



Integrated B.Sc., B.Ed. PCM and BCZ

Curriculum and Syllabus

Effective from the Academic year

2016 - 2017

Department of Education

School of Education

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- PEO1: Graduates will pursue higher studies in related fields including education.
- PEO2: Graduates will perform as employers in private/government institutions rising up to top positions
- PEO3: Graduates will acquire a job efficiently in diverse fields such as Science, Education, Public Services, Business etc
- PEO4: Graduates will adopt Creative Methodologies in teaching Science subjects.
- PEO5: Graduates will enhance applied research in core areas of Science and Education

PROGRAM OUTCOMES (POs)

- PO1: **Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- PO2: **Effective Communication:** Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- PO3: **Effective Citizenship:** Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- PO4: **Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- PO5: **Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.
- PO6: **Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life- long learning in the broadest context socio-technological changes
- PO7: **The Teacher and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional teaching practice.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- PSO1: Graduates will acquire a comprehensive knowledge and sound understanding of fundamentals of their core subjects (PCM & CBZ).
- PSO2: Graduates will develop teaching skills in their pedagogical subjects.
- PSO3: Graduates will be prepared to acquire a range of general skills, to solve problems, to evaluate information, to use computers productively, to communicate with society effectively and learn independently.
- PSO4: Graduates will perform procedures as per laboratory standards in the areas of physics, chemistry, biology and psychology.
- PSO5: Graduates will understand the behaviour of adolescent students and perform well in teaching practice period, analysis the co-operative school climates.

Credits for BCZ

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

Sl. No	Course Code	Course (Subject)	Credit
1	16TIED11/ 16IHED11	Tamil/ Hindi: Paper-1	3
2	16IEED11	English: Paper-1	3
3	16GEVS13	Environmental Education	1
4	16CIED11	Developmental Stages of Learner	2
5	16EIED13	Botany: Paper-1: Phycology (Algae), Fungi and Lichen	3
6	16CIED12	Chemistry: Paper-1: Introduction to Organic Chemistry	3
7	16EIED14	Zoology: Paper-1: Invertebrata-I	3
8	16PIED12	Practical Chemistry 1	1
9	16PIED13	Practical Botany 1	1
10	16PIED14	Practical Zoology 1	1
Total Credits for Semester I			21
SEMESTER II (CBZ)			
1	16TIED21/ 16IHED21	Tamil/ Hindi: Paper-2	3
2	16IEED21	English: Paper-2	3
3	16CIED21	Health, Physical Education and Yoga	1
4	16CIED22	Psychological Perspectives of Learners	2
5	16EIED24	Botany: Paper-2: Cytology, Anatomy, and Embryology	3
6	16CIED23	Chemistry: Paper-2: Metallurgy and Chemistry of Non-Metals	3
7	16EIED25	Zoology: Paper-2: Invertebrata-II	3
8	16PIED22	Practical Chemistry 2	1
9	16PIED23	Practical Botany 2	1
10	16PIED24	Practical Zoology 2	1
11	16PIED25	Practical Education 1	4
Total Credits for Semester II			25
SEMESTER III (CBZ)			

Sl. No	Course Code	Course (Subject)	Credit
1	16TIED31/ 16IHED31	Tamil/ Hindi: Paper-3	3
2	16IEED31	English: Paper-3	3
3	16CIED31	Education in Contemporary India	3
4	16CIED32	TeachingandLearning:Part-1	1
5	16EIED34	Botany: Paper-3: Bryophytes, Pteridophytes and Gymnosperms	3
6	16CIED33	Chemistry: Paper-3: Chemical Kinetics and Phase Rule	3
7	16EIED35	Zoology: Paper-3: Chordata	3
8	16PIED32	Practical Chemistry 3	1
9	16PIED33	Practical Botany 3	1
10	16PIED34	Practical Zoology 3	1
Total Credits for Semester III			22
SEMESTER IV (CBZ)			
1	16TIED41/ 16IHED41	Tamil/ Hindi: Paper-4	3
2	16IEED41	English: Paper-4	3
3	16CIED41	TeachingandLearning:Part-2	1
4	16CIED42	Information and Communication Technology	3
5	16EIED44	Botany: Paper-4: Taxonomy, Plant Physiology and Plant Biochemistry	3
6	16CIED43	Chemistry: Paper-4: Molecular Rearrangements and Stereo Chemistry	3
7	16EIED45	Zoology: Paper-4: Developmental Biology	3
8	16PIED42	Practical Chemistry 4	1
9	16PIED43	Practical Botany 4	1
10	16PIED44	Practical Zoology 4	1
11	16PIED45	Practical Education 2	4
Total Credits for Semester IV			26
SEMESTER V (CBZ)			
1	16CIED51	Planning for Assessment and Evaluation	3

Sl. No	Course Code	Course (Subject)	Credit
2	16CIED52	Pedagogy of Physical Science-P1	3
3	16EIED54	Pedagogy of Biology-P1	3
4	16EIED55	Botany: Paper-5: Plant Pathology and Paleo Botany	3
5	16EIED5C/ 16EIED5D	Botany: Paper-6 (Major Based Elective) (1). Medical and applied Botany. (2). Plant Bio Technology and Bio informatics	3
6	16CIED53	Chemistry: Paper-5: Solid State Chemistry	3
7	16EIED56	Zoology: Paper-5: Cell Biology	3
8	16PIED52	Practical Chemistry 5	1
9	16PIED53	Practical Botany 5	1
10	16PIED54	Practical Botany 6	1
11	16PIED56	Practical Zoology 5	1
Total Credits for Semester V			25
SEMESTER VI (CBZ)			
1	16CIED61	Educational Measurement	1
2	16CIED62	Pedagogy of Physical Science-P2	3
3	16EIED64	Pedagogy of Biology-P2	3
4	16EIED65	Botany: Paper-7: Genetics, Bio Statistics and Evolution	3
5	16CIED63	Chemistry: Paper-6: Thermodynamics	3
6	16EIED66	Zoology: Paper-6: Animal Physiology	3
7	16PIED67/ 16PIED68	Zoology: Paper-7 (Major Based Elective) (1). Economic Entomology and Pest Management. (2). Ornamental Fish Farming	3
8	16PIED64	Practical Chemistry 6	1
9	16PIED65	Practical Botany 7	1
10	16PIED66	Practical Zoology 6	1
11	16PIED67	Practical Zoology 7	1
12	16PIED69	Practical Education 3	6
Total Credits for Semester VI			29
SEMESTER VII (CBZ)			
1	16PIED71	Pedagogy of Physical Science-Subject Content at School	1

Sl. No	Course Code	Course (Subject)	Credit
2	16PIED73	Pedagogy of Biology-Subject Content at School	1
3	16CIED73	Botany: Paper-8: Plant Ecology and Conservation	3
4	16CIED71	Chemistry: Paper-7: Chemistry of Natural Products	3
5	16CIED74	Zoology: Paper-8 Genetics and Evolution	3
6	16PIED75	Practical Chemistry 7	1
7	16PIED76	Practical Botany 8	1
8	16PIED77	Practical Zoology 8	1
Total Credits for Semester VII			14
SEMESTER VIII (CBZ)			
1	16CIED81	Inclusive Education	3
2	16CIED82	Drama & Art in Education	2
3	16CIED83	Human Rights and Duties Education	2
4	16CIED8A/ 16CIED8B/ 16CIED8C	Education Elective (any one among the following) (1). Guidance and Counselling. (2). Communication Skills (3). Understanding the Self	2
5	16CIED85	Botany: Paper-9: Micro Biology, Plant Protection and Toxicology	3
6	16CIED84	Chemistry: Paper-8: Chemistry of Coordination Complexes	3
7	16CIED8D/ 16CIED8E	Chemistry: Paper-9(Major Based Elective) (1). Electro Chemistry and Surface Chemistry. (2). Analytical Techniques in Chemistry	3
8	16CIED86	Zoology: Paper-9: Bio Technology	3
9	16PIED82	Practical Chemistry 8	1
10	16PIED84	Practical Chemistry 9	1
11	16PIED85	Practical Botany 9	1
12	16PIED86	Practical Zoology 9	1
13	16PIED87	Practical Education 4	12
Total Credits for Semester VIII			37

Overall Credits for BCZ

S.No.	Semester	Credits
1	I	21
2	II	25
3	III	22
4	IV	26
5	V	25
6	VI	29
7	VII	14
8	VIII	37
Total Credits		199

Credits for PCM

Sl. No	Course Code	Course (Subject)	Credit
1	16TIED11/ 16IHED11	Tamil/ Hindi: Paper-1	3
2	16IEED11	English: Paper-1	3
3	16GEVS13	Environmental Education	1
4	16CIED11	Developmental Stages of Learner	2
5	16EIED11	Physics: Paper-1 Mechanics and Properties of Matter	3
6	16CIED12	Chemistry: Paper-1 Introduction to Organic Chemistry	3
7	16EIED12	Mathematics: Paper-1 Trigonometry and Fourier Series	3
8	16PIED11	Practical Physics I	1
9	16PIED12	Practical Chemistry I	1
Total Credits for Semester I			20
SEMESTER II (PCM)			
1	16TIED21/ 16IHED21	Tamil/ Hindi: Paper-2	3
2	16IEED21	English: Paper-2	3
3	16CIED21	Health, Physical Fitness and Yoga	1

Sl. No	Course Code	Course (Subject)	Credit
4	16CIED22	Psychological Perspectives of Learners	2
5	16EIED21	Physics: Paper-2 : Acoustics, Thermal and Statistical Physics	3
6	16CIED23	Chemistry: Paper-2: Metallurgy and Chemistry of Non-Metals	3
7	16EIED22	Mathematics: Paper-2: Differential Calculus	3
8	16EIED23	Mathematics: Paper-3: Classical Algebra	3
9	16PIED21	Practical Physics II	1
10	16PIED22	Practical Chemistry II	1
11	16PIED25	Practical Education I	4
Total Credits for Semester II			27
SEMESTER III (PCM)			
1	16TIED31/ 16IHED31	Tamil/ Hindi: Paper-3	3
2	16IEED31	English: Paper-3	3
3	16CIED31	Education in Contemporary India	3
4	16CIED32	Teaching and Learning: Part-1	1
5	16EIED31	Physics: Paper-3 Electricity and Magnetism	3
6	16CIED33	Chemistry: Paper-3: Chemical Kinetics and Phase Rule	3
7	16EIED32	Mathematics: Paper-4: Differential Equations	3
8	16EIED33	Mathematics: Paper-5: Algebraic Structures	3
9	16PIED31	Practical Physics 3	1
10	16PIED32	Practical Chemistry 3	1
Total Credits for Semester III			24
SEMESTER IV (PCM)			
1	16TIED41/ 16IHED41	Tamil/ Hindi: Paper-4	3

Sl. No	Course Code	Course (Subject)	Credit
2	16IEED41	English: Paper-4	3
3	16CIED41	Teaching and Learning: Part-2	1
4	16CIED42	Information and Communication Technology (ICT)	3
5	16EIED41	Physics: Paper-4: Analog Electronics	3
6	16CIED43	Chemistry: Paper-4: Molecular Rearrangements and Stereo Chemistry	3
7	16EIED42	Mathematics: Paper-6: Integral Calculus and Laplace Transforms	3
8	16EIED43	Mathematics: Paper-7: Real Analysis	3
9	16PIED41	Practical Physics 4	1
10	16PIED42	Practical Chemistry 4	1
11	16PIED45	Practical Education II	4
Total Credits for Semester IV			28
SEMESTER V (PCM)			
1	16CIED51	Planning for Assessment and Evaluation	3
2	16CIED52	Pedagogy of Physical Science-P1	3
3	16EIED51	Pedagogy of Mathematics-P1	3
4	16EIED52	Physics: Paper-5: Digital Electronics and Micro Processor	3
5	16CIED53	Chemistry: Paper-5: Solid State Chemistry	3
6	16EIED53	Mathematics: Paper-8: Vector Calculus and Geometry	3
7	16EIED5A	Mathematics: Paper-9: (Major Based Elective) (1). Operations Research. (2). Discrete Mathematics	3
8	16PIED51	Practical Physics 5	1
9	16PIED52	Practical Chemistry 5	1
Total Credits for Semester V			23
SEMESTER VI (PCM)			
1	16CIED61	Educational Measurement	1

Sl. No	Course Code	Course (Subject	Credit
2	16CIED62	PedagogyofPhysical Science-P2	3
3	16EIED61	PedagogyofMathematics-P2	3
4	16EIED62	Physics: Paper-6: Optics, Spectroscopy and Laser	3
5	16EIED6A	Physics: Paper-7:(Major Based Elective) (1). Energy Physics. (2). Astrophysics	3
6	16CIED63	Chemistry: Paper-6: Thermodynamics	3
7	16EIED63	Mathematics: Paper-10: Complex Analysis	3
8	16PIED61	Practical Physics 6	1
9	16PIED62	Project Physics 7 (Energy Physics)	1
10	16PIED64	Practical Chemistry 6	1
11	16PIED69	Practical Education III	6
Total Credits for Semester VI			28
SEMESTER VII (PCM)			
1	16PIED71	Pedagogy of Physical Science-Subject Content at School	1
2	16PIED72	Pedagogy of Mathematics Subject Content at School	1
3	16EIED71	Physics: Paper-8: Relativity and Quantum Mechanics	3
4	16CIED71	Chemistry: Paper-7: Chemistry of Natural Products	3
5	16EIED72	Mathematics: Paper-11:Mechanics	3
6	16PIED74	Practical Physics 8	1
7	16PIED75	Practical Chemistry 7	1
Total Credits for Semester VII			13
SEMESTER VIII (PCM)			
1	16CIED81	Inclusive Education	3
2	16CIED82	Drama & Art in Education	2
3	16CIED83	Human Rights and Duties Education	2
4	16CIED8A/1 6CIED8B/16 CIED8C	Education Elective (any one among the following) (1). Guidance and Counseling. (2). Communication Skills (3). Understanding the Self	2

Sl. No	Course Code	Course (Subject)	Credit
5	16EIED81	Physics: Paper-9: Atomic, Solid State and Nuclear Physics	3
6	16CIED84	Chemistry: Paper-8: Chemistry of Coordination Complexes	3
7	16CIED8D/ 16CIED8E	Chemistry: Paper-9:(Major Based Elective) (1). Electro Chemistry and Surface Chemistry. (2). Analytical Techniques in Chemistry	3
8	16EIED82	Mathematics: Paper-12: Mathematical Statistics	3
9	16PIED81	Practical Physics 9	1
10	16PIED82	Practical Chemistry 8	1
11	16PIED84	Practical Chemistry 9	1
12	16PIED87	Practical Education IV	12
Total Credits for Semester VIII			36

Overall Credits for PCM

S.No.	Semester	Credits
1	I	20
2	II	27
3	III	24
4	IV	28
5	V	23
6	VI	28
7	VII	13
8	VIII	36
Total Credits		199

SEMESTER-I

பருவம் I
தமிழ்- தாள் - 1

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 - (சிறுகதைய 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.

பார்வை நூல்கள்: -

1. முனைவர் அ . தட்சிணாமூர்த்தி – தமிழர் நாகரிகமும் பண்பாடும் யாழ் வெளியீடு செ-46
2. கே.கே. பிள்ளை – “தமிழக 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

SEMESTER – I

HINDI – PAPER-1

CODE: 1 # RL1**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 conversation, 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.

SEMESTER – I

ENGLISH – PAPER-1

CODE: I # E1

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.

Suggested 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

SEMESTER – I

ENVIRONMENTAL EDUCATION

CODE: 1 # IPCS1

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.

SEMESTER – I
DEVELOPMENTAL STAGES OF LEARNER

CODE: 1 # IPES1

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**MATHEMATICS – PAPER-1****TRIGONOMETRY AND FOURIER SERIES****CODE: I # M1****Credits: 3 (2L: 1T: 0P)****Hours: 4/Week****Objectives: To enable students to**

1. understand the concept of summation of series
2. gain knowledge in Fourier series
3. apply the concepts to other courses

Unit – I: Expansion in series – Expansions of $\sin \theta$, $\cos \theta$, (problems involving evaluation of limits only), Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$, $\tan(A+B+C+\dots)$ (Formation of equations excluded) , Powers of sines and cosines of θ in terms of functions of multiples of θ .

Unit – II: Hyperbolic Functions: definition, relation between hyperbolic functions and Inverse hyperbolic functions.

Unit – III: Logarithm of complex quantities.

Unit – IV: Summation of Trigonometric series by using complex quantities: $C + iS$ form Gregory series (only simple problems in both cases).

Unit – V: Fourier Series of periodicity 2π – half range series

COURSE OUTCOME

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

CO1: Derivate the Expansions of $\sin n\theta$ $\cos n\theta$, $\tan n\theta$

CO2: Compare the circular function and hyperbolic function

CO3: Construct the hyperbolic function formulae from circular function formulae

CO4: Apply the rule of logarithm and its concepts.

CO5: Gain knowledge in Fourier series.

Reference Books:

1. S. Narayan and T.K. Manicavachagom Pillay, Trigonometry
2. S. Narayan and T.K. Manicavachagom Pillay (2002), Calculus Volume –II, S.Viswanathan printers and publishers Pvt. Ltd., Chennai.
3. P.R. Vittal, Trigonometry, Margham Publications.

SEMESTER-I

PHYSICS – PAPER-I

MECHANICS & PROPERTIES OF MATTER

CODE: I # P1

Credits: 4 (3L: 0T: 1P)

Hours: 5/Week

Objectives : Enable the Students to

1. study and apply the knowledge of Gravitation at various situation.
2. understand the concepts of statics, hydrostatics, hydrodynamics and dynamics of charged bodies under various fields and the rigid body dynamics in terms of MI.
3. study the basics of Elasticity and its importance in beams, girders.
4. study the concepts of viscosity and surface tension and the various methods to
5. determine the parameters experimentally.

Unit – I: Statics

Friction - Laws of Friction - coefficient of Friction-Equilibrium on a rough inclined plane - impulse- Collision - oblique impact of smooth spheres - Direct impact of two smooth spheres - loss of kinetic energy due to direct impact and oblique impact of two smooth spheres.

Unit – II: Hydrostatics and Hydrodynamics

Center of pressure - centre of pressure of a rectangular lamina and triangular lamina - Atmospheric pressure - Variation of atmospheric pressure with altitude - Equation of continuity - Energy of liquid -Euler's equation -Bernoulli's theorem -Applications.

Unit – III: Dynamics of rigid bodies

Moment of inertia - Radius of gyration - Theorems of M .I - M.I of circular disc, solid cylinder, hollow cylinder, solid sphere and hollow sphere - K.E of a rotating body - M.I of a diatomic molecule - Rotational energy state of a rigid diatomic molecule - centre of

mass - conservation of linear momentum - Relation between Torque and angular momentum.

Unit – IV: Gravitation and Elasticity

Newton's law - Kepler's law - G by Boy's method - Gravitational field and potential - potential and field due to a spherical shell and solid sphere - Compound pendulum - Moduli of elasticity - work done in a strain – Rigidity modulus by static torsion (scale & telescope) Torsional oscillation of a body - Bending of beams - bending moment - cantilever - Y - Uniform and non- uniform bending.

Unit –V: Viscosity and Surface Tension

Critical velocity - Poiseuille's formula - coefficient of viscosity - h by variable pressure head - Terminal velocity and Stoke's formula - Stokes method - variation of viscosity with temperature and pressure - viscosity of gases - Rankine's method - Surface tension - work done - Angle of contact - Quincke's method - Drop weight method.

COURSE OUTCOME

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

- CO1: Understand the basic concepts of elastic moduli and their relation.
- CO2: Study the basics of Elasticity and its importance in beams, girders.
- CO3: Discuss the important concepts in surface tension and their experimental procedure.
- CO4: Analyze the concepts of statics, hydrostatics, hydrodynamics.
- CO5: Determine the parameters experimentally.

Reference Books:

1. R. Murugesan, Mechanics and Mathematical Physics , S.Chand & Company Ltd., New Delhi (Third Revised Edition 2008).
2. R. Murugesan, Properties of Matter, S.Chand & company Ltd, New Delhi (2010).
3. Fundamentals of Physics, 6th Edition, David Halliday, Robert Resnick and Jearl Walker, John Wiley and Sons Inc.
4. University Physics, Revised Edition, Harris Benson, John Wiley and Sons, Inc.

Physics Practicals – I

Paper – I

Any Seven Practicals

1. Torsion Pendulum.
2. Surface Tension – Capillary rise method.
3. Deflection Magnetometer (TanA & TanB).
4. Young's modulus – Non-uniform Bending.
5. Sonometer – frequency of the tuning fork.
6. Stoke's method.
7. Poiseuille methods.

8. Viscosity – Constant pressure head.
9. Viscosity – Variable pressure head.

SEMESTER-I**CHEMISTRY – PAPER-I****INTRODUCTION TO ORGANIC CHEMISTRY****Code: I # C1****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 mechanism –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**

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 H₂O₂
8. Estimation of copper using Potassium Dichromate
9. Estimation of Ferric Iron using Potassium Dichromate

SEMESTER-I

BOTANY – PAPER-1

PHYCOLOGY (ALGAE), FUNGI AND LICHEN

CODE: I # B1

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 cyanophyceae. (Ex.1.Oscillation 2. Nostoc).

Unit – II

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

Unit – III

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

Unit - IV – Fungi

General characteristics, ecology and distribution, range of thallus organization, cell wall composition, nutrition, reproduction and classification- life cycle of Ascomycetes, 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. Oscillatoria.
2. Nostoc
3. Chlorella
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 Reproduction 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.

SEMESTER-I
ZOOLOGY – PAPER-1
INVERTEBRATA – I

CODE: I # Z1

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,.

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

SEMESTER-II

பருவம் II

தமிழ்- தாள் - 2

CODE: II # RL2

Credits: 3 (2L: 1T: 0P)

Hours: 4/Week

நோக்கங்கள்: -

- தமிழ் மொழியின் வரலாற்றை அறிவியல் கண்ணோட்டத்துடனும் மொழிக்குடும்பங்களின் அடிப்படையிலும் விளக்குதல்
- சங்க இலக்கியத்தை வழி மாணவர்களுக்கு 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 மொழிகளின்மன் சிறப்புகள் - திராவிட மொழிகளுள் தமிழின் இடம் - தமிழ்மொழியின் சிறப்புகள் - தமிழ் பிறமொழித் தொடர்புகள்

அலகு - 2 சங்க இலக்கியம்

சங்க இலக்கியம் - எட்டுத்தொகை - நற்றினை - குறுந்தொகை - ஐங்குறுநூறு - பதிற்றுப்பத்து - பரிபாடல் - கலித்தொகை - அகநானூறு - புறநானூறு - பத்துப்பாட்டு - திருமுருகாற்றுப்படை - சிறுபாணாற்றுப்படை - பெரும்பாணாற்றுப்படை - பொருநராற்றுப்படை - மலைபடுகடாம் - குறிஞ்சிப்பாட்டு - முல்லைப்பாட்டு, பப்புனப்பாலை - 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.

பார்வை நூல்கள்: -

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 ஓவஸ்)

SEMESTER – II
HINDI – PAPER-2

CODE: II # RL2

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.

SEMESTER – II
ENGLISH – PAPER - 2

Code: II # E2

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 Writing

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

SEMESTER-II
HEALTH, PHYSICAL FITNESS & YOGA

CODE: II # IPCS2

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.
- McCarthy, 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>

SEMESTER – II

PSYCHOLOGICAL PERSPECTIVES OF LEARNERS

CODE: II # IPES2

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.

SEMESTER-II
MATHEMATICS – PAPER-2
DIFFERENTIAL CALCULUS

CODE: II # M2

Credits: 3 (2L: 1T: 0P)
Hours: 4/Week

Objectives: To enable students to

1. learn the principle and concepts of Differential Calculus
2. acquire the working knowledge in this course
3. apply the concepts to other courses

Unit-I: Successive Differentiation- n^{th} derivative, standard results – Leibnitz Theorem (without Proof) and its applications.

Book 1 Chapter 3 Section 1.1 -1.6 & Section 2.1 -2.2

Unit-II: Jacobians – Maxima and minima of functions of two independent variables. Necessary and Sufficient conditions (without proof) – Lagranges method of undetermined multipliers (without proof).

Book 1 Chapter 8 Section 4, 4.1, 5

Book 2 Chapter 3 Section 3

Unit-III: Envelopes- Curvature – Circle, radius and centre of curvature, Cartesian formula for the radius of curvature.

Book 1 Chapter 10 Section 1.1, 1.2, 1.3, 2.1-2.3

Unit-IV: Co-ordinates of the centre of curvature – Curvature- radius of curvature in polar Co-ordinates, p-r equations, Pedal equation of a curve.

Book 1 Chapter 10 Section 2.4, 2.6 - 2.8

Unit-V: Definition–Asymptotes parallel to the axis, oblique asymptotes, $F_n + P_{n-2} = 0$ form Intersection of a curve with its asymptotes (proofs are not needed).

Book 1 Chapter 11 Section 1 - 4 & Sections 6 - 7

COURSE OUTCOME

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

- CO1: Explain maxima and minima, critical points, and inflection points of functions and to determine the concepts of the curves.
- CO2: Find the n^{th} derivative and standard result.
- CO3: Solve the radius of the curvature of the problems using successive differentiation.
- CO4: Find evolutes and envelope for the Cartesian and polar coordinate and curvature of pedal equations.
- CO5: Solve the asymptotes for rational algebraic curves with special cases.

Reference Books:

1. S. Narayanan & T.K. Manickavachagom Pillay, Calculus Volume I (2004) ,
S. Viswanathan Printers & Publishers
2. P.R. Vittal (2004) , Calculus , Margham Publications
(P.T.O)
3. Singaravelu, R. Ramaa, Calculus & co-ordinate geometry of 2 dimensions (Paper II),
Meenakshi Agency, Chennai

SEMESTER II
MATHEMATICS – PAPER-3
CLASSICAL ALGEBRA

CODE: II # M3

Credits: 3 (2L: 1T: 0P)

Hours: 4/Week

Objectives: To enable students to

- learn topics like Matrices
- learn the basic concepts in theory of numbers
- learn the concepts of theory of equations

UNIT I: Summation of series using Binomial, Exponential, Logarithmic series, and Approximation problems (only under Binomial Series)

UNIT II: Matrices, Symmetric – Skew- symmetric- Hermitian, Skew-Hermitian, Orthogonal and Unitary matrices, Cayley- Hamilton theorem (without proof) Eigen Values and Eigen vectors – Similar matrices – Diagonalisation

UNIT III: Theory of equations : Roots of an equation – Relation between the roots and coefficients – Transformations of equations – Descarte’s rule os signs- symmetric function of roots – Reciprocal equations.

UNIT IV: Multiple roots – Rolle’s theorem- position of real roots of $f(x) = 0$ – Newton’s method of approximation to a root – Horner’s method.

UNIT V: Theory of numbers, prime numbers, composite numbers, decomposition into prime factors (without proof), Divisors of a positive integer ‘n’, Euler function $\phi(n)$, Formula for $\phi(n)$ (without proof), the higher power of a prime contained in $n!$, Congruence’s, Fermat’s and Wilson’s theorem (without proof)- simple proof (**18 hrs**)

COURSE OUTCOME

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

CO1: Understand the summation of series

CO2: Explain the nature of the roots and symmetric property of roots in the n^{th} degree polynomial

CO3: Relate the coefficients and roots of the equation

CO4: Prove the concepts and theory of equations

CO5: Analyze the theory of numbers

Reference Books:

1. T.K. Manicavachagam Pillay, T.Natarajan, K.S.Ganapathy, Algebra Volume – I & II, S.Viswanathan Pvt. Ltd,2008
2. P.R. Vittal and V.Malini, Algebra and Trigonometry,Margam Publishers
3. A.Singaravelu and R.Ramaa, Algebra and Trognometry Vol I &II, Meenakshi Publications, Chennai.

SEMESTER-II**PHYSICS – PAPER-2****ACOUSTICS, THERMAL & STATISTICAL PHYSICS****CODE: II # P2****Credits: 4 (3L: 0T: 1P)****Hours: 5/Week****Objectives : Enable the Students to**

1. study the relation between linearBD and rotational motion.
2. understand the production and propagation of waves in elastic media.
3. study the nature and transmission of heat and the laws associated with them.
4. study the laws of thermodynamics and understand their applications.
5. acquire knowledge of Maxwell's thermo dynamical relations and their importance.
6. understand the concepts of statistical thermodynamics and its applications.

Unit-I: Sound

Wave motion - characteristics of wave motion - transverse, longitudinal wave motion - Newton's formula for velocity of sound - effect of temperature, pressure, density of the medium, humidity and wind - stationary waves - Helmholtz resonator, theory of resonator, vibrations in rods - Kundt's tube - Doppler effect -applications, Acoustics of buildings - Reverberation – Sabine formula for reverberation - Ultrasonics - production and detection of ultrasonic waves - applications of ultrasonic waves.

Unit-II: Transmission of Heat

Coefficient of thermal conductivity- rectilinear flow of heat along a bar - Forbes method - Lee's method for bad conductors and liquids – convection and its applications - Black body - Stefan Boltzmann law - Wien's displacement law - Rayleigh - Jeans law - derivation and experimental verification of Stefan's law - Newton's law of cooling from Stefen's law - solar constant - temperature of the Sun - Angstrom's Pyroheliometer.

Unit-III: Thermodynamics I

Thermodynamic system - zeroth law of thermodynamics - internal energy - First law of thermodynamics - reversible and irreversible process - Carnot's ideal heat engine - Carnot's cycle - internal combustion engine - Otto and diesel engine - second law of

thermodynamics - entropy - change in entropy during reversible and irreversible process - entropy and second law of thermodynamics - third law of thermodynamics

Unit-IV: Thermodynamics II

Thermodynamic variable - Statistical equilibrium - Maxwell's thermodynamic relations - applications - Joule Thomson cooling - temperature of inversion - Clausius Claperon's latent heat equation - thermodynamic potential - T.dS equation - Joule Thomson porous plug experiment - Joule Thomson expansion - liquefaction of gases - liquefaction of hydrogen and Helium - adiabatic demagnetization - refrigerator.

Unit-V: Statistical Thermodynamics

Statistical equilibrium - probability theorems in statistical thermodynamics - Maxwell Boltzmann distribution law - Maxwell - Boltzmann distribution in terms of temperature - ideal gas - quantum statistics - Phase space – FD distribution law - application to electron gas - BE distribution law – application to photon gas - radiation laws - comparison of the three statistics.

COURSE OUTCOME

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

CO1: Understand different concepts in acoustics and apply it in building acoustics.

CO2: Apply the concepts of Liquefaction of gases in the low temperature and its practical applications.

CO3: Analyze the laws of thermodynamics and understand their applications.

CO4: Examine the Maxwell's thermo dynamical relations and their importance.

CO5: Develop the design and fabrication of various Heat engines and improve its efficiency.

References Books:

1. Fundamentals of Physics, 6th Edition, David Halliday, Robert Resnick and Jay Walker, John Wiley and Sons, Inc.
2. University Physics, Revised Edition, Harris Benson, John Wiley and Sons Inc.
3. Heat and Thermodynamics, Zeemansky, McGraw Hill.
4. Physics of Vibration and Waves, H J Pain.
5. N. Subrahmanyam and Brijlal, Sound, Vikas publication House, 1994.
6. Brijlal and Subramanyam, Heat and thermodynamics, S.Chand and Co.,2007.

Physics Practicals – II

Paper – II

Any Seven Practicals

1. Spectrometer – dispersive power of prism.

2. Air wedge.
3. Newton's ring.
4. Careyfosters Bridge – R & r.
5. Potentiometer – Low range voltmeter.
6. Potentiometer – Internal resistance.
7. Young's modulus – Cantilever/ stretching.
8. Post office box- temperature co-efficient.
9. M1/M2- Vibration magnetometer.

SEMESTER-II
CHEMISTRY – PAPER-II
METALLURGY AND CHEMISTRY OF NON-MENTALS

Code: II # C2

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 Inorganic 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**

**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.

SEMESTER-II**BOTANY – PAPER-2****CYTOLOGY, ANATOMY AND EMBRYOLOGY****Code: II # B2****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 meristems 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, megasporogenesis, Megagametogenesis (*Polygonum* type of embryonic development), Fertilization - Double fertilization – Syngamy – Triple fusion – Post fertilization 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 and post-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. Mosby 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.
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19. Verma P.S and Agarwal V,K,1980, *Cytology*, S. Chand & Co Limited

SEMESTER-II

ZOOLOGY – PAPER-2

INVERTEBRATA – II

CODE: II # Z2

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,.
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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

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

SEMESTER-III

பருவம் III
தமிழ் - தாள் - 3

CODE: III # RL3

Credits:3 (2L:1T:0P)

Hours: 4/Week

நோக்கங்கள்: -

1. தமிழ் மொழியின் வரலாற்றை அறிவியல் கண்ணோட்டத்துடனும் மொழிக்குடும்மங்களின் அடிப்படையிலும் விளக்குதல்
2. சங்க இலக்கியத்தை வழி மாணவர்களுக்கு 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 விடுத்தாது - 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. எழுத்து 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. ச. 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 வுவுஸ்

SEMESTER –III
HINDI – PAPER-3

CODE: III # RL3

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.

SEMESTER – III
ENGLISH – PAPER - 3

CODE: III # E3

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.

SEMESTER – III
EDUCATION IN CONTEMPORARY INDIA

CODE: III # IPES3

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*, Hyderabad; Neelkamal Publications.
- Working Group Report on Elementary Education and Literacy, XI Five Year Plan, 2007-12. New Delhi: Planning Commission of India.

SEMESTER – III**TEACHING AND LEARNING – PART 1****CODE: III # IPES4****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. (1980). *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.

SEMESTER-III
MATHEMATICS – PAPER - IV
DIFFERENTIAL EQUATIONS

Code: III # M4

Credits: 3 (2L:1T:0P)

Hours: 4/Week

Objectives: To enable students to

1. gain logical skills in the formulation of differential equations
2. expose students to different techniques of finding solution to these equations
3. know the basics for Mathematical modeling

UNIT – I: Equations of first order but of higher degree – Equations solvable for p – Equations solvable for x – Equations solvable for y – Clairaut’s Equation
 Book 1 Chapter 1 Sections 5.1, 5.2, 5.3, 5.4, 6.1

UNIT – II: Method of undetermined coefficient, Method of variation of parameters, Linear Differential Equations with constant coefficients
 Book 2 Chapter 5 Sections 5.4, 5.5, 5.6

UNIT – III: Bernoulli’s equations, Cauchy – Euler equation, Legendre linear equations
 Book 1 Chapter 1 Section 2.5 Book 2 Chapter 5, Section 5.7, 5.8

UNIT – IV: Exact equations, Total Differential Equations, Lagrange’s equations,

$$\text{I.F } \frac{1}{Mx+Ny}, \frac{1}{Mx-Ny}, \frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}, \frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{M}$$

Book1 Chapter 1 Section 3.1 Chapter 3 Section 7 Chapter 4 Section 6

UNIT – V: Formation of P.D.E Complete integrals, particular integrals, singular integrals, equations solving by direct integration, linear equations of the first order – non- linear equations of the first order- The four standard forms .
 Book 1 Chapter 4 Section 2.1, 2.2, 3, 4, 5.1, 5.2, 5.3, 5.4

COURSE OUTCOME

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

CO1: Classify the differential equation and solve for p, x, and y

CO2: Find the complementary function and particular integral of second order differential equations.

CO3: Categorize the PDE based on arbitrary constants and arbitrary functions

CO4: Explain the method of variation of parameters for the second order differential equations.

CO5: Identify the method of the homogenous equation of linear PDE.

Reference Books:

- Calculus – S. Narayanan and T. K. Manicavachagom Pillay.
- M.D. Raisinghania, Ordinary & Partial Differential Equations, S. Chand & Co.,
- M. K. Venkataraman, Engineering Mathematics, S. V. Publicaitons, 1985, Revised Edn.
- P.R. Vittal , Differential Equations and Laplace transformations
- Singaravalu, Differential Equations Fourier Series and Laplace transforms

SEMESTER-III
MATHEMATICS – PAPER - V
ALGEBRAIC STRUCTURES

CODE: III # M5

Credits: 3 (2L:1T:0P)
Hours: 4/Week

Objectives: To enable students to

1. analyze and understand theorems on algebraic concepts
2. apply the algebraic concepts in Mathematical Sciences.
3. understand the concepts of characteristic roots and matrices etc.,

UNIT – I: Groups – definitions- subgroups – A counting principle – quotient groups – homomorphism – isomorphisms – automorphisms.

UNIT – II: Rings – definitions – examples-some special classes of rings – homomorphism – ideals, more ideals and quotient rings.

UNIT – III: The field of quotients of an integral domain – Euclidean rings – A particular Euclidean rings.

UNIT – IV: Vector space – Linear Independence and bases – Dual space – inner product space.

UNIT – V: Linear transformation – Algebra of linear transformation – characteristic roots – matrices – canonical forms – triangular form.

COURSE OUTCOME

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

CO1: Understand basic concepts of Groups, Properties, Permutations Groups.

CO2: Analyze the theorems of Algebraic structures.

CO3: Prove the Concepts of Rings, Subrings, Quotient rings

CO4: Illustrate Fields of quotients of an integral domain and Euclidean rings

CO5: Apply the algebraic concepts in Mathematical Sciences.

Reference Books:

- N. Herstein, Topics in Algebra, Wiley Eastern Ltd., NewDelhi.
- K.Viswanatha Naik,Modern Algebra, Emerald publishers

- N.S. Gopakrishnan, University Algebra, New Age International (P) Limited, Publishers., New Delhi.
- S.Arumugan , Modern Algebra, Scitech Publications, Chennai.
- M. L. Santiago (1988) Modern Algebra Arul Publication, Chennai

SEMESTER-III**PHYSICS – PAPER - 3****ELECTRICITY AND MAGNETISM****CODE: III # P3****Credits: 4 (3L:0T:1P)****HOURS: 5/Week****Objectives: To enable students to**

- study Gauss theorem and its applications
- study the principle of Magneto-statics, magnetic effects of electric current and their applications.
- understand the working of potentiometer and its uses
- understand the principle of electromagnetic induction and ac circuits and network theorem.

Unit - I: Electrostatics

Point charge - Rest charge - charge distributions - coulomb's law – vector form - Principle of superposition - electric field strength - Electric field due to uniform line charge, charged ring at an axial point - Electric dipole – The concept of a solid angle - Gauss theorem and its differential form – Electric potential energy - Potential difference - Zero potential - Principle of superposition for potential - Potential due to a point charge-uniformly charged disc, spherical conductor - Poisson's and Laplace equations.

Unit - II: Magneto statics

Definition of B - Lorentz force - magnetic field intensity H - magnetic shell - Hall effect - Cyclotron - Ampere's circuital theorem - applications - field at a point inside a long cylindrical wire - magnetic vector potential- magnetic susceptibility and relative permeability - classification of magnetic materials - Properties of magnetic materials - susceptibility determination (Gouy's and Quincke's method - Experimental determination of hysteresis loop.

Unit - III: Magnetic effects of current

Biot and Savart law - field due to a straight wire - field on the axis of a circular coil - field due to a solenoid - Torque on a current loop in a uniform field - force on a current carrying conductor in a magnetic field - Theory of moving coil galvanometer - Applications of BG - Figure of merit - comparison of e.m.f of two cells and capacitances.

Unit - IV: Current Electricity

Current and current density - equation of continuity - resistance - Ohm's law - combination of resistance star and Delta transformations - grouping of cells - Kirchoff's

laws - Wheatstone Bridge - Carry - Foster's Bridge - Potentiometer - uses - Low resistance - Measurement of a very small e.m.f – growth and decay of current in inductor - charge and discharge of a capacitor through a resistance - Measurement of high resistance by leakage method - Physics of the LC Oscillator.

Unit - V: Electro Magnetic Induction and A.C.circuits

Faraday's laws - differential form - induced current and eddy currents -charge - self inductance - self inductance of a long straight solenoid - Rayleigh's method of self inductance - Mutual inductance – resistivity relation - coefficient of coupling - Determination of mutual inductance using B.G - Earth inductor - Measurement of horizontal, vertical component of B and angle of dip - Dynamo - D.C generator - D.C Motor.

COURSE OUTCOME

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

CO1: Understand the basic concepts of electrostatics and its applications.

CO2: Apply the concepts of magnetostatics and its experimental techniques in project preparation.

CO3: Identify the various concepts involved in AC and DC circuits.

CO4: Understand the magnetic effect of electric current used in various galvanometer and its instrumentation techniques.

CO5: Develop the design, fabrication, and characterization techniques for the self and mutual inductances.

Reference Books

- Sehgal - Chopra - Sehgal, Electricity and magnetism, Sultan Chand and Sons Ltd, New Delhi, 6th edition reprint, 2010.
- K K Tewari, Electricity and magnetism, S. Chand & Co. Ltd., NewDelhi, Reprint 2003.

Physics Practicals – III

Paper – III

Any Seven Practicals

1. Spectrometer – Grating ($N\&\lambda$).
2. Spectrometer – i-d curve.
3. Spectrometer – Dispersive Power of Grating.

4. Young's modulus - Uniform Bending.
5. Junction diode & Zener diode Characteristics.
6. K- Lees disc.
7. Field along the axial of coil – vibration magnetometer.
8. Potentiometer – high range voltmeter.

SEMSTER-III
CHEMISTRY – PAPER-III
CHEMICAL KINETICS AND PHASE RULE

CODE: III # C3**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**

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)

SEMESTER-III
BOTANY – PAPER-3
BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS

Code: III # B3

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 Bryophytes.

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*; Stellar 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, Megasporephyll – 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.

SEMESTER-III
ZOOLOGY – PAPER-III
CHORDATA

CODE: III # Z3

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. Dhama, P.S and Dhama, 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.

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

SEMESTER-IV

பருவம் IV
தமிழ் - தாள் - 4

CODE: IV # RL4

Credits: 3 (2L:1T:0P)

Hours: 4/Week

நோக்கங்கள்: -

1. தமிழ் மொழியின் வரலாற்றை அறிவியல் கண்ணோட்டத்துடனும் மொழிக்குடும்மங்களின் அடிப்படையிலும் விளக்குதல்
2. சங்க இலக்கியத்தை வழி மாணவர்களுக்கு 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 - அறிவுகளுஞ்சியவாயில் - அடிப்படை மொழித்திறன்கள் - இலக்கிய இன்பம் - படைப்பாற்றல் - கற்பனையாற்றல் - அழகுணராற்றலை வளர்த்தல் - சமூகப் பண்பாட்டு வளர்ச்சி - சமூகமரபுகளைப் பேணுதல்

அலகு - 2 காப்பியங்கள்: -

மணிமேகலை - பவத்திறம் அறுக எனப் பாவை நோற்றகாதை முழுவதும் கம்பராமாயணம் - மந்தரைச் சூழ்ச்சிபடலம்

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 - கலைஞர்

COURSE OUTCOME

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

- CO1: Enhance their appreciation skills.
- CO2: Justify the contemporary social issues 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 வுவுஸ்
- சுப்புரெட்டியார்.ந - "தமிழ் பயிற்று முறை", மெய்யப்பன் பதிப்பகம், ஐந்தாம் பதிப்பு 2006
- இரவிச்சந்திரன்.சு - "செய்யுள் திரட்டு:, வேல்ஸ் பல்கலைக்கழகம், முதற் பதிப்பு

SEMESTER – IV

HINDI – PAPER 4

CODE: IV # RL4

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 Vidyapati.

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 .

SEMESTER – IV
ENGLISH – PAPER - 4

CODE: IV # E4

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:

- Merriam, 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.

SEMESTER – IV**TEACHING AND LEARNING – PART II****CODE: IV # IPES-5****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:

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- Berk, Laura E. (2010). *Child Development*. New Delhi: PHI Learning Private Limited.
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- 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.

SEMESTER – IV

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

CODE: IV # IPAS1

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.
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SEMESTER-IV
MATHEMATICS – PAPER - VI
INTEGRAL CALCULUS AND LAPLACE TRANSFORMS

CODE: IV # M6

Credits: 3 (2L:1T:0P)

Hours: 4/Week

Objectives: To enable students to

1. provide working knowledge to apply the integral principles in other courses.
2. learn new topics like Beta and Gamma functions and Multiple integrals.
3. expose different techniques in Integration.

UNIT – I: Integral Calculus: Reduction formulae, Bernoulli's formula

UNIT – II : Multiple integrals - Evaluation of Double and Triple integrals - change of order of integration- applications to plane area (Cartesian co-ordinates only)

UNIT – III : Beta and Gamma functions – properties and simple problems.

UNIT – IV : Laplace Transforms – Definition – standard results – simple theorems – Inverse Laplace transform.

UNIT – V: Applications of Laplace transform to solution of first and second order linear differential equations (constant coefficients) and simultaneous linear differential equations.

COURSE OUTCOME

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

- CO1: Solve problems using reduction formulas and Bernoulli's formula
- CO2: Evaluate double and triple integrals
- CO3: Compare the properties of Beta and Gamma functions
- CO4: Explain the concept of Laplace transforms and inverse Laplace transforms
- CO5: Execute the first and second order linear differential equations

Reference Books:

- S.Narayanan & T.K. Manicavachagom Pillay , Calculus Volume II & III, Integral Calculus, S.Viswanathan (Printers & Publishers) PVT.LTD.
- P.R. Vittal , Differential Equations and Laplace Transforms, Margham Publications, Chennai.

SEMESTER-IV
MATHEMATICS – PAPER - VII
REAL ANALYSIS

CODE: IV # M7

Credits: 3 (2L:1T:0P)
Hours: 4/Week

Objectives: To enable students to

1. get acquainted with the concepts of real analysis
2. work comfortably with concepts
3. explore sequence and series , the varies limiting processes viz. continuity, differentiability and integrability

UNIT – I: Countability, Real numbers, least upper bounds, sequences and subsequences, limit of a sequence, convergent and divergent sequence , bounded sequences , Monotone sequences, Cauchy sequences. Chapter 1: sections 1.5 - 1.7 Chapter 2: sections 2.1 - 2.8, 2.10.

UNIT – II: Convergence and divergence of series, series of non-negative terms, Alternating Series conditional and absolute convergenc, test for absolute convergence.
 Chapter 3: sections 3.1 - 3.4 & 3.6

UNIT – III: Limit of a function, metric spaces, functions continuous at a point on a real line, Open sets, closed sets. Chapter 4: sections 4.1 & 4.2 Chapter 5: sections 5.1 - 5.4 & 5.

UNIT – IV: Sets of measure zero, definition of Riemann integral, Existence and properties of Riemann integral. Chapter 7: sections 7.1 - 7.4

UNIT – V: Derivations, Rolle’s Theorem, the law of mean. Chapter 7: sections 7.1 - 7.7

COURSE OUTCOME

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

- CO1: Understand the concept of Monotone and Cauchy’s equations
- CO2: Execute convergence and divergence series of non-negative terms
- CO3: Define metric spaces and limit of a function
- CO4: Appraise the concepts of Riemann integrals and properties of Riemann integral functions
- CO5: Formulate the derivation of Rolle’s Theorem

Recommended Books:

- Richard .R .Goldberg, ‘Methods of Real Analysis’, Oxford & IBH Publishing Co., Pvt. Ltd, New Delhi.
- Shanthi Narayan, A Course of Mathematical Analysis, S. Chand & Co., 1995.

SEMESTER-IV
PHYSICS – PAPER - 4
ANALOG ELECTRONICS

Code: IV # P4

Credits: 4 (3L:0T:1P)
Hours: 5/Week

Objectives: To enable students to

- understand the various techniques and concepts in Electronics
- apply these techniques in practical circuits.
- develop the skill in handling instruments.

Unit - I: Diode Characteristics and Applications

Constant voltage source - constant current source - Maximum power transfer theorem - Thevenine's theorem - procedure for finding Thevenin Equivalent circuit - PN junction theory - V-I characteristics of a PN junction diode – Half wave rectifier - Bridge rectifier - Efficiency - filters - Shunt capacitor filter – p filter - Zener diode - equivalent circuit - voltage regulator - LED - V-I characteristics - advantages - applications - photo diode - characteristics - applications.

Unit - II: Transistor characteristics and biasing techniques

Junction transistor structure - working of a transistor - transistor amplifying action - transistor characteristics - CB, CE, CC - comparison between the three configurations - basic CE amplifier circuit -selection of operating point - need for bias stabilization - requirements of a biasing circuit - fixed bias - voltage divider biasing circuit - h parameter equivalent circuits - Types of FET - JFET - working principle - symbol - comparison with bipolar transistor - output characteristics - shorted gate drain current, pinch off voltage and gate source cut off voltage - JFET parameters.

Unit - III: Single stage, multistage and power amplifiers

Single stage transistor amplifier - BJT, FET - analyzing an amplifier – graphical method - equivalent circuit method - gain of a multistage amplifier - RC and transformer coupling - frequency response curve of an RC coupled amplifier - analysis of two stage RC coupled amplifier - classification of amplifiers - single ended and power amplifier - push pull amplifier.

Unit - IV Feedback amplifiers and oscillators

Concept of feedback in amplifiers - types of feedback - voltage gain of feedback amplifier - advantages of negative feedback - amplifier circuits with negative feedback -

classification of oscillators - positive feedback amplifier as an oscillator - LC oscillators - Hartley, Colpitts and RC oscillators - Phase shift and Wien's bridge - Crystal oscillators - Astable multivibrator.

Unit - V: Switching circuits & Integrated circuits

Clipping and clamping circuits - SCR: working - equivalent circuit – important terms - V-I characteristics - Integrated circuits - advantages and disadvantages - Operational amplifier - differential amplifier - basic circuit - operation - common mode and differential mode signals - voltage gains - CMRR- Schematic symbol of OP AMP - output voltage - OP-AMP with negative feedback - inverting amplifier - Non inverting amplifier – Voltage follower - summing amplifiers - Integrator and differentiator

COURSE OUTCOME

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

- CO1: Understand the properties and applications of semiconductor diodes.
- CO2: Analyze the rectifier and regulator circuits.
- CO3: Design and implement combinational logic circuits using reprogrammable logic devices.
- CO4: Demonstrate the programs of digital to analog and analog to digital conversion.
- CO5: Create circuits to solve clocked Flip-Flops problems.

Reference Books

- Bhargava N.N, Kulshreshtha D.C and S.C Gupta - Basic electronics an linear circuits, Tata McGraw Hill Publishing Company Limited, 2007.
- V.K. Mehta and Rohit Mehta, Principles of Electronics, S. Chand & Co. Ltd, New Delhi, 2013.

Physics Practicals – IV

Paper – IV

Any Seven Practicals

1. Compound pendulum.
2. Study of basic and universal gates (IC's).
3. NAND & NOR as universal building blocks.
4. Bridge rectifier – π filter.
5. Transistor – characteristics C.E mode.
6. Zener Diode – characteristics.
7. Maxwells bridge – (AC method – self-induction)
8. Bandgap of semiconductor.

SEMSTER-IV
CHEMISTRY – PAPER-IV
MOLECULAR REARRANGEMENTS AND STEREO CHEMISTRY

CODE: IV # C4**Credits: 4 (3L: 0T: 1P)****Hours: 5/Week**

Course objective: To understand about what 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: Stereochemistry 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**.

**CHEMISTRY
PRACTICAL-IV**

Complexometric titration

1. Estimation of Magnesium
2. Estimation of Calcium

Demonstration Experiment

3. Estimation of Chloride using Silver nitrate

SEMESTER-IV
BOTANY – PAPER - IV
TAXONOMY, PLANT PHYSIOLOGY & PLANT BIOCHEMISTRY

Code: IV # B4

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.

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- 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.
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- 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.
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- Naik, V.N. (1996). *Taxonomy of Angiosperms (9th Ed.)*. Tata McGraw-Hill Publishing Co., (P) Ltd., New Delhi.
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- Palaniyappan, S. (2000). *Angiospermgalin Vagaippadu (Taxonomy of Angiosperms)*. V.K. Publishing House, Chennai.
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- 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.

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 CO₂ concentrations.

SEMESTER-IV
ZOOLOGY – PAPER - IV
DEVELOPMENTAL BIOLOGY

CODE: IV # Z4

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.,

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.

SEMESTER – V

PLANNING FOR ASSESSMENT AND EVALUATION

CODE: V # IPAS2

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:

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- George, David. (2008). Trends in Measurement & Evaluation techniques, Common Wealth Publishers, New Delhi.
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- 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.
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- Walton, John.A. (2008). Educational Objectives & Achievement testing, Common Wealth Publishers, New Delhi.

SEMESTER – V
PEDAGOGY OF PHYSICAL SCIENCE – P1

CODE: V # IPAS3-P1

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:

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- Chauhan, S.S. (1985). *Innovation in Teaching and Learning Process*. New Delhi: Vikas Publishing House.
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- Jenkins, E.W. (2000). *Innovations in Science and Technology Education. Vol. VII*, Paris: UNESCO.
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Shantha Publication.

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- Yadav, M.S. (2003). *Teaching of Science*. New Delhi: Anmol Publications.

SEMESTER – V
PEDAGOGY OF MATHEMATICS – P1

CODE: V # IPAS4-P1**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 nature and scope of Mathematics.
2. comprehend the aims and objectives of teaching Mathematics;
3. explore different methods of teaching and learning in Mathematics;
4. recognise different approaches and strategies in teaching and learning of mathematical concepts;
5. organise various learning resources;
6. integrate the knowledge of Instruction (Teacher Controlled, Learner Controlled and Group Controlled) effectively for better curriculum transaction.

UNIT-I: Nature and Scope of Mathematics

Meaning, Definition and Scope of Mathematics - Importance of learning Mathematics - Structure, Abstractness, Symbolism, Precision - Mathematics as a science of measurement and quantification - Aesthetic sense in Mathematics - Mathematics and its relationship with other disciplines.

UNIT-II: Objectives of Teaching Mathematics and Teaching skills

Need and significance of teaching Mathematics -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 in Mathematics

Inductive, Deductive, Analytic, Synthetic, Heuristic, Project, Problem solving and laboratory methods of teaching mathematics- Activity Based Learning (ABL)- Simplified Active Learning Methods (SALM)- Applications of ABL and SALM- Format of a typical lesson plan based on SALM- Introduction; Evocation, Recall, Survey- Understanding; Concept, Teacher and Individual solving Problem-Group Work, Presentation-Evaluation: Reinforcement, Homework, Remedial measures.

UNIT-IV: Teaching Aids in Mathematics

Edgar dale's cone of experience - Instructional material or teaching aids employed in Mathematics teaching : Blackboard of Chalk Board, Bulletin Board, Flannel Board, pictures, Graphs, Charts, Diagrams, Photographs, Cartoons, Posters, Flash cards, Newspapers, Models, Dioramas, Slides, Filmstrips, Transparencies, Scrap Book, Epidiascope, Projectors Radio, Tape Recorder, Television, Closed Circuit Television (CCTV), Video Tape or Cassette Recorder (VCR), DVD, MP-3VCD, Motion Pictures and Computers. Importance of TLMs in classroom

transaction - No cost and low cost materials- Contextual and local-specific TLMs - Collection, preparation, storing and use of TLMs.

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 able students. Activities to enrich mathematics 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 Mathematics.
- 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, J.C. (2008). *Teaching of Mathematics*. Uttar Pradesh: Vikas publishing House Pvt Ltd.
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- Kumar Sudhir, *Teaching of Mathematics*. New Delhi: Anmol Publications.
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- Nickson, Marilyn. (2000). *Teaching and Learning Mathematics: A Guide to Recent Research and Its Applications*. New York: Continuum Press.
- Nunes, T., & Bryant, P. ((1997). *Learning and Teaching Mathematics: An International Perspective*. London: Psychology Press.
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- Siddizui, M.H.(2005). *Teaching of Mathematics*. New Delhi: APH Publishing Corporation.
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- Singh,M. (2006). *Modern Teaching of Mathematics*. New Delhi: Anmol Publications Pvt. Ltd.

SEMESTER – V
PEDAGOGY OF BIOLOGICAL SCIENCE – P1

CODE: V # IPAS4-P1

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.
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SEMESTER-V

MATHEMATICS – PAPER - VIII

VECTOR CALCULUS AND GEOMETRY

CODE: V # M8

Credits: 3 (2L:1T:0P)

Hours: 4/Week

Objectives: To enable students to

1. learn the topic on vector calculus
2. understand the fundamental concepts of vector calculus and polar co-ordinate geometry
3. apply the knowledge of polar co-ordinate gained, to solve various problems
4. apply the various techniques of vector integration in solving volume and surface integrals

UNIT – I : Vector Differentiation: Directional Derivative, Unit normal to the surface, equation of tangent plane to a surface, equation of normal to a surface , Divergence, Curl, Laplace operators

UNIT – II: Evaluation of line integral, surface integral and volume integral

UNIT – III: Application of Green’s theorem, Guass-Divergence theorem, Strokes theorem (proofs of theorems not included), simple problems

UNIT-IV: Polar co-ordinates: Distance between the points, area of triangles-equation of straight line, circle and Conic

UNIT-V: Planes: General Equation of a plane, Angle between two planes, to find the equation of the plane which bisects the angle between two given planes, Condition for a homogeneous equation of the second degree to represent a pair of planes, simple problems.

COURSE OUTCOME

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

- CO1: Derive the equations of normal to a surface, curve and laplace operators
- CO2: Understands the fundamental concepts vector calculus and polar geometry
- CO3: Evaluate line integrals and surface integrals
- CO4: Apply Green's theorems, Gauss divergence and stokes theorem
- CO5: Explain the concepts of general equation of the plane and angle between the planes

Reference Books:

- P. Duraipandian & Laxmi Duraipandian, Vector Analysis, Emerald Publisher.
- T.K. Manicavachagam Pillay&others, Revised edition, Reprint 2001, Analytical Geometry of two dimensions, S. Vishwanathan Printers and publishers pvt.ltd, Chennai
- P.R. Vittal, Vector analysis, Analytical solid geometry and sequences and series.

SEMESTER-V

MAJOR-BASED ELECTIVE - I

MATHEMATICS – PAPER - IX

OPERATIONS RESEARCH

CODE: V # M9.1

Credits: 3 (2L:1T:0P)

Hours: 4/Week

Objectives: To enable students to

1. develop computational skills
2. develop logical thinking in formulating industry oriented problems
3. apply these techniques in real life situations

UNIT – I: Linear programming: General LPP- Mathematical formulation-Solution for LPP by Graphical Method and Simplex Method (finite optimal solution, unbounded solution, alternative optimal solution)- slack and surplus variables – solution for LPP with unrestricted variables

UNIT – II: Artificial Variable Technique- Big-M Method (Charner's Penalty Method) – concept of Duality- Dual theorem only statement- Reading solution from the dual from the final simplex table of the primal and vice-versa

UNIT – III: Transportation problem-Assignment problem.

UNIT – IV: Sequencing Problem – n jobs through 2 machines-n jobs through 3 machines- two jobs and m machines; Game Theory – Two-person zero-sum game with saddle point-without saddle point-dominance property-solving $2 \times n$ or $m \times 2$ game by graphical method.

UNIT – V: PERT & CPM - Project network diagram & its rules-Fulkerson's rule-time estimate and critical path in network analysis – floats - forward pass and back pass computations. PERT – optimistic time-most likely time-pessimistic time- expected duration and variance-difference between PERT and CPM. .

COURSE OUTCOME

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

CO1: Develop computational skills in solving linear programming problem

CO2: Understands the concepts of dual simplex method

CO3: Solve transportation and assignment problems

CO4: Explains the concept of Game theory and saddle point

CO5: Implement the techniques of PERT and CPM in real life situations

Reference Books:

- R.K. Gupta, Operations Research, 12th edition, Krishna Prakash
- Gupta P.K & Hira D.S (2000) Problems in Operations Research, S.Chand & Co, Delhi
- S.D. Sharma, Operations Research, 8th edition , Kedhar Nath Ram Nath & co, Meerut
- Taha , 6th Edition, Operation Research, Printice Hall, New Delhi
- V.Sundaresan, K.S. Ganapathy Subramanian, & K.Ganesan, Resource Management Techniques (Operations Research), Reprint June 2002, A.R. Publications, Nagapattinum District
- Prem Kumar Gupta , D,S, Hira , Operations Research,S,Chand & Company Ltd, Delhi

SEMESTER-V**MAJOR-BASED ELECTIVE - II
MATHEMATICS – PAPER - IX
DISCRETE MATHEMATICS****CODE: V # M9.2****Credits: 3 (2L:1T:0P)
Hours: 4/Week****Objectives: To enable students to**

1. develop construction and verification of mathematical logic.
2. gain fundamental knowledge about lattices and Boolean Algebra.
3. learn the basics of Graph Theory and its application.

UNIT – I: PROPOSITIONAL CALCULUS

Tautology and contradiction – Equivalence of formulae -duality law – Tautological implications - Normal forms – disjunctive normal forms – conjunctive normal forms.

UNIT – II :LATTICES

Lattices - Introduction – Principle of duality - Properties of Lattices – sub Lattice – distributive Lattice modular lattices – bounded lattice - complemented lattice.

UNIT – III: BOOLEAN ALGEBRA

Definition – Other basic laws of Boolean Algebra – Principle of duality for Boolean Algebras – ATOM definition - ATOMIC Boolean algebra – Finite Boolean Algebra. Boolean expression – definition – Boolean function – Literal – minterm and maxterm, Normal forms and Canonical forms.

UNIT –**IV: GRAPHS, SUBGRAPHS AND CONNECTEDNESS**

Introduction – definition and examples – degrees – subgraphs – Isomorphisms – walks, trails and paths – connectedness and components – blocks – connectivity.

UNIT – V: EULERIAN AND HAMILTONIAN GRAPHS

Introduction - Eulerian graphs – Hamiltonian graphs.

COURSE OUTCOME

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

CO1: Explain the Relation, Functions, Composition of functions

CO2: Construct the truth table and explain the proof, reasoning

CO3: Proof of the theorems are explained in Groups, Abelian Groups, Monoids, Semi groups and few problems are discussed

CO4: Explain the mathematical reasoning and proof in automata theory.

CO5: Solving abilities with an emphasis on proof

Reference Books:

- Dr. S.P. Rajagopalan, Dr.R. Sattanathan, Discrete Mathematics, Margham Publications, Chennai -17.
- S.Arumugam, S.Ramachandran: Invitation to graph theory, Scitech Publications (India) Pvt.ltd, Chennai -17.
- Trembley J.P and Manohar .R , “Discrete Mathematical Structures with Applications to Computer Science”, Tata Mcgraw – Hill Publication Co., limited, New Delhi, 2003.
- Ralph.P. Grimaldi, “ Discrete and Combinatorial Mathematics: An Applied Introduction” 4th edition, Pearson Education Asia, Delhi 2002.

SEMESTER-V
PHYSICS – PAPER - 5
DIGITAL ELECTRONICS AND MICROPROCESSOR

CODE: V # P5**Credits: 4 (3L:0T:1P)****Hours: 5/Week****Objectives: To enable students to**

- Study various number systems and to simplify Boolean expression using the methods of Boolean Algebra and Karnaugh map.
- know the fixed function Combinational logical circuits and their implementation.
- study the fundamentals and applications of sequential logical circuits.
- study the fundamentals of architecture and instruction set of an 8-bit microprocessor.
- write Assembly Language Programs for an 8-bit microprocessor INTEL- 8085.

UNIT I : Number Systems, Logic Gates & Boolean Algebra and K-MAPS

Number Systems and Logic Gates: Different Number Systems -Binary, Octal and Hexadecimal. Conversion between the number systems. Different Digital codes - ASCII, BCD, Gray codes. Basic logic gates: AND, OR and NOT Gates. Realization using Diodes and Transistor. Universal gates - NAND, NOR - conversion into Basic gates, Special Gates - Ex-OR, Ex-NOR. Boolean algebra and K-Maps:- Boolean Laws. De-Morgan's Theorems. Simplification of Logical expression using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Implementation of a Truth Table into an Equivalent Logic Circuit by Boolean Algebra and Karnaugh Maps – 4 Variables.

UNIT II: Combinational and Arithmetic Digital Circuits and Semiconductor Memories

Data processing circuits :- A basic study of TTL, CMOS and MOSFET- Classification and parameters. Basic Idea of Multiplexers 2:1, 4: 1, Demultiplexers 1:2, 1:4, Decoders, Encoders - decimal - to - BCD, Parity Generator and Checker - odd & even. Arithmetic Circuits :- Binary Addition, Binary Subtraction using 2's Complement Method, Half Adders, Half subtractors, Full Adders and Full Subtractors. Memories :- Read-only memories (ROM), PROM, EPROM and RAM.

UNIT III: Sequential Circuits

Sequential Circuits :- RS, D, JK and T Flip-Flops. Level Clocked and Edge Triggered Flip-Flops. Preset and Clear Operations. Race-around Conditions in JK Flip-Flops. Master-Slave JK Flip-Flop (As Building Block of Sequential Circuits). Counters : - Asynchronous and Synchronous Counters. Decade Counter, UP-DOWN Counters, Ring Counter. Shift registers : - Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serialout and Parallel-in-Parallel-out Shift Registers (only upto 4 bits).

UNIT IV: Microprocessors

Intel 8085 Microprocessor Architecture Architecture of 8085. Block Diagram, different blocks, Buses, Registers, ALU, Memory- Stack Memory. Interfacing Devices, Timing and Control Circuitry, Pin-out Diagram. Timing States, Instruction Cycle , Interrupts and Interrupt Control, Input/Output. Machine Language. Assembly Language. Instruction Set and Format. Data Transfer, Arithmetic, Logical, Branching and Machine Control Operations. RIM and SIM. Different Addressing Modes : Register, Implied, Immediate, Direct and Indirect. Memory Organization and Addressing, Memory Interfacing, Memory Map.

UNIT V : 8085 Instruction Set and Programming

Microprocessor Programming :- Algorithm and Flowcharts. Simple programming Exercises : Addition - sum of two 8-bit data without carry, sum of two 8-bit data with carry, decimal addition, sum of a string of data, Subtraction of two 8-bit data, 8 bit Multiplication - using successive addition and 8 bit Division - using successive subtraction, Look-up-table, Masking of a data, block transfer.

COURSE OUTCOME

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

- CO1: Understand various number systems and simplify Boolean expressions.
- CO2: Analyze the logical circuits and their implementation.
- CO3: Compare the fundamentals and applications of sequential circuits.
- CO4: Assess the fundamentals of architecture and instruction set of an 8-bit microprocessor.
- CO5: Create language programs for an 8-bit microprocessor INTEL-8085

Reference Books

- Microprocessor Architecture, Programming, and Applications with the 8085 by Ramesh S. Gaonkar, (Prentice Hall, 2002).
- Microprocessor Architecture, Programming, and Systems featuring the 8085 by William A. Rountt, (Thomson Delmar Learning, 2006).
- Digital principles and Applications by Donald P. Leach & Albert Paul Malvino, (Glencoe, 1995).
- Digital Fundamentals, 3rd Edition by Thomas L. Floyd (Universal Book Stall, India, 1998).

Physics Practicals – V

Paper – V

Any Seven Practicals

1. Semiconductor - Laser
2. Potentiometer – EmF of a thermocouple.
3. Zener regulated power supply.
4. B.G – L by Anderson bridge.
5. Fresnel's biprism.
6. Transistor characteristics – CB mode.
7. Transistor characteristics – CE mode.
8. FET characteristics.
9. Study of FET amplifier.

SEMSTER-V
CHEMISTRY – PAPER-V
SOLID STATE CHEMISTRY

CODE: V # C5

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 nuclei 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**

**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

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

Code: V # B5

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 nematocides. 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 petrifications and radio carbon dating.

Unit – V

Brief study of the following fossils:

1. Lepidodendron
2. Calamites
3. Williamsonia

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). *Text 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.

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.

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

CODE: VI # B6.1

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 (*Pleurotus 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.
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- 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 distributors, 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.

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.

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

CODE: VI # B6.2

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. Argobios 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.

PRACTICAL – VI
MAJOR-BASED ELECTIVE – II

PAPER – VI: PLANT BIOTECHNOLOGY 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.

SEMESTER – V
ZOOLOGY – PAPER – V
CELL BIOLOGY

CODE: V # Z5

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 Fractionation, 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 reticulum, 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
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- 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

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

SEMESTER – VI
EDUCATIONAL MEASUREMENT

CODE: VI # IPAS5

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.
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- 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.

SEMESTER – VI
PEDAGOGY OF PHYSICAL SCIENCE – P2

CODE: VI # IPAS3-P2

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.
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- Chauhan, S.S. (1985). *Innovation in Teaching and Learning Process*. New Delhi: Vikas Publishing House.
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SEMESTER – VI
PEDAGOGY OF MATHEMATICS – P2

CODE: VI # IPAS4-P2

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 importance of non- scholastic activities in Mathematics;
2. develop the knowledge of process of evaluation;
3. develop competence writing lesson plan and in teaching mathematics;
4. develop the professional growth and commitment to profession of teaching
5. understand the importance of classroom climate
6. acquire the skill of managing classroom effectively
7. develop the skill and competencies to maintain records.

UNIT-I: Evaluation of Mathematics Learning

Assessment of Mathematics Learning – Developing blue-print for designing question paper, item construction, marking schemes, question - wise analysis, framing of questions based on concepts and sub-concepts so as to encourage critical thinking, promote logical reasoning and to discourage mechanical manipulation of rote learning, framing of open ended questions providing the scope to learning to give *responses* in their own words, framing of conceptual questions from simple questions.

UNIT -II: Planning for Teaching-Learning Mathematics

Macro teaching - Lesson Plan, Unit Plan, Year plan - Herbartian steps - Format of a typical lesson plan – G.I.O's & S.I.O's - Teaching aids - Motivation, Presentation, Application, Recapitulation and Assignment

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 a focus on the individual needs of students. Teacher commitment as a 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. Qualities and skills of mathematics teachers – General qualities, personal qualities and specific qualities.

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 - Difficulties in Learning Mathematics: Dyscalculia - Mathematics Phobia - Dysgraphia - Mathematics Anxiety - Difficulties in handling mathematical instrument - Causes, Problems and its remedial measures .

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- its application in Mathematics education- advantages and limitations.

COURSE OUTCOME

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

- CO1: Classify the co-curricular activities in Mathematics.
- CO2: Recognize the significance of planning and teaching Mathematics.
- 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:

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SEMESTER – VI
PEDAGOGY OF BIOLOGICAL SCIENCE – P2

CODE: VI # IPAS4-P2

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.
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- 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.
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- Passi, B. K. (1976). *Becoming a Better Teacher: Micro teaching approach*. Ahmedabad: 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.
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SEMESTER-VI
MATHEMATICS – PAPER - X
COMPLEX ANALYSIS

CODE: VI # M10

Credits: 3 (2L:1T:0P)
HOURS: 4/Week

Objectives: To enable students to

1. apply modern treatment of concepts and techniques of Complex Function Theory.
2. understand methods to solve problems in pure as well as in Applied Mathematics.
3. learn complex number system, complex function and complex integration.

UNIT – I: Analytic function: functions of complex variables – Limit continuity – Uniform continuity – Analytic function – C-R equation.

UNIT – II: Bilinear transformation – Definitions – Definition of Conformal Mapping – Necessary and sufficient condition for conformal mapping – The transformations $w = az + b$, $w = 1/z$, $w = z^2$

UNIT – III : Complex Integration: Rectifiable arcs, Contour's – complex line integration – Cauchy's theorem, Cauchy – Goursat theorem (statement only) – Cauchy's Integral formula - Cauchy's integral formula for first order derivative – Cauchy's formula for higher order derivatives (without proof).

UNIT – IV: Taylor's and Laurents's Series (statement only), Residue Calculus – Zeros and Poles of a function – Meromorphic function – The Residue at a pole – Residue Theorem – Argument principle – Rouché's Theorem (simple problems)

UNIT – V: Contour integration, Evaluation of

i) $\int f(\cos\theta, \sin\theta) d\theta$

ii) $\int f(x) dx$ where $f(x)$ is a rational polynomial having no poles on the Real Axis

iii) $\int f(x) \cos mx dx$, where $m > 0$ and $f(x)$ is a rational function having no poles on the Real Axis.

COURSE OUTCOME

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

- CO1: Understand the C- R equations and analytic functions
- CO2: Solve problems using Taylors and Lawrence series
- CO3: Differtiate bilinear transformation and conformal transformation
- CO4: Derive Cauchy's theorem and couch's integral formula
- CO5: Prove the concept of contour integrations.

Recommended Books:

- R.V. Churchill and J.W Brown (1990), Complex variable and application (5th edition) McGraw Hill International Book Co., New York.
- T.K. Manickavachagom Pillay, Dr. S.P. Rajagopalan, Dr. R. Sattanathan (2011), Complex Analysis, S. Viswanathan (Printers and Publishers), Pvt.Ltd.
- P. Duraipandian & Laxmi Duraipandian, Complex Analysis, Emerald Publisher, Chennai – 2. 1997.

SEMESTER-VI
PHYSICS – PAPER - 6
OPTICS, SPECTROSCOPY AND LASER

CODE: VI # P6

Credits: 4 (3L:0T:1P)

Hours: 5/Week

Objectives: To enable students to

- understand the concepts of Dispersion of Light , interference, diffraction and polarization of light waves and their applications
- study the principles of MW, IR, Raman and Resonance Spectroscopy and its applications.
- understand the working principle of Lasers , and their applications
- study different types of optical fiber and its applications.

UNIT-I: Geometrical Optics

Fermat's Principle - Dispersion of Light - Dispersive Power - Deviation without dispersion - Dispersion without deviation- Constant deviation Prism- Constant deviation spectroscope- Aberration- Spherical aberration- methods of minimizing spherical aberration - Chromatic aberration of a lens – Lateral chromatic aberration - Eyepiece- Huygen's eyepiece - Ramsden's eyepiece.- Fourier optics (Basic concept only).

UNIT-II : Physical Optics

Interference - Condition for sustained interference of light - Fresnel's Prism - colors of thin films due to transmission - Michelson Interferometer and its applications. Fresnel & Fraunhofer diffraction - Zone plate - construction - theory- Diffraction at straight edge - Plane transmission grating - theory - Determination of λ of light using grating (Normal Incidence) - Polarization - double refraction -Nicol prism - Theory of Production of elliptically and circularly polarized light - Quarter wave plate - Half- wave Plate- Detection of plane , circularly and elliptically polarized light - Optical activity.

UNIT-III: Microwave and Infrared Spectroscopy

Theory of Microwave spectroscopy - diatomic molecule as a rigid rotator- Instrumentation. IR - Range of IR radiation - theory of IR absorption spectroscopy - theory of vibrational diatomic molecule as anharmonic oscillator - Instrumentation.

UNIT -IV: Raman and Resonance Spectroscopy

Raman spectroscopy: Principle - characteristics and properties of Raman lines - Difference between Raman and IR spectra - quantum theory – Perkin Elemer Raman spectrometer. Resonance Spectroscopy: ESR, NMR, NQR (Principle & Theory only).

UNIT -V: LASER and Fiber Optics

Basic ideas of Lasers - stimulated emission and radiation – Population inversion - He- Ne Lasers - Semiconductor Lasers - Laser Raman Spectroscopy- Holography - Principle and method - applications –Optical fiber and its importance - Types of fibers-Propagation of light waves in optical fiber - acceptance angle and cone - Numerical aperture- modes of propagation- Applications.

COURSE OUTCOME

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

- CO1: Understand the fundamental and operation principle of modern lasers.
- CO2: Apply the laser operation principles to atom and molecular physics, solid state physics, quantum mechanics and physical optics.
- CO3: Demonstrate solid knowledge of modern laser spectroscopic techniques.
- CO4: Interpret IR spectroscopy. Explain working principles and taking spectrum of IR spectroscopy device.
- CO5: Examine the concepts of optical fiber and its application.

Reference Books

- R. Murugesan, Kiruthiga sivaprasath, Optics and Spectroscopy, S.Chand & Company Ltd, 7th Revised Edition. 2010.
- Gurdeep R. Agarwal and Sham K.Anand - Spectroscopy (atomic and molecular), Himalaya Publishing House, 2004.
- Laser and fiber Optics, by the Department of Physics.
- S.L.Kakni, K.C. Bhandari, A text book of Optics, S.Chand and Sons, New Delhi, 2002.

- N. Subramanyam, Brijal. A Text Book of Optics S.Chand and Company Ltd., New Delhi.
- B.B.Laud Lasers and Non-Linear Optics.
- H.S. Randhawa, Modern Molecular Spectroscopy, Macmillan India Ltd.

Physics Practical – VI
Paper – VI

Any Seven Practical

1. Logic gates – by discrete components.
2. Series and Parallel resonance.
3. Convex lens – f, R and m.
4. Concave lens – f, R and m.
5. Conversion of galvanometer into an ammeter.
6. Conversion of galvanometer into a voltmeter.
7. Acceptance angle, Numerical Aperture – fibre optic cable.
8. L,C,R – series resonance .
9. L,C,R – parallel resonance .

SEMESTER-VII
PHYSICS – PAPER – 7
MAJOR-BASED ELECTIVE - I
ENERGY PHYSICS

CODE: VI # P7.1

Credits: 4 (3L:0T:1P)

Hours: 5/Week

Objectives: To enable students to

- study the power potential of the Sun and its utility.
- study the principle and performance of harnessing solar and other alternative energy sources.
- understand the availability and practical usage of solar energy in various forms and other alternative energy sources.

UNIT I: Solar Energy

An overview of thermal application and solar radiation - energy alternatives - devices for thermal collection and storage - thermal applications – Water heating - Space heating - Power generation - instruments for measuring solar radiation and sun shine

UNIT II: Flat-Plate Collectors & Solar Air Heaters

Performance analysis - -Transmissivity of the cover system based on reflection - Refraction - Absorption - Transmissivity for diffuse radiation - Transmissivity - Absorptivity product

UNIT III: Concentrating Collectors and Thermal Energy Storage

General characteristics - Definitions - Methods of classifications – Thermal energy storage - Sensible heat storage - Liquids - Solids - Latent heat storage - Thermal and chemical storage

UNIT IV: Photo Conversion

Photovoltaic conversion - Single crystal silicon cell - Principle and working of solar cells - Conversion efficiency - Single crystal silicon – Polycrystalline and amorphous silicon-- Cadmium sulphide - Cadmium telluride – copper indium diselenide

UNIT V: Other Forms of Energy

Wind energy - Recent developments - Energy from biomass - Direct methods - Indirect methods ~ Wave energy - Vegetation for fuel - Bio-diesel – Plants for Bio-diesel- Physical and chemical properties of Bio-diesel.

COURSE OUTCOME:

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

CO1: Illustrate the knowledge about conventional energy sources and the working of thermal and nuclear power plant.

- CO2: Demonstrate the general concepts of non-conventional energy sources and its types.
- CO3: Apply the knowledge of solar energy for domestic purposes.
- CO4: Understand the basic concept of wind energy and wind energy conversion system.
- CO5: Identify different types of biodiesel production technique.

Reference Books

- P. Sukhatme, Solar energy (Second edition), Tata McGraw-Hill Publishing Co. Ltd.
- G.D.Rai, Solar Energy Utilization, Khanna publishers (New Delhi).

SEMESTER-VI
PHYSICS – PAPER – 7
MAJOR-BASED ELECTIVE - II
ASTROPHYSICS

CODE: VI # P7.2

Credits: 4 (3L:0T:1P)

Hours: 5/Week

Objectives: To enable students to

- impart an understanding of the great number of diverse phenomena in the Universe through Physics
- understand the solar system
- understand the life in universe.

UNIT - I: Elements of Space Dynamics

Man's quest for space - the energy requirements - Rocket propulsion -suborbital flights - Artificial earth satellites - Lunar and planetary probes.

UNIT- II: The Heart of the Solar System

Vital statistics of the Sun - the solar photosphere - the Fraunhofer lines -structure of solar atmosphere - the solar interior - Sunspots and solar activity - other features of the solar activity - Radio studies of the quiet Sun – Radio radiation of the disturbed Sun.

UNIT - III: Small Bodies in the Solar System

Asteroids - Meteorites - Comets as members of the Solar system – Physical properties of comets - Origin and evolution of comets - Space studies of comets - Meteors - an inventory of satellites - the large satellites - Medium, small and tiny satellites - Planetary rings.

UNIT - IV: Our Home and the Nearest Neighbour

EARTH: Gross properties - internal structure - the terrestrial atmosphere - the Earth's magnetic field - motions - Solar terrestrial relations - the Earth in space - atmospheric circulation in the troposphere. MOON: Some basic facts - telescopic studies - internal

structure - surface features - Origin of the Moon - the lunar environment - Solar and Lunar eclipses.

UNIT - V: Life in the Universe

Nature of life on Earth - A survey of objects in the Solar System - Pre Mariner search for life on Mars - Post-Mariner search for life on Mars - Life outside the Solar system - the search for life in the Universe.

COURSE OUTCOME:

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

CO1: Understand the fundamentals of solar energy technologies.

CO2: Construct the solar heating and cooling system.

CO3: Classify the diverse phenomena of the universe.

CO4: Design the solar photovoltaic cells and study the installation process.

CO5: Compare the atmosphere of Earth and Moon.

Reference Books: Astrophysics of the Solar System - KD Abhyankar, Universities Press India Pvt. Ltd. Hyderabad, 1999.

**SEMSTER-VI
CHEMISTRY – PAPER-VI
THERMODYNAMICS AND QUANTUM CHEMISTRY**

CODE: VI # C6

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 de Broglie's equation, the Davison Gernens 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 C_p and C_v 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 Thomson 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

CHEMISTRY PRACTICAL-VI

Preparations.

1. Preparation of Parabromoacetalide
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 benzylation technique
8. Preparation involving Esterification method

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

Code: VI # B7

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, epistasis (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.

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- Watson, J.D. (1977). *Molecular Biology of the Gene*. W.A. Benjamin Inc., California.
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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.

SEMESTER – VI
ZOOLOGY – PAPER – VI
ANIMAL PHYSIOLOGY

CODE: VI # Z6

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 - Krebs'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 - distribution, composition, properties and functions - Adaptations to high altitude and diving. Transport of oxygen and carbon dioxide - 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 - Neurotransmitter, Autonomic nervous system. Muscle proteins - mechanism of contraction - Con cycle - Theories of muscle contraction - Muscle twitch - Tetanus - Muscle Fatigue - Isotonic and isometric 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, Anantkrishnan and Ananta Subramanian. (1975). Outlines of Animal 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

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.

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

CODE: VI # Z7.1

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, Choram 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. Ananthkrishan 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.

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

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

CODE: VI # Z7.2

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 aquatic plants.

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.

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.

**SEMESTER – VII
PEDAGOGY OF PHYSICAL SCIENCE – P3**

CODE: VI # IPAS3-P3

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 MATHEMATICS – P3**

CODE: VI # IPAS4-P3

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 Mathematics deeply based on the orientation given.

Subject Content on Mathematics Subject 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 Mathematics.
- 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: VI # IPAS4-P3

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

**SEMESTER-VII
MATHEMATICS – PAPER - XI
MECHANICS**

CODE: VII # M11

Credits: 3 (2L:1T:0P)

Hours: 4/Week

Objectives: To enable students to

1. understand some real life problems
2. understand the basic concepts of forces, moments, friction
3. know the application of Mathematics.

UNIT – I : Forces: Linear momentum – friction – laws of friction- angle and cone of friction. Resultant of two, three and several forces acting on a particle Equilibrium of a particle: Triangle law of forces and its converse – Lami’s theorem, equilibrium of a particle under several forces – Limiting equilibrium of a particle on an inclined plane

Chapter 2: Section 2.1,2.2

Chapter 3: Sections 3.1, 3.2

UNIT – II: Forces on a rigid body: Moment of a force- General Motion of a rigid body – equation of motion of a rigid body (statement only)- equivalent systems of forces resultant of Like and Unlike parallel forces – Varignon’s theorem **Chapter 4** : Sections 4.1, 4.2, 4.3, 4.4

UNIT – III: Kinematics: Velocity-resultant Velocity- relative velocity-Acceleration-velocity and acceleration in a coplanar motion-Angular velocity-Relative angular velocity.

Chapter 1 – Sec 1.1,1.2,1.3,1.4.

UNIT – IV: Impact: Impulsive force-Laws of impact- Direct and oblique impact of smooth spheres-Impulse: Loss of kinetic energy due to impact.

Chapter 14 – Sec 14.1,14.2,14.3,14.5(Omit 14.4)

UNIT – V: Central Orbits: General Orbits- central force- Differential equation of a central orbit-Law of central force- Method to find the central orbit-Conic as a central orbit-Kepler’s law of planetary motion. **Chapter 16** - Sec 16.1,16.2,16.3.

COURSE OUTCOME

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

CO1: Relate linear momentum and triangle law of forces to real life problems

CO2: Explain the momentum of a force and general motion of rigid body

CO3: Understand the concept of velocity and acceleration

CO4: Examine loss of impact and loss of kinetic energy

CO5: Describe laws of central force and Kepler’s law of planetary motion

Reference Books:

- Duraipandian, P. Laxmi Pandian, Muthamizh Jayapragasam. (2005).Mechanics (6th Revised Edition), New Delhi: S.Chand and Co.
- Dharmapadam, A.V. (1991), Mechanics, Chennai, S. Viswanathan and Co.,
- Viswanath Naik, K. (2000), Statics, Chennai, Emerald Publishers (Reprint).

SEMESTER-VII**PHYSICS – PAPER - 8
RELATIVITY AND QUANTUM MECHANICS****CODE: VII # P8****Credits: 4 (3L:0T:1P)****Hours: 5/Week****Objectives: To enable students to**

- understand the concepts of wave mechanics, dualistic nature of Nature.
- understand the physical implications of wave functions, expectation value, linkage between classical and quantum physics.
- apply the Schrödinger equation to 1D and 3D physical systems
- learn the 4D space and changes from our common sense.

UNIT - I: Origin of Quantum Mechanics

Introduction - expression for group velocity - experimental study of matter waves - Properties of wave functions. Phase velocity - wave velocity – group velocity- relation between group velocity and phase velocity. Heisenberg's Uncertainty principle - Mathematical proof of uncertainty principle for one dimensional wave packet - wave particle duality.

UNIT - II: General Formalism

Basic postulates - derivation of time dependent Schrödinger's equation - Probability current density - Ehrenfest's theorem- Commutator algebra - form of wave function in terms of definite momentum - probability density - properties of energy eigen values.

UNIT-III: One Dimensional Schroedinger Problems

Particle in a box - Infinite square well potential - potential step. The free particle - rectangular potential well- Finite square potential well. Barrier penetration problem. Linear harmonic Oscillator - Comparison of classical and quantum ideas.

UNIT-IV: Spherically Symmetric Potential Problems

Wave mechanical atom model - The hydrogen atom - normalized wave function of the Hydrogen atom - Expression for energy of the electron of the Hydrogen atom in the ground state - Significance of various quantum numbers - electron probability density - Orbital angular momentum - expression for eigen values of L^2 and L - Rigid rotator.

UNIT - V: Relativity

Introduction - Frame of reference - Newtonian relativity – Galilean Transformation equations - The Ether hypothesis - The Michelson –Morley experiment - Special theory of relativity - The Lorentz Transformation equations - Length contraction - Time Dilation - relativity of simultaneity - addition of velocities - variation of mass with velocity - Mass Energy equivalence - Minkowski's Four dimensional Space-Time continuum.

COURSE OUTCOME

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

- CO1: Gain the knowledge about the concepts of wave mechanics, dualistic nature.
- CO2: Classify the implications of wave functions and expectation value.

- CO3: Apply the Schrödinger equation to 1D and 3D physical systems.
CO4: Interpret the 4D space and changes from our common sense.
CO5: Differentiate the linkage between classical and quantum physics.

Reference Books

- R Murugesan & Kiruthiga Sivaprasath, Modern physics, S Chand & Co, New Delhi, Edition 2010.

Physics Practicals – VII
Paper – VII

Any Seven Practicals

1. Hartley oscillator.
2. B.G – absolute M.
3. B.G – absolute C.
4. B.G – resistance and figure of merit (condenser method).
5. B.G - high resistance by leakage.
6. Sonometer - AC frequency determination.
7. P.O box temperature co-efficient.
8. Surface tension - drop weight method.
9. Resonators.

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

CODE: VII # C7

Credits: 4 (3L: 0T: 1P)

Hours: 5/Week

Course objective: To understand what are carbohydrates proteins amino acid, alkaloids, terpenoids 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, B₁, B₂, B₆, B₁₂ 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. Classification - 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 fluorescein 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**.

**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. $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$, $\text{CH}_3\text{COONa} \cdot 3\text{H}_2\text{O}$, $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$, $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$.
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.

SEMESTER-VII

**BOTANY – PAPER - VIII
PLANT ECOLOGY & CONSERVATION**

CODE: VII # B8

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 & heterotrophic 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.

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.

SEMESTER – VII

ZOOLOGY – PAPER – VIII GENETICS AND EVOLUTION

CODE: VII # Z8

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, Klinefelter, 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 Veres 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.

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.

**SEMESTER VIII
INCLUSIVE EDUCATION**

CODE: VIII # IPES6

**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, Baltimore.
- 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

SEMESTER – VIII

DRAMA AND ART IN EDUCATION

CODE: VIII # IPCS3

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 bhāratha natyām 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). *Christian 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.

SEMESTER-VIII
HUMAN RIGHTS AND DUTIES EDUCATION

CODE: VIII # IPCS4

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: Essays 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.

SEMESTER-VIII
GUIDANCE AND COUNSELLING

CODE: VIII # IPCS5(i)

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 counselling' 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 for 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 Jersey: 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.
- Manuel 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.

SEMESTER – VIII
COMMUNICATION SKILLS

CODE: VIII # IPCS5(ii)

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- lispings, 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.

SEMESTER – VIII
UNDERSTANDING THE SELF

CODE: VIII # IPCS5(iii)

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 themselves 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, Françoise.(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.

SEMESTER-VIII
MATHEMATICS – PAPER - XII
MATHEMATICAL STATISTICS

CODE: VIII # M12

Credits: 3 (2L:1T:0P)
Hours: 4/Week

Objectives: To enable students to

1. understand the concepts of sampling, testing of hypothesis, critical region and standard error.
2. understand the significance of the connection between statistics and their applications to the real world.

UNIT – I: Random Variables:

Definition of a random variable , Definition of Discrete and Continuous Random Variable, Mathematical Expectation of Discrete And Continuous Random variable.

UNIT – II: Binomial, Poisson Distributions:

Definitions, mean, mode, recurrence formula for moments, fitting of distributions.
NORMAL DISTRIBUTION:

Definition, Limiting Form of Binomial Distribution, Chief characteristics of Normal distribution, Normal probability curve, mode, median, moment Generating functions, moments, Area property, Fitting of Normal distribution.

UNIT – III: Simple correlation – Pearsonian’s rank correlation – regression lines – regression coefficients and its properties – computation of mean and variances and correlation coefficients from regression lines

UNIT – IV: Sampling theory – parameter and statistic – standard error – null and alternative hypothesis – test of significance for large samples – test of significance for single proportion – difference of proportion – single mean – difference of means- difference of standard deviation

UNIT – V: Test of significance for small samples – tests for significance based on t-test, F-test, chi-square distributions and its applications-test the goodness of fit – Independence of attributes.

COURSE OUTCOME

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

CO1: Explain the concept of random variable and mathematical expectation of a random variable

CO2: Appraise normal distribution and binomial distribution

CO3: Compare and contrast Pearson rank correlation and simple correlation

CO4: Relate the concept of statistics and their application to real life situations

CO5: Execute T-test and chi-square distributions for comparing the given data.

Reference Books:

- S.C. Gupta and V.K Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons publications.
- S.P Gupta, Statistical Methods, Sultan Chand Publications.
- P.R. Vittal, Mathematical Statistics, Margham publications

SEMESTER-VIII
PHYSICS – PAPER - 9
ATOMIC, SOLID STATE & NUCLEAR PHYSICS

CODE: VIII # P9

Credits: 4 (3L:0T:1P)

Hours: 5/Week

Objectives: To enable students to

- study atom models and their importance.
- study crystal structure, bonding in crystals, specific heat and superconductivity.
- study the structure and models of nucleus and also to study the process of radioactivity and its applications and also.
- study the working of detectors, accelerators and cosmic rays.
- study the aspects related to elementary particle and space physics.

UNIT -I: Atomic Physics

Sommerfeld's relativistic atom model - vector atom model - quantum numbers associated with the vector atom model - coupling schemes - Pauli exclusion principle - periodic classification of elements - magnetic dipole moment (due to orbital motion of the electron and due to spin) - Stern and Gerlach experiment - spin orbit coupling - Optical spectra - Zeeman effect - Lorentz classical theory of normal effect, shift, experiment - Larmor's theorem – quantum mechanical explanation of the normal and anomalous effect -Paschen Back effect - Stark effect.

UNIT - II: Solid State Physics

Periodicity - Lattice, Basis, Unit cell, crystal structure - symmetry elements - 2D and 3D Bravais lattices - bonding in crystals - different types and their properties - band theory of solids - specific heat capacity: Einstein's theory and Debye's theory - Superconductivity - experimental facts – persistent current - Type I - Type II - Meissner effect - BCS theory - applications.

UNIT - III: Nucleus and Radioactivity

General properties - binding energy - nuclear stability - theories of nuclear composition - nuclear forces - models of nuclear structure - liquid drop model and shell model - Alpha particle spectra - Beta ray spectra - origin of the line and continuous spectrum - neutrino theory of beta decay - origin of gamma ray spectra - Nuclear isomerism- internal conversion - law of successive disintegration - radioactivity dating - Biological effect of nuclear radiations.

UNIT-IV: Particle Detectors, Accelerators and Cosmic Rays

Particle detectors - interaction between energetic particles and matter – Wilson Cloud chamber - Geiger Muller Counter - nuclear emulsion technique – Particle accelerators - Cyclotron - Betatron - Synchrotron - electron synchrotron and proton synchrotron - Discovery - Cosmic Rays - latitude, azimuth, altitude and longitude effects - primary and secondary cosmic rays – showers - positron - mesons - Van Allen belts - origin of cosmic rays.

UNIT-V: Elementary Particle Physics and Space Physics

Properties of elementary particles (Lepton & Baryon) - exact conservation laws - energy linear momentum angular momentum - charge - Baryon & Lepton number - origin of these laws - fundamental interactions – approximate conservation laws - strangeness - parity - charge conjugation - time reversal - Quark model - unification of interaction - geography of the universe - Hubble's law.

COURSE OUTCOME

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

- CO1: Distinguish the change in behaviour of atoms in external applied electric and magnetic field.
- CO2: Identify the lattice vibration phenomenon and thermal properties of solids.
- CO3: Develop the various types of nuclear detectors and accelerators.
- CO4: Apply the knowledge of nuclear fission and fusion reactions.
- CO5: Classify different kinds of interactions between elementary particles.

Reference Books

- R. Murugesan., Kiruthiga Sivapasath. Modern Physics, S. Chand &Co., Thirteenth Revised Multicoloured Edition, New Delhi, 2007.
- H.S Mani and G.K. Mehta, Introduction to Modern Physics, EW Press, New Delhi, 1988.
- Arthur Beiser, Concepts of Physics, Tata McGraw - Hill - Sixth Edition, 2003.
- Sehgal Chopra Sehgal - Modern Physics, Sultan Chand Sons, New Delhi, 2004.
- Sanjiv and Puri, Modern Physics Concepts and Application, Narosa Publication, New Delhi - 2004.

Physics Practicals – VIII
Paper – VIII

Any Seven Practicals

1. B.G comparison of EMF's & capacitance.
2. g-by fall plate.
3. A stable multivibrator.
4. Monostable & bistable multivibrator.
5. De Morgan's theorem and Boolean algebra.
6. Colpitts Oscillator.
7. Clipping and Clamping.
8. Kater's pendulum.
9. Frequency – Melde's apparatus.

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

CODE: VIII # C8

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 Inorganic 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**.

**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.

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

CODE: VIII # C9.1**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 $\text{H}_2 - \text{Cl}_2$. 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, electrophoresis 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**

**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

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

CODE: VIII # C9.2

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 K_a and K_b 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 silver nitrate. 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 chromatography. 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 $AgNO_3$, $CaC_2O_4 \cdot H_2O$ 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 Woodward 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. “ Instrumental 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. Morrill, “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. “ Instrumental 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

SEMESTER-VIII
BOTANY – PAPER - IX
MICROBIOLOGY, PLANT PROTECTION & TOXICOLOGY

CODE: VIII # B9

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, aflotoxins.

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.

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.

**SEMESTER-VIII
ZOOLOGY – PAPER - IX
BIOTECHNOLOGY**

CODE: VIII # Z9

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 – Fermentor 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 Fish

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. Eugene, 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 Hybridoma Cells – Production of Monoclonal Antibodies – Growth Curve 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
