edition **1983.**
- S. Glasstone, "Thermodynamics for Chemist" EastWest Press, 6th edition, **1999**

Reference Books:

- P.L. Soni, "Text Book of Physical Chemistry" Sultan Chand & sons. 2th edition, **2011**
- Kundu and Jain, "Physical Chemistry" S. Chand, 6th edition, **2011**
- S. Glasstone, "Text Book of Physical Chemistry" –Macmillan. 7th edition **2012**

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CHEMISTRY
PRACTICAL-VI

Preparations.

1. Preparation of Parabromoacetanalide
2. Preparation of benzoic acid from benzaldehyde
3. Preparation of methyl salicylate
4. Preparation of metadinitro benzene
5. Preparation of methyl orange
6. Preparation of Picric acid
7. Preparation involving benzoylation technique
8. Preparation involving Esterification method

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SEMESTER-VI
BOTANY – PAPER - VII
GENETICS, BIOSTATISTICS & EVOLUTION

Code: 16EIED65 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

1. study Mendelian genetics, recombination of chromosomes, structure and function of genes and their various units
2. educate on mutation
3. impart knowledge on biostatistics and its applications biological experiments
4. understand the mechanism of evolution and study of population genetics

Unit - I

Genetics: Mendel's laws, monohybrid, dihybrid, back cross and test cross. Allelic interactions: Incomplete dominance and co-dominance – complementary factor hypothesis, epitasis (Dominant and recessive), Non-allelic interaction – Lethal factor, Multiple factor hypothesis

Unit - II

Recombination – Linkage & crossing over in *Lathyrus odoratus*, eye colour in *Drosophila* and colour blindness in man. Cytoplasmic inheritance. Sex determination in plants and *Drosophila.*

Functional units of gene – cistron, recon, muton, codon and operon concept (lac). Mutation – classification, types, mechanism (physical and chemical mutagens) and application (role of mutation in evolution)

Unit - III

Biostatistics: Definition and scope. Sampling techniques: Sample, population, Random and non – random sampling techniques. Data – Types of data. Presentation of data – Graphical methods: Histogram, Bar and Pie diagrams.

Unit - IV

Measures of central tendency – Mean, median and mode. Measures of dispersion – range, variance, Standard Deviation and Standard Error. Chi Square analysis. Correlation and its types: Probability Distribution – normal, binomial and Poisson distribution.

Unit - V

Evolution – Evolutionary concepts – Theories of Lamarck, Charles Darwin and the modern synthetic theories. Population genetics – gene pool, gene frequency and Hardy–Weinberg law. Factors affecting gene frequencies.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Classify Mendelian genetics, recombination of chromosomes, structure and function of genes and their various units

CO2: Understand the genetically aberrations of mutation

CO3: Apply the knowledge on biostatistics and its applications biological experiments

CO4: Understand the mechanism of evolution and study of population genetics

CO5: Identify the significance of biotechnology and genetic engineering.

References:

GENETICS

- Adrin, M.S.R.B., Owen, R.D. and Edger, R.S. (1979). *General Genetics*. In: Mendelism. Eurasia Publishing House (P) Ltd., New Delhi.
- Agarwal, V.K. (2000). *Simplified course in Genetics* (B.Sc., Zoology). S. Chand & Company Ltd., New Delhi.
- Ahluwalia, K.B. (1990). *Genetics*. Wiley Eastern Ltd., Madras.
- Chandrasekaran, S.N. and Parathasarathy, S.V. (1965). *Cytogenetics and Plant Breeding*. P. Varadhachari & Co., Madras.
- Daniel Sundararaj, D. and Thulsidas, G. (1972). *Introduction to Cytogenetics & Plant Breeding* (3rd Ed.). Popular Book Depot, Madras.
- Gardner, E.J. and Snusted, D.P. (1984). *Principles of Genetics* (7th edition). John Wiley & Sons, New York.
- Gupta, P.K. (2000). *Genetics*. Rastogi Publishers, Meerut.
- Herskowitz, I.H. (1977). *Principles of Genetics* (2nd Ed.). MacMillan Publishing Co. Inc., New York.
- Hexter, W. and Yost, H.T. Jr. (1977). *The Science of Genetics*. Prentice Hall of India (P) Ltd., New Delhi.
- Jain, H.K. (1999). *Genetics-Principles, Concepts & Implications.* Oxford & IBH Publishing Co., (P) Ltd., New Delhi.
- Lewin, B. (1990). *Genes IV*. Oxford University Press, Oxford.
- Meyyan, R.P. (2000). *Genetics & Evolution*. Saras Publication, Nagercoil.
- Palaniyappan, S. (1987). *Marabiyal* (Genetics - In Tamil). V.K. PublishingHouse, Madras.
- Pandey, B.P. (2012). *Cytology, Genetics and Molecular Genetics*. Tata McGraw-Hill Education Private Ltd., New Delhi.
- Renganathan, T.K. and Shanmugavel, S. (1996). *Genetics & Genetic Engineering*. Commercial Offset Printers, Sivakasi.
- Sandhya Mitra (1994). *Genetics - A Blue Print of Life*. Tata McGraw-Hill Private Ltd., New Delhi.
- Sarin, C. (1994). *Genetics*. Tata McGraw-Hill Education Private Ltd., New Delhi.
- Singleton, R. (1963). *Elementary Genetics*. D. Van Nostrand Co., Ltd. Inc.,New York.
- Sinha, U. and Sinha, S. (1989). *Cytogenetics, Plant Breeding & Evolution*. Vikas Publishing House, New Delhi.

- Sinnott, E.W., Dunn, L.C. and Dobshansky, J. (1958). *Principles of Genetics* (5th Edition) McGraw Hill Publishing Co., New York.
- Strickberger, M.W. (1976). *Genetics* (2nd Ed.). MacMillan Publishing Co. Inc., New York
- Watson, J.D. (1977). *Molecular Biology of the Gene*. W.A. Benjamin Inc., California.
- Winchester, A.M. (1958). *Genetics* (3rd Ed.). Oxford & IBH Publishing House, Calcutta.
- Winter, P.C., Hickey, G.I. and Fletcher, H.L. (1999). *Instant Notes in Genetics.* Viva Books (P) Ltd., New Delhi, Mumbai, Chennai.

BIOSTATISTICS

- Nageswara Rao, G. (1983). *Statistics for Agricultural Science*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- Olive, J.D. (1995). *Basic Statistics - A Primer for the Biomedical Sciences*. John Wiley and Sons, New Delhi.

EVOLUTION

- Gottlieb, LD. and Jain, S.K. (1988). *Plant Evolutionary Biology*. Chapman & Hall, London.
- Savage, J.M. (1969). *Evolution* (2nd Ed.). Amerind Publishing (P) Ltd., New Delhi.
- Shukla, R.S. and Chandel, P.S. (1996). *Cytogenetics, Evolution & Plant Breeding*. S. Chand & Company Ltd., New Delhi.
- Sproule, A. (1998). *Charles Darwin Scientists who have changed the world*. Orient Longmans, Hyderabad.
- Verma, P.S. and Agarwal, V.K. (1999). *Concepts of Evolution*. S. Chand & Company Ltd., New Delhi.

PRACTICAL - VII
PAPER – VII: GENETICS, BIOSTATISTICS & EVOLUTION

1. Problems on simple monohybrid and dihybrid ratios. Simple problems on interaction on factors included in the theory.
2. Simple experiments to determine the mean, median and mode. Illustration of graphic representation of data using simple analysis.

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SEMESTER – VI
ZOOLOGY – PAPER – VI
ANIMAL PHYSIOLOGY

CODE: 16EIED66 **Credits: 4 (2L:1T:1P)**
Hours: 6/Week

Objectives: To enable students to

1. understand how the body functions adapts with respect to its external and internal environment, related to nervous integration, sensation, metabolism and reproduction.

Unit – I

Introduction - Scope and fields of Physiology - Food requirements - Carbohydrates, Proteins, Fats, Minerals, water and vitamins. Enzymes - properties and classification - mechanism of enzyme action - Digestion - Intracellular and Extracellular - Digestive enzymes and their role in digestion - Absorption. Metabolism - Metabolic pathways with reference to Carbohydrates, Proteins and Lipids - Glycogenesis - Glycogenolysis - Gluconeogenesis Glycolysis - Kreb's cycle Oxidative Phosphorylation - Electron Transport System - Deamination - Fate of Keto acids - Nitrogen metabolism - Beta oxidation of fatty acids - Basal metabolism.

Unit – II

Respiration - External and Internal (Tissue) respiration - Respiratory pigments - disibution, composition, properties and functions - Adaptations to high altitude and diving. Transport of oxygen and carbondioxide - Anaerobiosis Circulation - Types - Composition, Properties and functions of blood - Types of Heart. Human - Cardiac cycle - Cardiac rhythm - origin of heart beat - regulation of heart beat - ECG - Blood pressure .

Unit – III

Excretion - Organs in animals - Kinds of excretory products - ornithine cycle - mechanisms of urine formation in mammals - hormonal regulation of excretion. Homeostasis - regulatory mechanisms - osmoconformers osmoregulators - Thermoregulation - acclimation and acclimatization - heat death - cold death - poikilotherms - heterotherms - homeotherms - temperature regulation in poikilotherms and homeotherms - physiology of hibernation - aestivation Biorhythms - definition, types and examples and adaptive significance.

Unit – IV

Nervous tissue - Neuron - structure, types of neurons and their distribution - giant nerve fibres - myelinated nerve fibres. Nerve Impulse - definition - conduction of impulse - saltatory conduction - synapse - synaptic transmission of impulses - Neurotransmitte, Autonomic nervous system. Muscle proteins - mechanism of contraction - Con cycle - Theories of muscle contraction - Muscle twitch - Tetanus - Muscle Fatigue - Isotonic and isomoetric contraction - Aerobic and Isometric exercises. Bioluminescence - Definition, types, chemistry and adaptive significance - chromatophores

Unit – V

Endocrine glands - structure, secretions and functions of endocrine glands in vertebrates - Pituitary, Hypothalamus, Thyroid, Parathyroid, Adrenal, Thymus, islets of Langerhans, Sex organs - Gastrointestinal hormones - Hormones of Insects and Crustaceans. Receptors - Classification - chemoreceptors - touch receptors - equilibrium receptors- Photoreceptor - vertebrate mammalian eye - Structure of retina - Visual pigments - Physiology of vision - Binocular vision - adaptation to darkness - Compound eyes and Mosaic vision. Phonoreceptors - Mammalian ear - organ of corti - working mechanism - Phono reception in Birds.

References:

1. Sambasivaiah, Kamalakara Rao and Augustine Chellappa. (1990). A textbook of Animal Physiology and Ecology. New Delhi: S.Chand & Co. Ltd., 480 pp.
2. Parameswaran, Anantakrishnan and Ananta Subramanian. (1975). Outlines of Aniimal Physiology, S. Viswanathan (Printers & Publishers) Pvt. Ltd., 329 pp.
3. William S. Hoar. (1976). General and Comparative Physiology. New Delhi: Prentice Hall of India Pvt. Ltd., 848 pp.
4. Wood, D.W. (1983). Principles of Animal Physiology, 3rd Ed.,
5. Prosser C.L. (1985). Comparative Animal Physiology. Agra: Satish Book Enterprise, 966

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PRACTICAL – VI
PAPER – VI: ANIMAL PHYSIOLOGY

1. Qualitative and quantitative tests for proteins,
2. Qualitative tests for carbohydrates and fats
3. Human salivary amylase activity in relation to Temperature and pH.
4. Identification of Nitrogenous waste products

Spotters:
Haemoglobinometer,
Kymograph,
Sphygmomanometer.

Models
Amino acids,
Haemoglobin,
ATP,
Steroids.

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SEMESTER-VI
ZOOLOGY – PAPER - VII
MAJOR BASED ELECTIVE - 1
ECONOMIC ENTOMOLOGY & PEST MANAGEMENT

CODE: 16PIED67 **Credits: 4 (2L:1T:1P)**
Hours: 6/Week

Objectives: To enable students to

1. enlighten the students on beneficial and harmful insects, their biology, their nature of damage and their management measures.
2. understand about pests which attack our crops and their management measures.

Unit – I

Brief account of morphology, classification (Major orders) and development (Metamorphosis) of insects.

Unit – II

Beneficial and harmful insects. Economic importance of honeybees, silk worm and lac insect - parasitic and predatory insects. Damages to plants, animals and man by insects. Brief account of any three pests of 1. Rice, Cholam and Pulses 2. Sugar cane 3. Cotton 4. Goundnut, Gingely and Coconut 5. Brinjal, Tomato and Lady's finger 6. Cardomam, Chillies, Tea and Coffee 7. Mango and Citrus.

Unit – III

Insect pests of stored grains - Insect vectors of plants, animals and man - Other insects affecting the health of man and domestic animals.

Unit – IV

Insect pest control methods (Physical, mechanical, biological and chemical) - Classification of pesticides and their modes of action.

Unit – V

Insects and Diseases: Mode of transmission pathogens and epidemiology of typhoid fever, dengue, plague. Plant protection appliances used - basic principles of insecticide formulations and their application in pest control. Pesticides and environmental pollution - precautions in handling pesticides.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Differentiate the beneficial and harmful insects.

CO2: Classify the development of insects.

CO3: Produce the pest free grains.

CO4: Understand about pests which attack our crops and their management measures.

CO5: Gain knowledge about insecticide and pesticide.

References

- David, B.V. (1992). Pest Management and Pesticides Indian Scenario. Madras: Namratha Publications.
- David, B.V. and T. Kumarasamy, (1984). Elements of Economic Entomology. Madras: Popular Book Depot.
- Metcalf, C.L. and W.P. Flint. (1973). Destructive and Useful Insects. 4th ed., New Delhi: Tata McGraw Hill Publishing Co Ltd.
- Nayar, K.K. T.N. Ananthakrishan and B.V. David. (1992). General and Applied Entomology. New Delhi: Tata McGraw Hill Publishing Co Ltd.,
- Ramkrishna Iyer, T.V. (xxxx). Economic Entomology. Madras: Government Publications.
- Roya D.N. and A.W.A. Brown (eds). (1981). Entomology Medical and Veterinary (3rd ed.). Bangalore: The Bangalore Printing and Publishing Company.

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PRACTICAL – VII
MAJOR BASED ELECTIVE - 1
PAPER-VII: ECONOMIC ENTOMOLOGY & PEST MANAGEMENT

1. Collection and identification of important pests and their natural enemies.
2. Collection of insect pests according to the crops.
3. Identification, Preparation, Formula and employment of standard insecticides.
4. Study of different manufacturers of insecticides.
5. Identify and comments on the spots: spraying and dusting appliances and apparatus used in insect-pest control.
6. Class record and viva-voce

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SEMESTER-VI
ZOOLOGY – PAPER - VII
MAJOR BASED ELECTIVE – 2
ORNAMENTAL FISH FARMING

CODE: 16PIED68 **Credits: 4 (2L:1T:1P)**
Hours: 6/Week

Objectives: To enable students to

1. enlighten the students about ornamental fish farming a profitable culture practice.
2. help the students know about opportunities for their self-employment.

Unit – I

Importance and scope of ornamental fish culture - Economics. Commercial value and potential trends in ornamental fish farming in the world and in India. Budget required for setting up an Aquarium Fish Farm as a Cottage Industry.

Unit – II

Important freshwater and marine ornamental fishes - Indigenous and exotic species- Guppy, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish, Butterfly fish, Zebra fish, Koi, Tetra, Molly, Glass fish, Cichlids, Hippocampus and Scat fishes.

Unit – III

Mass production of fancy fishes: Preparations for breeding – breeding behaviour of chosen fishes- molly and fighter fish. Induced breeding. Food and feeding – Preparation and composition of formulated fish feeds. Live feeds: rotifers, tubifex. Live fish transport- Fish handling, packing and forwarding techniques.

Unit – IV

Aquarium design, Construction and preparation: size, shape, substrate, ornamental aquatic plants. Construction and functions of Bio filters, aerators – accessories for fish tanks – hood and light, nets, suction tube.

Unit – V

General Aquarium maintenance – Maintenance of water quality: controlling ammonia build up, pH, feeding regimes. Disease management: Common bacterial, viral, fungal, protozoan and crustacean infections, their treatment and control.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the basic concepts of ornamental fish forming.

CO2: Distinguish fresh water and marine water ornamental fish.

CO3: Implement new methods in production and breeding of fishes.

CO4: Gain the knowledge about constructing aquaticplants.

CO5: Apply learnt skills in disease management.

References Books

- Day, F. (1978). Fishes of India Vol. I & II. AAAAA: William Danisan & Sons, India.
- Gupta, S.K and Gupta, P.C. (2006). General and Applied Ichthyology. New Delhi: S. Chand and company Ltd.
- Jameson, J.D. and R.Santhanam (1996). Manual of ornamental fisheries and farming technology. Thoothukudi: Fisheries College and Research Institute.
- Jingran V.G. (1991). Fish and Fisheries in India. New Delhi: Hindustan Publishing Company.
- Mill Dick, (1993). Aquarium Fish. New York: DK Publishing Company.
- Mitchell Beazley, (1998). The complete guide to tropical aquarium fish care. London: Read and Consumes Book Ltd.,
- Mitchell Beazley. (1998). The complete guide to tropical aquarium fish care. London: Read and Consumes Book Ltd.,
- Santhanam, R., N. Sugumaran and P. Natarajan. (1987). A manual of Fresh water aquaculture. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.,
- Shanmugam, K. (1992). Fishery Biology and Aquaculture. Madras: Leo Pathipagam.

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PRACTICAL - VII
MAJOR BASED ELECTIVE - 2
PAPER-VII: ORNAMENTAL FISH FARMING

1. Identification of common ornamental fishes and plants. Fabrication of all-glass
2. Aquarium. Setting-up and maintenance. Aquarium accessories and equipments. Conditioning and packing of ornamental fishes.
3. Identification of ornamental fish diseases and prophylactic measures.

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SEMESTER – VII
PEDAGOGY OF PHYSICAL SCIENCE – P3

CODE: 16PIED71 **Credits: 1 (0L: 0.5T: 0.5P)**
Hours: 2/Week

Objective: On completion of the course, the student-teachers will be able to

Understand the subject matters at the School level in Physical Science deeply based on the orientation given.

Subject Content on Physical Science Subjects (Physics and Chemistry) at the School Level of Class VI to X will be taught by the Teacher Educators to strengthen the Subject Knowledge of the Student Teachers.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the subject matters at the school level in physical science.

CO2: Apply the teaching methods and techniques in school subject.

CO3: Gain the knowledge about the co-operative school climate.

CO4: Use the teaching practice experience while giving demo teaching in various school.

CO5: Relate the lesson plan format with the Bloom taxonomy of educational objectives

SEMESTER – VII
PEDAGOGY OF BIOLOGICAL SCIENCE – P3

CODE: 16PIED73 **Credits: 1 (0L: 0.5T: 0.5P)**
Hours: 2/Week

Objective: On completion of the course, the student-teachers will be able to

Understand the subject matters at the School level in Biological Science (Botany and Zoology) deeply based on the orientation given.

Subject Content on Biological Science (Botany & Zoology) Subjects at the School Level of Class VI to X will be taught by the Teacher Educators to strengthen the Subject Knowledge of the Student Teachers.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the subject matters at the school level in Biology

CO2: Apply the teaching methods and techniques in school subject.

CO3: Gain the knowledge about the co-operative school climate.

CO4: Use the teaching practice experience while giving demo teaching in various school.

CO5: Relate the lesson plan format with the Bloom taxonomy of educational objectives

SEMSTER-VII
CHEMISTRY – PAPER-VII
CHEMISTRY OF NATURAL PRODUCTS

CODE: 16CIED71 **Credits: 4 (3L: 0T: 1P)**

Hours: 5/Week

Course objective: To understand what are carbohydrates proteins amino acid, alkaloids, terpenoide their classification structure, elucidation and to know about dyes

Unit – I: Carbohydrates

Classification – Constitution of glucose and fructose. Reactions of glucose and fructose-osazone formation. Mutarotation and its mechanism. Cyclic structure. Pyranose and furanose forms. Determination of ring size. Haworth projection: formula. D and L configuration of monosaccharides – epimerisation, chain lengthening and chain shortening of aldoses. Inter conversion of aldoses and ketoses.

Unit – II: Amino Acids and Proteins

Aminoacids and proteins - Classification of amino acids. Essential and nonessential amino acids, preparation of alpha aminoacids, properties and reactions. Zwitter ions, isoelectric points - Peptide synthesis - structure determination of polypeptides - end group analysis.

Unit – III: Vitamins and Alkaloids

Vitamins: - classification, biological importance of vitamins A, B_1, B_2, B_6, B_{12} and C. General methods of isolation and general methods of structure determination of conine, piperine and nicotine.

Unit – IV: Terpenoids

Isoprene rule, special isoprene rule, Structural elucidations of - Geraniol, menthol and alpha terpineol.

Unit – V: Dyes and Pigments

Theory of colour and constitution. Calssification - according to structure and method of application. Preparation and uses of 1) Azo dye-methyl orange and Bismark brown 2) Triphenyl methane dye Malachite green. 3) Phthalein dye - phenolphthalein and fluroescein 4) Vat dye - indigo 5) Anthraquinone dye - alizarin.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the Basic Structure and Reactions of Glucose and Fructose

CO2: Prove Haworth projection formula and D & L configuration of carbohydrates

CO3: Understand the classification, function and reactions of amino acids and proteins

CO4: Demonstrate the concept of synthesis and structural determination of polypeptides

CO5: Classify fat soluble and water-soluble vitamins with suitable examples.

Text Book:

- Ashutosh Kaur. "Chemistry of Natural Products" Vol. I & II. B. S. publishers. 2nd edition, **2012.**

Reference Books:

- Jagadamba Singh. "Natural Products Chemistry" Pragati Prakashan,2nd edition **2012.**
- O. P. Aggarwal. "Chemistry of Natural Products" Vol. I & II. Goel publishers. 41st edition. **2009.**

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CHEMISTRY
PRACTICAL-VII

Heterogeneous equilibria:

1. Phenol-water system – CST
2. Effect of Impurity- 2% NaCl or succinic acid solutions on phenol-determination of the concentration of the given solution.
3. Determination of transition temperature of the given salt hydrate. $Na_2S_2O_3$. $5H_2O$, CH_3COONa. $3H_2O$, $SrCl_2$ $6H_2O$, $MnCl_2$ $4H_2O$.
4. Molecular weight of a solute-Rast's method using naphthalene, m-dinitrobenzene and diphenyl as solvents.
5. Determination of strength of a strong acid by conduct metric titration (HCl *vs* NaOH).
6. Determination of the strength of Fe (II) by potentiometric redox titration.

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SEMESTER-VII

BOTANY – PAPER - VIII
PLANT ECOLOGY & CONSERVATION

CODE: 16CIED73 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

1. realize the values of plants and animals of the ecosystem
2. know about the hazards of pollution and the importance of keeping his/her environment clean
3. know in detail on various types of vegetation
4. know about his/her environment and mould the students to become managers of various ecological systems

Unit - I

General Ecology – Approaches to the study of Ecology, Autecology – Synecology, Plant environment – climatic, edaphic and Biotic factors (interference on Plant habitat by animals – Grazing and browsing, by humans – deforestation, Agriculture), Allelopathy.

Unit - II

Ecosystem concept – components abiotic-biotic-autotrophic producers & heterotroophic consumers, biomass-ecological pyramids, Productivity – primary, secondary & gross; food chain – food web & energy flow – pond ecosystem.

Unit - III

Vegetation – Units of vegetation – formation, association, consociation, society – Development of vegetation: Migration – colonization, ecesis, Methods of study of vegetation (Quadrat & transect). Plant succession – Hydrosere & xerosere. Ecological classification of Plants; Morphological and anatomical features of plants and their correlation to the habitat.

Unit - IV

Pollution and its control: Air pollution, Radiation pollution, Noise pollution, Thermal pollution-Soil pollution: Industrial, agrochemicals (insecticides, pesticides, fungicides, herbicides). Water pollution – Industrial effluents. Marine pollution.

Unit - V

Phytogeography-Approaches to Phytogeography – Climate of India & its climatic zones, Botanical regions (provinces) of India – Vegetational types of TamilNadu: Evergreen, deciduous, scrub & Mangrove, Continuous and discontinuous distribution. Endemism. *In situ* and *ex situ* conservation. Application of remote sensing in conservation.

COURSE OUTCOME)

At the end of this course the students will be able to,

CO1: Realize the values of plants and animals of the ecosystem.

CO2: Synthesize the importance of keeping his/her environment clean by overcoming pollution.

CO3: Analyze various types of vegetation in an eco-system.

CO4: Synthesize abiotic, biotic, and edaphic factors that influence plants and animal.

CO5: Understand the morphological and anatomical features of plants according to their adaptation (water, dry lands, and soil).

Reference Books:

PLANT ECOLOGY & CONSERVATION

- Agrawal, K.C. (1987). *Environmental Biology*. Agro Botanical Publisher, India.
- Arumugam, N. (1994). *Concepts of Ecology* (Environmental Biology). Saras Publications, Nagercoil, Tamilnadu.
- Cain, S.A. (1944). *Foudations of Plant Geography*. Harper & Brothers, N.Y.
- Chandrasekaran, P. (1996). Chutruch choozhal Maasupadu (Environmental Pollution) T.K. Printers, Pudukkottai, Tamilnadu.
- Good, R. (1997). *The Geography of flowering Plants* (2nd Edn.). Longmans, Green & Co., Inc., London & Allied Science Publishers, New Delhi.
- Kumar, H.D. (1992). *Modern Concepts of Ecology* (7th Edn.). Vikas Publishing Co., New Delhi.
- Mani, M.S. (1974). *Ecology & Biogeography of India*. Dr. W. Junk Publishers, The Haque.
- Odum, E.P. (1971). *Fundamentals of Ecology* (2nd Edn.). Saunders & Co., Philadelphia & Natraj Publishers, Dehradun.
- Sharma, P.D. (2000). *Ecology & Environment*. Rastogi Publications, Meerut, India.
- Sundaram, R. (1972). Thaavara Chuyach Choozhnilai yiyal. Tamilnadu Text Book Society.
- Vashishta, P.C. (1990). *Plant Ecology*. Vishal Publications, Delhi, Jalandhar.
- Verma, P.S. and Agarwal, V.K. (1999). *Concept of Ecology* (Enviromental Biology). S. Chand & Co., New Delhi.

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PRACTICAL - VIII
PAPER – VIII: PLANT ECOLOGY & CONSERVATION

1. Study of morphological and anatomical features of hydrophytes and xerophytes.
2. Study of morphological features of epiphytes, parasites and halophytes.

3. Study of vegetation by the quadrat and line transect method.
4. Estimation of frequency, density & Dominance.
5. Determination of soil & water pH.
6. The light and dark bottle experiment for primary productivity study in the aquatic ecosystem.

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SEMESTER – VII

ZOOLOGY – PAPER – VIII
GENETICS AND EVOLUTION

CODE: 16CIED74 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

1. get overview of genes, mutations, sex determination and patterns of inheritance.
2. understand the chromosomal inheritance and expression of human genetic characters and disorders.
3. understand the evolution of life.

Unit – I

Mendel's principles and applications. Linkage and crossing over -chromosome theory of linkage, kinds of linkage, linkage groups, types of crossing over, mechanism of meiotic crossing over, kinds of crossing over, theories about the mechanism of crossing over, cytological detection of crossing over, significance of crossing over. Chromosome mapping - Gene mapping.

Unit – II

Chromosomal variation in Number & Structure – Euploidy, Non-disjunction & Aneuploidy. Chromosomal deletions & duplications, inversions & translocations. Gene mutations. Mutagens. Human Cyto-Genetics - human traits – Human karyotype, Banding techniques, classification, Genetic diseases (gout, hypercholesterolemia, cystic fibrosis, phenylketonuria, hemophilia, and muscular dystrophy), syndromes (Down, Klinfelter, and Turner), and congenital anomalies.

Unit – III

Molecular genetics: Structures and replication of DNA. Types and structure of RNA. Organization and functions of genetic materials- Chromatin, nuclear and mitochondrial genome. Gene paradox, Repetitive DNA, Satellite DNA, Overlapping genes, Split genes, Pseudogenes. Fine structure of gene – cistron, recon and muton - Gene expression and regulation in prokaryotes – Operon model – Lac and Trp Operon – Gene regulation in Eukaryotes. Gene amplification.

Unit - IV

Chemical origin of life; Evidences – Morphological, Embryological, Biochemical and Paleontological evidences. Fossil and Fossilization, Dating of Fossils. Lamarck, Darwin and De Veries Theories of Evolution and their modern concepts.

Unit – V

Mimicry and animal colouration;Speciation and Species Concepts;Isolating mechanisms;Hardy Weinberg Principle;Gene pool and Gene frequency.Evolution of Man.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Get overview of genes, mutations, sex determination and patterns of inheritance.

CO2: Understand the chromosomal inheritance and expression of human genetic characters and disorders.

CO3: Differentiate various structures and replication of DNA.

CO4: classify the need and importance of evolutionary theories

CO5: Analyze the Speciation and Species Concept.

References:

- Kumar, H.D. (1998). Molecular Biology and Biotechnology. Vikas publishing House.
- Lewin, B. (1998). Gene VI . New Delhi: Wiley Eastern Ltd.,
- Rothwell, N.V. (1979). Human Genetics. New Delhi: Prentice Hall of India.
- Gupta P.K. (1996). Genetics. Meerunt: Rastogi publication, Shivaji Road.
- Strickberger, M.W. (2002). Genetics (3rd edition). New Delhi: Prentice Hall of India.
- Friefelder, D. (1997). Microbial Genetics. New Delhi: Narosa Publishing.
- Arumugam, N. (1989). Organic Evolution. Nagarcoil: Saras Publication.

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PRACTICAL – VIII
PAPER – VIII: GENETICS AND EVOLUTION

1. Recording of Mendelian traits in Man, Blood grouping of man.

2. Models:
   Monohybrid and Dihybrid crosses. Karyotypes of normal male and female. Klinefelter's syndrome, Turner's syndrome and Down's syndrome. Drosophila- Male and female identification, Genetic importance, Mutants (Wing, body colour, eye colour). Models for DNA, RNA, tRNA Structure and DNA replication.

3. Spotters:
   Protective coloration -Leaf insects, Stick insects, Chameleon, Hippocampus, Pepper moth. Mimicry: Monarch and Viceroy butterfly. Quantum evolution; Bat, Pteropus.

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SEMESTER VIII
INCLUSIVE EDUCATION

CODE: 16CIED81 **Credits: 3 (2L: 0.5T:0.5P)**
Hours: 4/Week

Objectives: On completion of the course, the student-teachers will be able to

1. understand and list basic facts on Inclusive Education
2. identify children with diverse needs
3. locate the appropriate initiatives taken at the national level towards inclusion.
4. develop an inclusive curriculum
5. evaluate teacher preparation programme for Inclusive Education

UNIT-I: Introduction to Inclusive Education

Equity and Educational Policy: Equity- meaning and scope- Educational Policies and recommendations pertaining to Equity, Equal Educational Opportunity, and Inclusiveness – Inclusive Education: Definition – concept and importance of inclusive education – Historical perspectives on education of children with diverse needs – difference between special education, integrated education and inclusive education – advantages of inclusive education.

Children with Diverse Needs: Definition and Characteristics of children (hearing, visual and physically challenged) developmental disabilities (autism, cerebral palsy, learning disability) social and emotional problems, importance of early detection and functional assessment.

UNIT-II: Initiatives taken at National Level towards Inclusion

National level: University Education Commission (1949). The Indian Education Commission (1964-66). Integrated Education for Disabled Children (IEDC, 1974). National Policy on Education 1986 (POA, 1992). Rehabilitation Council of India Act, 1992, The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995, The National Trust for the welfare of persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act 1999, Sarva Shiksha Abhiyan, RMSA, National Curriculum Framework, 2005, IEDSS-2009, RTE-2009, Right to persons with disability Bill 2012/2014.

UNIT-III: Inclusive Curriculum

Inclusive curriculum – meaning and characteristics – Teaching and learning environment with special reference to inclusive school – Guidelines for adaptation for teaching / practicing science, mathematics, social studies, languages, physical education, yoga, heritage, arts, theatre, drama etc in inclusive settings – Techniques and methods used for adaptation of content, laboratory skills and play material in inclusive classroom.

UNIT-IV: Teacher Preparation and Inclusive Education

Review existing educational programmes offered in secondary school (general and special education) – Skills and competencies of teachers and teacher educators for secondary education in inclusive settings – N.C.F. 2005 and curriculum for teacher preparation and transaction modes – Roles, responsibilities and professional ethics of an

inclusive education teacher and teacher educators – Evaluation and follow-up programmes for improvement of teacher preparation programmes in inclusive education.

Practicals:

1. Visits to a special school
2. Carrying out a case study in opportunity school for slow learners.
3. Preparation of Three teaching aids for differently abled children.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Explain the concept of inclusiveness.

CO2: Differentiate the diverse needs of children.

CO3: Evaluate the initiatives taken at national level towards inclusion.

CO4: Schedule preparation for inclusive curriculum.

CO5: Support the innovative ideas for implementing the curriculum.

References:

- Ainscow,M. (1999) understanding the development of inclusive schools, London: Falmer Press
- Berry, P. (1976). Language and Communication in the mentally handicapped, University Park Press, Baltiomore.
- Booth, T., Nes, K., Stromstab, M. (2003). developing inclusive Teacher Education, London: Routledge Falmer.
- Clough, P. and Corbet, J. (200) Theories of inclusive education – a students' guide, Paul Chapman Publishing Ltd.
- Deiner, P. L. (1993). Resources for teaching children with diverse abilities, Harcourt Brace College Publishers.
- Gunter, H (200) "Educational Leadership and diversity" Educational Management, Administration and leadership, special edition: diversity.
- Halsall, R. (Ed.). (1998) Teacher Research and School improvement. Open University Press
- Hegarty, S. and Mithu Alur (2002) Education and Children with special educational needs – segregation to inclusion. New Delhi: Sage Publication India Pvt. Ltd.
- Index of inclusion (2014) NCERT, New Delhi
- Jangira N.K and Mani, M.N.G (1990): Integrated education for visually handicapped, Gurgaon, Old Subjimandi, Academic Press
- Jangira, N.K. and Ahuja, A. (2002): Effective Teacher Training: Cooperative Learning Based Approach: National Publishing house 23 Daryaganj, New Delhi
- Jha. M. (2002) inclusive education for all: schools without walls, Heinemann educational publisher, multivista global ltd, Chennai
- Julka, A (2006). Inclusive children and youth with disabilities in education – a guide for practitioners NCERT, New Delhi

- Karantha, P. and Rozario, J. (2003). Learning disabilities in India, New Delhi: Sage Publication India Pvt. Ltd.
- Umadevi.M.R. (2101). Special education: A practical approach to education children with special needs, Neelkamal Publications Pvt, Ltd, New Delhi.
- University Grants Commission (India) Inclusive and Quality Expansion of Higher Education – XII Five Year Plan, 2012-17

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SEMESTER – VIII

DRAMA AND ART IN EDUCATION

CODE: 16CIED82 **Credits: 2 (1L: 0.5T:0.5P)**
Hours: 3/Week

Objectives: On completion of the course student teachers will be able to

1. integrate Art with Education and become better communicator;
2. develop creative thinking through different Art forms;
3. understand that liberal arts help in making better professionals;
4. understand Art as a medium of education;
5. understand the role of Art medium of education;
6. develop student's ability for perception and reflection;
7. use Art as an alternative language to experience
8. communicate concepts in teaching-learning.

ACTIVITIES

1. Visit to any center of art (museums, art gallery or institutes of performing art like NCPA) and observe pieces of art/play, Group Discussion can be conducted on the observation highlight up the aesthetics in art.
2. Write an appreciation essay on the historical movements (sculpture, and agricultures) or any piece of art (music, dance, drama, painting)
3. Perform a drama or dance or music of local culture.
4. Prepare a project work o ay contemporary thinkers like Rabinranath Tagore, Herbert Read, etc and their contribution to art field.
5. Prepare a file on different forms of bharatha natyam mudras, bavas,rasas.
6. Do a different variety of craft work on "origami".

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Adapt various cultural aspects through drama and art.

CO2: Select art as an alternative language to experience

CO3: Develop creative thinking through different art forms.

CO4: Communicate concepts in teaching-learning.

CO5: Exhibit different variety of craft work on “origami”

References:

- Coomara Swamy, A.K. (1974). *Chrisatian and Oriental Philosophy of Art*. New Delhi: MunshiramManoharlal.
- Esner Elliot, W. *Educating Artistic Vision*. New York: Macmillan Publishers.
- Herbert Reed. *Education through Art*. New York: Faber and Faber.
- Jefferson B. (1960).*Teaching Art to children- Continent View Point.* Boston: AllynBacon.
- John Dewey.*Art as Experience.* New York: Macmillan Publishers.
- John, B. and Chawla, R. (2007). *Playing for real: Using drama in the classroom*. MancmillanPublishers.
- Rabindranath Tagore .*Lectures and Address*, New Delhi: Macmillan Publishers.

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SEMESTER-VIII
HUMAN RIGHTS AND DUTIES EDUCATION

CODE: 16CIED83 **Credits: 2 (1L: 0.5T:0.5P)**
Hours: 3/Week

Objectives: On completion of the course, the student-teachers will be able to

1. understand the concept, development and evolution of Human Rights and Duties
2. appreciate the role of society towards Human Rights and Duties
3. understand the constitutional provisions, Govt. policies etc. towards Human Rights and Duties
4. state and understand the different categories of population and their rights
5. realizes the trends and the importance of internationalizing Human Rights and Duties

UNIT-I: Human Rights and Duties - Concept, Development and Evolution.

(1) Sociology of Human Rights: (a) Society and the individual, (b) Society and Groups, Socio-economic Justice, (c) Society and Societal Culture, (d) Society and the Process of Socialization.

(2) Rights and Duties: Classifications of Rights and duties, Co-relation of rights and duties. Changing dimensions of human rights & duties.

(3) Values, Dignity, Liberty, Equality, Justice, Unity & Diversity. Inherent, inalienable, universal and individual.

(4) Society and Human Rights : Promotion and Protection: (a) Role of NGOs, (b) Role of Mass Media, (c) Role of Educational Institutions, (d) Role of Government, (c) Human Rights Education, (d) Social Movements

UNIT-II: Human Rights and Duties in India: Constitutional Framework

(1) **Basic Features of the Constitution of India**: Fundamental Rights, Directive Principal of State Policy, Fundamental Duties - Protection & enforcement of human rights and duties: (a) Police and Human Rights, Judiciary and Human Rights, (b) National and State Human Rights Commission & other grievance redressal mechanism.

(2) **Emerging Trends:** (a) Human Rights and Terrorism, (b) Human Rights and Environment. (c) Human Rights and Globalization.

UNIT-III: Human Rights of Special Category and Marginal Groups

(1) **Rights of different categories of population:** (a) Rights of the Women, (b) Rights of the Children, (c) Rights of the Dalit and Tribes, (d) Rights of Minorities, (e) Rights of Old and Disabled, (d) Rights of unorganized Labour & Displaced Persons.

(2) **Importance of internalizing human rights and duties:** Urgent need for not only sensitizing others of human rights and duties, but of practicing oneself those values: self-inculcation and endeavor to live up to those ideals - Duty to respect other's rights, respect each other's human dignity.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Value the categories of population.

CO2: Appreciate the role of society towards Human Rights and Duties.

CO3: Implement the acquired knowledge in the appropriate situations.

CO4: Realizes the trends and the importance of internationalizing.

CO5: Understand the different categories of population and their rights.

Suggested Readings :

- Basu, Durga Das. (1994). Human Rights in Constitutional law. New Delhi: Prentice Hall.
- Baxi, Upendra. (2002). Future of Human Rights.
- Bueren, Geraldine Van. (1995). International Law on the Rights of the Child.
- Caney, Simon and Jones, Peter (eds.). (2001). Human Rights and Global Diversity.
- Freeman, Michael. (2002). Human Rights: An Interdisciplinary Approach.
- Gogia, S.P. (2000). Law relating to Human Rights.
- Gupta D.N. and Singh, Chandrachur. (2001). Human Rights and Freedom of Conscience: Some suggestions for its Development and Application.
- Iyer, Venkat (ed.). (2000). Democracy, Human Rights and the Rule of Law: Essayes in Honour of Nani Palkivala.
- Jhunjhunwala, Bharat (ed.). (2002). Governance and Human Rights.
- Nirmal, Chiranjivi J. (ed.). (2002). Human Rights in India: Historical, Social and Political Perspective.
- Paul, R.C. (2000). Situation of Human Rights in India.
- Peter, S.E. (1994). Human Rights: Perspective and Challenges. New Delhi: Lancers Books.
- Rai, Rahul. (2002). Monitoring International Human Rights.
- Rao, D. Bhaskar (ed.). (2003). Human Rights and the Constitution: Vision and the Reality.
- Saksena, K.P. (ed.), Human Rights and the Constitution: Vision and the Reality (2003)
- Sen, Sankar. (2002). Human Rights and Law Enforcement.
- Sinha, Manoj Kumar. (1999). Implementation of Basic Human Rights.
- Sreekumar, R. (2003). Handbook for Prison Visitors: Checking, Correcting and Preventing in Prisons.

Other Primary Sources:

- ILO, Comparative Analysis of the International covenants of on Human Rights and International
- ILO, Recommendations by the ILO of the World Conference on Human Rights: A Description of ILO Action on Human Rights, UN Doc. A/CONF. 57/PC16/Add 3.
- ILO. (1968). The ILO and Human Rights: Report of the Director-General (PartI), Geneva: International Labour Office.
- ILO. (1974). Migrant Workers. Geneva: International Labour Office.
- Labour Conventions and Recommendations. (1969). Official Bulletin (General), Vol. 52, No. 2, pp.181-216.

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SEMESTER-VIII
GUIDANCE AND COUNSELLING

CODE: 16CIED8A **Credits: 2 (1L: 0.5T:0.5P)**
Hours: 3/Week

Objectives: On completion of this course the student teacher will be able to

1. handle the subject area 'guidance and couselling' for student teachers.
2. offer educational, vocational, personal guidance and counseling to prospective teachers.
3. offer basic counseling to needy students.
4. equip student teachers with the skills to impart guidance to students at secondary and higher secondary level.
5. develop interest among student teachers to enter into the field of guidance and counseling
6. take initiative in planning and organizing various guidance services in educational institutions.
7. recognize the impact of new technology in guidance and counseling

UNIT-I: Introduction to Guidance Programme in Schools

Concept and definition of guidance. Scope and principles of guidance. General, individual and social needs of guidance . Common misconceptions about guidance. Objectives of guidance. Sociological and philosophical bases of guidance. Ethical considerations in guidance . Need for guidance at various levels education. Guidance as an integral part of Education. Integrating guidance with curriculum. School guidance : a team approach of school and community. Planning of guidance programme in schools – steps. Standardized and non-standardized techniques in guidance. Standardized – intelligence tests, aptitude tests, personality tests, interest inventory, achievement tests. Non – Standardized – questionnaire, observation, sociometry, rating scale, anecdotal records, cumulative record, case study, interviews.

UNIT-II: Guidance and its Dimensions

Types of guidance: Educational, vocational/career and personal guidance. Nature , need, scope and functions of Educational, vocational/career and personal guidance. How to impart Educational, vocational/career and personal guidance. Individual vs. group guidance : concept, advantages and limitations. Group guidance activities – class talks, career talks, career conferences, career- fair, socio drama, psycho drama and role play. Career development: concept, theories – Ginzberg and Super. Career development needs of students. Factors affecting career development.

UNIT–III: Understanding Counselling

Meaning, nature and scope of counseling. Basic principles of counseling. Counseling and related fields: psycho therapy, advice, instruction, guidance etc. Objectives of counseling. Approaches to Counselling: directive, non-directive and eclectic Counseling theories : behaviouristic, psycho analytic, humanistic, trait, factor. Individual vs. group counseling: concept, advantages and limitations. Stages of counseling process. Counseling techniques: Relaxation technique, Assertion training (social skills training) , Rational Emotive Behaviour Therapy, Systematic Desensitization. Roles and functions

of Personnel involved in the counselling programme: in-school resources and out of school resources. Skills and qualities of an effective counselor. Specialized areas of counseling: family counseling, career counseling, adolescent counseling, educational counseling, parental counseling, peer counseling. Counseling and Technology: tele counseling, internet counseling. Recent researches in the area of counseling.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Support the need for guidance at various levels of education.

CO2: Examine the ethical considerations in guidance.

CO3: Appraise the dimensions and factors affecting career development.

CO4: Design counseling programme for school students.

CO5: Provide positive platform form students under depression.

References

- Anastasi Anne (1982). Psychological testing, New York, Mac Millan
- Bhatnagar, Asha and Gupta, Nirmala (Eds)(1999) Guidance and Counselling A theoretical perspective, (Vol.I:) New Delhi: Vikas.
- Bhatnagar, Asha and Gupta, Nirmala (Eds)(1999) Guidance and Counselling (Vol.II) A practical approach, New Delhi: Vikas.
- Borders (1975)Counselling Programmes, London; Sage publications
- Corel,G.(2000). Theory and Practice of Group Counselling.
- Devu Indu (1984). The Basic Essentials of Counselling. New Delhi: Sterling Pvt. Ltd.
- Govt. of India, (1986).: National Policy on education. MHRD
- Govt. of India, (1992). Programme of Action. MHRD
- George, R.L. and Christiani, T.H.(1990). Counselling theory and practice (3rd edn.). New Jersy: Prentice Hall.
- Gibson, R.L.(2005). Introduction to Counselling and Guidance (6th edn.)New Delhi: Prentice hall of India.
- Jones, J.A.(1979). Principles of Guidance, New York:Mc Graw Hill.
- Kennedy ,E. and Charles, SC.(1997). On becoming a Counsellor: a basic guide for non professional counselors, New York: The Cross road Pub.Co.
- Kochar, S.K.(1980). Educational and Vocational Guidance in Secondary School. New Delhi: Sterling Pvt. Ltd.
- Mannuel for Guidance Counsellor,NCERT,New Delhi.
- Mathewson, R.H.(1962). Guidance, policy and practice.
- Mohan, S. (1985). Readings for Career Teachers.
- Mohan, V.(1983). Counselling its concept its, principles and methods, Chandigarh: Common wealth youth programme.
- Nanda, S.K. and Sharma,S.(1992). Fundamentals of Guidance, Chandigarh.

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SEMESTER – VIII
COMMUNICATION SKILLS

CODE: 16CIED8B **Credits: 2 (1L: 0.5T:0.5P)**
Hours: 3/Week

Objectives: On completion of the course, the student-teachers will be able to

1. acquires good pronunciation and fluency of speech.
2. understands the need for teaching of English as second language.
3. defines functions of language in the class rooms identify various speech defects in the class room.
4. understands the concepts of word formation.

Unit-I: Functions of Language and Lexis

Class-room discourse; nature, meaning and medium-Strategies for using oral language in the class-room- Functions of language in the class-room and outside the class-room - Speech defects- lisping, slurring, stuttering and stammering, and the role of a teacher in its resolution.

Word formation: Affixation, Conversion, Compounding-Clipping–Portmanteau – Onomatopoeia–Loan Words and other minor devices -Patterns of Spelling - Grammar Games-Phrasal Verbs and Prepositional Phrases-Sentence Connectors - Devices for Cohesion and Coherence - Common Idioms and phrases.

Unit -II: Development of communication skills

Listening: Sub skills of listening, importance of listening in English, approaches to develop aural–oral skill. Speaking: Sub skills of speaking, importance of speaking skill - Reading: Sub skills of reading, importance of oral and silent reading in English, Intensive, Extensive reading, Skimming, Scanning, methods of teaching oral reading, ways of developing reading - Writing: Components of writing, importance and Characteristics of good handwriting, ways of improving handwriting - Tasks for developing communication skills.

Unit-III: Fluency

Using the language laboratory to practice the following: Describing and interpreting pictures, models, tables, maps, etc., -Reading aloud prose passages and Poems -Telling stories and narrating incidents. -Use of conventional formulae (Greeting, apology, invitation, refusal, accepting, thanking, etc.,) -Communication Games-Interviews-Extempore speeches on given topics, just –a- minute (JAM), Debates, Role play and dramatization

At the end of this course the students will be able to,

CO1: Identify the speech disorders and find the solution.

CO2: Implement the communication skill in the classroom activities.

CO3: Develop their lexical formation.

CO4: Design the language games and activities.

CO5: Improve their Fluency in English language.

References:

- Allen &Pit Corder (eds.), Edinburgh Course in Applied Linguistics', Vol.3, (OUP), 1982.
- Bhatia K, Teaching of English, Tandon Publications, Ludhiana, 2000.
- Billows, 'The Technique of Language Teaching' (Longman), 1952 .
- Heaton J.B, 'Composition through Pictures' (Longman) 1952.
- Heaton J.B, 'Writing English Language Test', (Longman) 1952.
- Horsburgh,(1954). How to Use the Blackboard in Teaching English. Orient Longman.
- Kohli A. L (2002). Teaching English in the New Millenium, Dhanpetrai Publishing Company, New Delhi.
- Krishnaswamy,(2000). Modern English, A Book of Grammar, Usage and Composition (Macrillag)
- Quirk and Greenbaum. (1950). A University Grammar of English (Longman), 1950.
- Willkins. (1962). Notional Syllabuses, (OUP) 1962.

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SEMESTER – VIII

UNDERSTANDING THE SELF

CODE: 16CIED8C **Credits: 2 (1L: 0.5T:0.5P)**

Hours: 3/Week

Objectives: On completion of the course student teachers will be able to

1. know thyself through self analysis;
2. change their negative thoughts into positive thoughts;
3. identify and manage emotions;
4. plan and manage time effectively;
5. gain the knowledge of the dreams and aspirations.

ACTIVITY : Self-Awareness and self Motivation
Exercise : Know Thyself through SWOT Analysis
ACTIVITY : Power of Positive thinking
Exercise : Exercises of Positive thinking
ACTIVITY : Emotional Intelligence
Exercise : Identifying and categorizing emotions
ACTIVITY : Time Management
Exercise : Strategy for using time effectively
ACTIVITY : Towards Empowerment
Exercise : My Dreams and Aspirations

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Evaluate themself through self-analysis.

CO2: Change their negative thoughts into positive thoughts.

CO3: Implement the acquired knowledge in the appropriate situations.

CO4: Gain the knowledge of the dreams and aspirations.

CO5: Identify the different categories of emotions.

References:

- Bos, (Ed.). (2012). *Critical Thinking, Academic Writing and Presentation Skills.* New Delhi: Oxford University Press.
- Dudley, G.A. (2004). *Double Your Learning Power* : Delhi:Konark Press. Thomas Publishing Group Ltd.
- Grellet, Francoise.(2007).*Developing Reading skills*. Cambridge: Cambridge University Press.
- Hedge, Tricia. (1998).*Writing.* Delhi: Oxford University Press.

- Hurlock, E.B. (2006). *Personality Development*. 28th reprint. New Delhi : Tata McGraw Hill.
- John Seely, (2004).*The Oxford guide to Writing and speaking*. New Delhi: Oxford University Press.
- Mile, D.J.(2004). *Power of Positive Thinking.* Delhi : Rohan Book Company.
- Pravesh Kumar, (2005). *All about Self-motivation*. New Delhi : Good will Publishing House.
- Raman, Meenakshi., and Sharma, Sangeeta. (2011).*Communication skills*. New Delhi: Oxford University Press.
- Swaminthan, V.D., and Kaliappan , K.V. (2001). *Psychology for Effective Living*. Chennai. The Madras Psychology Society.

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SEMSTER-VIII
CHEMISTRY – PAPER-VIII
CHEMISTRY OF COORDINATION COMPLEXES

CODE: 16CIED84 **Credits: 4 (2L: 1T: 1P)**
Hours: 6/Week

Course objective: To learn about what is coordination chemistry, nomenclature and various theories: Werner theory, valence bond theory, crystal field theory and John-Teller theory.

Unit – I: Introduction

Nomenclature- Werner Theory- EAN Rule – Chelation- Stability of complexes **–** factors affecting the stability – Stepwise and overall formation constant Isomerism: structural isomerism- stereoisomerism – geometrical and optical isomerism in 4 and 6 coordinated Complexes

Unit – II: Theories of Coordination – I

Valence bond theory – shortcomings of VB theory – crystal field theory –CFSE – Spectrochemical series- colour and magnetic properties of complexes– high spin and low spin complexes Defects of CFT, Comparison of VBT and CFT

Unit – III: Theories of Coordination – II

Evidences of covalent bonding in metal – legend bonding Molecular Orbital theory of 6 bonded complexes only Jahn Teller effect and electronic spectra of complexes comparison of CFT and MOT

Unit – IV: Metal Carbonyls

Metallic carbonyls – Preparation – Reaction – Classifications Structure and Bonding in Carbonyls – Back bonding – Evidences for π– bonding – Applications of carbonyls Ferrocene – preparation – properties – Aromatic character of ferrocene – Structure.

Unit – V: Coordination complexes reaction and mechanisms

Liability and inertness of complexes – mechanism of acid hydrolysis and base hydrolysis of octahedral complexes – SN^1, $SN^2$and SN^1CB mechanisms – evidence for SN^1CB mechanism *trans* effect – trans effect series – Theories of trans effect – applications of trans effect.

COURSE OUTCOME)

At the end of this course the students will be able to,

CO1: Appreciate the postulates of Werners theory of coordination compounds

CO2: Understand the coordination Chemistry and nomenclature.

CO3: Learn the rules of nomenclature of coordination compounds

CO4: Identify different types of isomerism in coordination compounds

CO5: Understand the bonding in coordination compounds in terms of the valence Bond and crystal Field theories

Text Books:

- Puri B. R, Sharma L. R. Kalia K. K "Principles of inorganic Chemistry" Milestone publishers, 31st edition, **2013.**

Reference Books:

- P. L. Soni, "Text Book of Inorganic Chemistry" Sultan Chand & sons. 32nd edition. **2013**
- R. D. Madhan, "Modern Inorgnaic Chemistry" S. Chand & Co., 6th edition **2012**
- James E. Huheey, Ellen, A. Keiter, Richard, L. Keiter, "Inorganic Chemistry" Pearson education (Singapore Pvt Limited) 9th edition, **2013.**
- J. D.Lee, Concise Inorganic chemistry" Blackwell Science Limited (France) 9th edition **2013**
- F. A cotton G. Wilkinson and P. L. Gvas "Basic Inorganic Chemistry" John Wiley, 11th edition, **2009.**

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CHEMISTRY
PRACTICAL-VIII

Organic Analysis:

Reaction of the following functional groups:

1. Aldehyde,
2. Ketone,
3. Carboxylic acid (mono and di),
4. Ester,
5. Carbohydrate (reducing and non reducing),
6. Phenol,
7. Aromatic primary amine,
8. Amide,
9. Nitro compound,
10. Diamide,
11. Anilide.

The given organic compound containing one functional group should be analyzed and to be reported with a characteristic derivative.

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SEMSTER-VIII
CHEMISTRY – PAPER-IX
MAJOR-BASED ELECTIVE - I
ELECTRO CHEMISTRY AND SURFACE CHEMISTRY

CODE: 16CIED8D **Credits: 4 (2L: 1T: 1P)**

Hours: 6/Week

Course objective: To have detailed knowledge about electrochemistry, theories of electrochemistry and surface chemistry.

Unit – I: Electrochemistry-I

Conductance - cell constant specific conductance and equivalent conductance measurement. Variations of equivalent conductance with concentration weak and strong electrolytes mobilities of ions - transport number Kohlraush's law. Applications of Ostwald dilution law - conductance -titrations (acid-base, precipitation) solubility product dissociation constant.

Unit – II: Electrochemistry-II

Potentiometry - cells electromotive force - electrode potential - their thermodynamic significance. Nernst equation standard electrode potentials and its determination. Reference electrodes hydrogen electrode calomel, quinhydrone and glass electrodes. Types of cells - chemical and concentration cell - liquid junction potential salt bridges. Redox systems.

Unit – III: **Electrochemistry-III**

Theory of indicators- pH Henderson equation - determination of pH by Potentiometry. Electrolytes - strong and weak-ionic equilibria - ionisation constant hydrolysis of salts-hydrolysis constant and its determination by potentiometry. Potentiometric titrations - acid-base, redox, precipitation.

Unit – IV: Surface Chemistry-I

Laws of photochemistry Grotthus Drapper law, Einstein's law of photochemical equivalence- quantum yield. Kinetics of photochemical reactions of CH_3CHO and H_2 - Cl_2. Photophysical processes fluorescence and phosphorescence – sensitisation chemiluminescence.

Unit – V: Surface Chemistry-II

Physisorption and chemisorption - adsorption isotherms - Freundlich and its use in surface area determination. Colloids-types, stability and electrical double layer, electrophorosis and electro-osmosis -association colloids (micelles) and critical micelle concentration.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Value concept of specific conductance and equivalent conductance measurement

CO2: Prove the concept of applications of ostwald dilution law.

CO3: Understand the Nernst equation standard electrode potentials and its nature.

CO4: Examine the concept of various types of chemical and concentration cells photochemical equivalence

CO5: Evaluate the concept of photophysical processes and fluorescence.

Text Books:

- P.W. Atkins, "Physical Chemistry" Oxford publishers, 11th edition, **2009**
- B. R. Puri, L. R. Sharma, Pathania, "principle of Physical Chemistry" Vishal Publishing & Co., 46th edition **2013**

Reference Book:

- P.L. Soni, "Text Book of Physical Chemistry" Sultan Chand & sons. 12th edition, **2011**
- Kundu and Jain, "Physical Chemistry" S. Chand, 6th edition, **2011**
- S. Glasstone, "Text Book of Physical Chemistry" –Macmillan. 7th edition **2012**

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CHEMISTRY
PRACTICAL-IX

List of Experiments

1. Estimation of Barium as Barium Sulphate
2. Estimation of lead as lead chromate
3. Estimation of Lead as Lead sulphate
4. Estimation of nickel as Ni –DMG Complex

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SEMSTER-VIII
CHEMISTRY – PAPER-IX
MAJOR-BASED ELECTIVE - II
ANALYTICAL TECHNIQUES IN CHEMISTRY

CODE: 16CIED8E **Credits: 4 (2L: 1T: 1P)**
Hours: 6/Week

Course objective: To understand the basic concepts about errors and their minimization. Various practical's in chemistry with their concepts, instruments and their utility.

Unit – I: Titrimetric Methods of Analysis

Methods of expressing concentration of solutions. Types of titrations. Requirements for titrimetric analysis. Primary and secondary standards. Limitation of volumetric analysis. pH of strong and weak acid solutions. Buffer solutions. Henderson equations.Preparation of acidic and basic buffers. Relative strength of acids and bases from Ka and Kb values.Neutralisation-titration curve, theory and choice of indicators. Stability of complexes.Titration involving EDTA. Metal ion indicators and their characteristics.

Unit – II: Precipitation titrations and Gravimetric methods of analysis

Concept of sparingly soluble salts. Relation between solubility and solubility products. Argentometric titrations, indicators for precipitation titrations involving silvernitrate. Determination of chloride by Volhard's method. Adsorption indicators. Separation by precipitation. Factors affecting solubility, gravimetric factor. Purity of precipitates, von Weiman ratio. Co-precipitation and post precipitation. Precipitation from homogeneous solution.

Unit – III: Chromatographic techniques and applications

Principles of adsorption and partition chromatography: Column and Paper chromotography. TLC, ion-exchange chromatography - technique and applications.Gas chromatography, principle, detector and applications. Purification of solid organic compounds: recrystallisation, sublimation. Use of miscible solvents.Use of drying agents and their properties.Purification of liquids. Experimental techniques of distillation – fractional distillation – vacuum distillation – steam distillation.

Polarography and Thermal methods

Polarography - theory, apparatus, DME, Diffusion, Kinetic and catalytic currents, Current - voltage curves for reversible and irreversible system, qualitative and quantitative applications to inorganic systems. Amperometric titrations-theory, apparatus, types of titration curves, successive titrations and indicator electrodes – Applications. Principle of thermogravimetric analysis (TGA). Differential thermal analysis (DTA): Instrumentation and applications. Factors affecting TGA and DTA curves. TGA of $AgNO_3$, $CaC_2O_4.H_2O$ and DTA of sulphur.

Unit – IV: Microwave and IR Spectra

Basic principle of M.W. concept of selection rule Instrumentation. Basic principle of IR Spectra Region of IR spectra plotting methods sampling and functional technique concept of groupings FTIR.

UV visible and Mass Spectra

Lambert Beers law- Basic principle of UV visible Spectra and Woodword Fiesher rule Chromophores Auxo - chromes plotting methods of spectra-solvent effect.

Basic principle of mass spectra and plotting methods fragmentation Pattern and methods base peak Molecular ion peak meta stable peak Nitrogen rule Mc lafferty rearrangement

Unit – V: NMR Spectra

Classification- atoms based on nuclear types nuclear moment principle of nuclear magnetic resonance -oscillating frequency larmour frequency-chemically and magnetic environments reference Nucleic plotting method chemical shift low resolution and high resolution spectra Spin-Spin coupling concept PMR C^{13}, F^{15}, P^{35} FTNMR

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the theoretical principles classical analytical methods within titration.

CO2: Analyze the various techniques within gravimetric and coulometric methods.

CO3: Classify the various separation techniques in chromatography, and typical applications of chromatographic techniques.

CO4: Examine the theory and working of polarography and its application in inorganic elements.

CO5: Gain the idea about the basics and Merits of electro analytical techniques.

Text Books:

- B. K. Sharma. "Instrumental method of chemical analysis" Goel publishing house, 27th edition, **2011.**
- Grudeep R. Chatwal, Sham K. Anand. " Instrumntal Methods of Chemical Analysis" Himalaya Publishing House, 5th edition, **2013.**
- B. K. Sharma. "Instrumental method of chemical analysis" Goel publishing house, 27th edition, **2011.**

Reference Books:

- Robert M. Silverstin, Clayton Bassler and Terence C. Morril, "Spectrophotometer Identification of organic compounds" John Wiley Sons. 6th edition, **2009.**
- H. H.Willard, J. A. Dean, L.L. Merit "Instrumental method of chemical analysis" Words Worth, 7th edition, **1999.**
- Grudeep R. Chatwal, Sham K. Anand. " Instrumntal Methods of Chemical Analysis" Himalaya Publishing House, 5th edition, **2013.**

CHEMISTRY
PRACTICAL-X

1. Estimation of Sulphate as Barium Sulphate
2. Estimation of Chloride as Silver Chloride
3. Estimation of Calcium as Calcium oxalate monohydrate
4. Estimation of Magnesium as magnesium Oxinate
5. Estimation of Zinc as Zinc Oxinate
6. Estimation of Aluminium as Aluminium Oxinate
7. Estimation of Chromium as lead Chromate
8. Estimation of Magnesium as Magnesium pyrophosphate

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SEMESTER-VIII
BOTANY – PAPER - IX
MICROBIOLOGY, PLANT PROTECTION & TOXICOLOGY

CODE: 16CIED85 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

1. realize the good and bad values of micro-organism (Bacteria, Virus etc.,)
2. know about the structure and classification of the microorganisms
3. know in detail on need of plant protection and methods of protecting various plants
4. know about his/her environment and mould the students to become managers of various ecological systems by giving some awareness towards toxicology.

Unit – I

Scope – general characteristics of bacteria, virus and fungi isolation and culture of microorganisms.
Microbial nutrition – types of media (semisolid and broth) antiseptics and antibiotics. Bacteria – classification – external and internal structure, and reproduction of bacteria.

Unit – II

Viruses - general structure – viral components – classification- transmission – multiplication (bacteriophage) – virus like infectious agents (viriods and prions) viral diseases – symptomatology.

Unit - III

Scope, Importance, equipments used in plant protection -Sprayers - dusters - soil injector - seed dressing drum; Seed treatment: objectives of seed treatment, Traditional and modern methods of seed treatment. Soil sterilization: Objectives, Traditional and modern methods of soil sterilization. Role of soil sterilization in Polyhouse farming.

Unit - IV

Methods of Plant Protection

a) Cultural – Tillage, sowing and planting dates, crop hygiene, crop rotation, trap crops, fertilizer.
b) Mechanical – Field sanitation: For diseases – collection and destruction of diseased plant-debris; For pests – hand picking and destruction of egg masses; shaking of plants, rope dragging, netting, bagging, physical barriers, use of sticky bands, tin-bands and light traps.
c) Physical – Heat and soil solarizations.
d) Chemical – Brief account and uses of Bactericides, Fungicides, Insecticides, Nematicides, Acaricides, Molluscicides, Rodenticides and Herbicides.
e) Biological – Introduction, biological control of Insect pests and diseases
f) Legal (Plant Introduction, domestic quarantine, need of plant quarantine) quarantine in India

Unit - V

Environmental toxicants – classification – occurrence- sources – effects on plants. Atmospheric toxicants – Carbon monoxide and sulphur oxides. Pollution indicators – plants from algae and angiosperm. Toxins of biological origin – borulins, afflotoxins.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Realize the good and bad values of micro-organisms like bacteria, virus etc.

CO2: Understand the structure and classification of micro-organisms.

CO3: Synthesize the need of plant protection and methods of protecting various plants.

CO4: Aware of equipment's used in plant protection.

CO5: Become counsellors for society, parents to bring awareness towards toxicology.

Reference Books

- Anantharayanan R and panicker J 1980, Text book of Microbiology, Orient Longmans.
- Talaro K and Talato A. 1996, Microbiology, NC Brown Publishers.
- Dube H. 1978. A text Book of Fungi, Bacteria and Virus, Vikas Publications.
- Mc Kane L and Judy K 1996, Microbiology, Essentials and Applications. MCGraw Hill Publications.
- Bap Reddy, D. and Joshi, N.C. (1991). *Plant Protection in India* (Second Edition). Allied Publishers Ltd., New Delhi.

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PRACTICAL - IX
PAPER – IX: MICROBIOLOGY, PLANT PROTECTION & TOXICOLOGY

1. Pictures of plants which are affected by microorganisms are observed and drawn.
2. Plants such as algae and angiosperms which are toxic are examined.
3. Method of plant protection and its techniques are practiced.

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SEMESTER-VIII
ZOOLOGY – PAPER - IX
BIOTECHNOLOGY

CODE: 16CIED86 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

1. enumerate the major aspects of Biotechnology
2. enlighten the integration of DNA technology through microbes and eventual production resources for the welfare human beings**.**
3. understand all sorts of advancements and their importance.

Unit – I: PRINCIPLES OF BIOTECHNOLOGY:

Applications in the Areas of Agriculture -Health Care and Environment - Global and Indian Scenario of Biotechnology -Biotechnology and its Challenges -Social and Moral Implications of Biotechnology and Genetic Engineering - International Safety Guidelines- Patent law and Intellectual Property Rights.

Unit – II: FUNDAMENTALS OF r–DNA TECHNOLOGY RESTRICTION AND MODIFICATION SYSTEM IN BACTERIA:

Restriction Enzymes – Classification - Nomenclature and Activity - Restriction Mapping of DNA - Molecular Cloning Construction of Genomic Libraries - Indirect Cloning c-DNA preparation of DNA Probes.

Unit – III: PRINCIPAL OF MICROBIOLOGY:

Tissue Culture and Biotechnology -Principal of Microbiology -Pure Culture Technique - Industrial Microbes products – Plant tissue culture and its industrial usage – Animal Tissue Culture and Its Technological Applications.

Unit - IV BIOCHEMICAL ENGINEERING:

Basic Concepts of Fermentation – Fermenteor Design – operation of Fermentation And Computer Controls – Biosensors – Biochips - Upstream Processing and Down Stream Processing.

Unit – V AQUACULTURE BIOTECHNOLOGY:

Improved Diagnosis Reagents – Hormone and Feeds – Genetic Manipulation – Cell Culture and Nuclear Transplantation- Cytopreservation – Transgenic Flash

GENETIC ENGINEERING AND BIOTECHNOLOGY:

Plasmids and Transposons - Restriction Enzyme – Gene Cloning – Gene Therapy.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Enumerate the major aspects of Biotechnology.

CO2: Analyse the integration of DNA technology through microbes.

CO3: Apply the knowledge of eventual production resources for the welfare human beings.

CO4: Understand all sorts of advancements and their importance.

CO5: Gain the knowledge of genetic engineering and biotechnology.

Text books

1. Ignacimuthu, S., Basic Biotechnology.
2. Trehan, K. Fundamental of Biotechnology.

References

1. Manlalls Et Al, Molecular Cloning
2. Glober, D. Gene Cloning.
3. Eugine, T. Fundamentals Of Biotechnology.

PRACTICAL – IX
PAPER – IX: BIOTECHNOLOGY

- Cleaning of Glassware
- Preparation of Media
- Sterilization-Demonstration
- Isolation of Pure Culture of Bacteria
- Bacterial Staining Techniques
- Gel Electrophoresis and Southern Blotting.

BIOTECHNOLOGY: SPOTTERS

SEM of Hybriodama Cells – Production of Monoclonal Antibodies – Growth Cure of Cell Line – Animal Cell Culture – Tray Fermenter – System Suitable For Anchorage Dependent Cell Culture – Type of Bioreactors – Orbital Shaker – Micro Fugue.

Reference

1. Trehan, K. Applications Of Biotechnology
2. Old And Primrose, Gene Manipulation Techniques
3. Ignacimuthu S., Basic Biotechnology

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