Approved By Competent Authority Under Section 11(7) of University Act, 2014 on dated 08/10/18

Scheme of Examination for B.Sc.B.Ed. (Four Years Integrated) Regular Programme

Table1. Semester I Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group A: Ability Enhancement Compulsory Courses (AECC)											
1	4	AEC1(I) Hindi/ English	3	3	1(T)	0	5	20	80	------	100
2	4	AEC2(I) Information and Communication Technology (ICT) in Education-I	3	3	1(P)	2	5	20	60	20	100
Group C: Core Course											
3	4	Core Course1(I) Physics/ Botany	3	3	1	2	5	20	60	20	100
4	4	Core Course 2(I) Chemistry	3	3	1	2	5	20	60	20	100
5	4	Core Course 3(I) Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
6	4	PEBE 101: Basics in Education	3	3	1	2	5	20	80	-----	100
Group F: Skill Enhancement Course (SEC)											
7	3	WEAP 101 Work Education (Agriculture Practice)-I / WEEE 101: Work Education (Electricity & Electronics)-I	2	2	1(P)	2	4	10	40	----	50
Total	27	**Total Marks of Semester I**									650

Table2. Semester II Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group A: Ability Enhancement Compulsory Courses (AECC)											
1	4	AEC1(II) Hindi-II/ English-II	3	3	1(T)	0	5	20	80	------	100
2	4	AEC2(II) Information and Communication Technology (ICT) in Education-II	3	3	1(P)	2	5	20	60	20	100
Group C: Core Course											
3	4	Core Course1(II) Physics/ Botany	3	3	1	2	5	20	60	20	100
4	4	Core Course 2(II) Chemistry	3	3	1	2	5	20	60	20	100
5	4	Core Course 3(II) Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
6	4	PEBE 102: Childhood and Growing up	3	3	1(T)	2	5	20	80	-----	100
Group F: Skill Enhancement Course (SEC)											
7	3	WEAP 102 Work Education (Agriculture Practice)-I / WEEE 102: Work Education (Electricity & Electronics)-II	2	2	1(P)	2	4	10	--	40	50
Total	27	**Total Marks of Semester II**									650

Table3. Semester III Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group B: Generic Courses (GC)											
1	4	GCEE 201: Environmental Education & Sustainable Development	3	3	1(T)	0	5	20	80	------	100
Group C: Core Course											
2	4	Core Course1(III) Physics/ Botany	3	3	1	2	5	20	60	20	100
3	4	Core Course 2(III)Chemistry	3	3	1	2	5	20	60	20	100
4	4	Core Course 3(III)Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
5	4	PESS 201: Schooling, Socialization and Identity	3	3	1(T)	2	5	20	80	-----	100
6	2	EPYH 201: Yoga, Health and Well being	1	1	1(P)	2	3	10	40	-------	50
7	2	EFWC 201: Working with Community	0	0	1(P)	---	2 weeks	--	--	50	50
Group G: Choice Based Courses (CBC)											
8	4	**(Choose any one from following)** 1) CBCPH-I-201: Physics: Renewable Energy Sources Electronics)-II 2) CBCPH-II-201: Physics: Nano Science 3) CBCCH-I-201: Chemistry: Green Chemistry 4) CBCZO-I-201: Zoology: Biodiversity 5) CBCBO-I-201: Botany: Biodiversity 6)CBCGE-201: Geography: Basics of Geographical Information System- GIS 7) CBCMT-I-201: Mathematics: Discrete Mathematics 8) CBCED-I-201: Education: Guidance & Counselling in School 9) CBCED-II-201: Education: Peace Oriented Value Education 10) CBCLH-201: Language: रचनात्मक लेखन अवम अनुवाद	3	3	1(P)	2	5	20	80	----	100

11) CBCLE-201: Language: Language Literature & Education 12) CBCHS-201: History: Heritage & Tourism 13) CBCPS-201: Political Science: Democracy at Work 14) CBCEC 201: Economics: Recent Trends & Practices in Economics												
Total	28	Total Marks of Semester III										700

Table-4. Semester IV Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group B: Generic Courses (GC)											
1	4	GCIR 202 : Indian Constitution and Human Rights	3	3	1(T)	0	5	20	80	------	100
Group C: Core Course											
3	4	Core Course1(IV) Physics/ Botany	3	3	1	2	5	20	60	20	100
4	4	Core Course 2(IV) Chemistry	3	3	1	2	5	20	60	20	100
5	4	Core Course 3(IV) Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
			3	3	1(T)	2	5	20	80	-----	
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
6	4	PEIS 202: Inclusive Schooling	3	3	1(T)	2	5	20	80	------	100
7	4	PELT 202: Learning and Teaching	3	3	1(T)	2	5	20	80	------	100
Group E: Professional Education Courses (PEC) - III: Curriculum and Pedagogic Studies (CPS)											
8	4	CPSKC 202: Knowledge and Curriculum	3	2	1(T)	2	5	20	80	-----	100
Total	32	Total Marks of Semester IV									700

Table-5. Semester V Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group C: Core Course											
1	4	Core Course1(V) Physics/ Botany	3	3	1	2	5	20	60	20	100
2	4	Core Course 2(V) Chemistry	3	3	1	2	5	20	60	20	100
3	4	Core Course 3(V) Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
			3	3	1(T)	2	5	20	80	-----	
Group E: Professional Education Courses (PEC) - II: Enhancing Professional Capacities (EPC)											
4	2	EPCAA 301: Arts and Aesthetic Education	1	1	1(P)	2	3	10	---	40	50
Group E: Professional Education Courses (PEC) - III: Curriculum and Pedagogic Studies (CPS)											
5	4	CPSPS 301: Physical Science: Pedagogy of Physical Science (CBZ group)	3	2	1(T)	2	5	20	80	-----	100
6	4	CPSPM 301: Pedagogy of Mathematics (I) / CPSPBS 301: Pedagogy of Biological Science	3	2	1(T)	2	5	20	80	-----	100
7	4	CPSLA 301: Learning Assessment	3	2	1(T)	2	5	20	80	-----	100
Total	26	**Total Marks of Semester V**									650

Table-6. Semester VI Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group C: Core Course											
1	4	Core Course1(VI) Physics/ Botany	3	3	1	2	5	20	60	20	100
2	4	Core Course 2(VI) Chemistry	3	3	1	2	5	20	60	20	100
3	4	Core Course 3(VI) Zoology/ Mathematics	3	3	1	2	5	20	60	20	100
			3	3	1(T)	2	5	20	80	-----	
Group E: Professional Education Courses (PEC) - III: Curriculum and Pedagogic Studies (CPS)											
4	4	CPSPS 302 Physical Science: Pedagogy of Physical Science (CBZ group)	3	2	1(T)	2	5	20	80	-----	100
5	4	CPSPM 302: Pedagogy of Mathematics (II) / CPSPBS 301: Pedagogy of Biological Science	3	2	1(T)	2	5	20	80	-----	100
Group E: Professional Education Courses (PEC) - IV: Engagement with Field (EF)											
6	4	EFSE 302: School Exposure and related Activities	0	0	4(P)	----	04 weeks	---	---	100	100
Total	24	**Total Marks of Semester V**									600

Table-7. Semester VII Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group D: Discipline Specific Elective (DSE)#											
1	3	PHY 401: Physics: Quantum Mechanics and Statistical Physics	3	3	1(P)	2	5	20	60	20	100
2	3	CHM 401: Chemistry: Advance Chemistry-I	3	3	1(P)	2	5	20	60	20	100
3	3	ZOO 401: Zoology: Evolution and Palaeontology	3	3	1(P)	2	5	20	60	20	100
4	3	BOT 401: Botany: Plant Anatomy and Ecology	3	3	1(P)	2	5	20	60	20	100
5	3	MTH 401: Mathematics: Number Theory and Theory of Equations	3	3	1(T)	2	5	20	80	-----	100
Group E: Professional Education Courses (PEC) - IV: Engagement with Field (EF)											
6	14	EFSE 302: School Internship	0	0	14(P)	----	14 weeks	---	---	300	300
Total	23	Total Marks of Semester VII									600

#For CBZ group combination is Chemistry, Botany and Zoology and for PCM group combination is Physics, Chemistry and Mathematics

Table-8. Semester VIII Examination

Course No.	Total Credits	Courses	Credits Theory (L)	Teaching Hours per week	Credits: Practicum/ al (Lab/Field) (P)/ Tutorial(T)	Practicum/al Hours Per week(T/P)	Total Hours Per Week (L+T+P)	Marks			
								Internal assessment	External assessment	Practical	Max Marks
Group D: Discipline Specific Elective (DSE)#											
1	5	PHY 402: Physics: Atomic, Molecular and Nuclear Physics	4	4	1(P)	2	5	20	60	20	100
2	5	CHM 402: Chemistry: Advance Chemistry-II	4	4	1(P)	2	5	20	60	20	100
3	5	ZOO 402: Zoology: Molecular Genetics, Biotechnology and Instrumentation	4	4	1(P)	2	5	20	60	20	100
4	5	BOT 402: Botany: Molecular Biology Biochemistry and Biotechnology	4	4	1(P)	2	5	20	60	20	100
5	5	MTH 402: Mathematics: Numerical Analysis	4	4	1(T)	2	5	20	80	----	100
6	6	*DSE 402: One Project in Physics / Chemistry / Mathematics / Botany / Zoology	0	0	6(P)	--	--	---	---	100	100
Group E: Professional Education Courses (PEC) - I: Perspectives in Education (PE)											
7	4	PEVE 402: Vision of Education in India-Issues and Concerns	3	3	1(T)	2	5	20	80	100	100
Group E: Professional Education Courses (PEC) - II: Enhancing Professional Capacities (EPC)											
8	2	EPCPE 402: Peace Oriented Value Education	1	1	1(T)	2	3	10	40	---	50
9	2	EPCGI 402: Gender Issues in Education	1	1	1(T)	2	3	10	40	---	50
Total	29										
Total Marks of Semester VIII											600

#For CBZ group combination is Chemistry, Botany and Zoology and for PCM group combination is Physics, Chemistry and Mathematics
* DSE 402: One Project in Physics / Chemistry / Mathematics / Botany / Zoology, candidate may take a project from any one discipline. The project will be assigned in the semester VI only to the candidates of CBZ & PCM groups and they are required to work for the project during the semesterVI to semester VIII on topics selected by the candidates in consultation with the project guide/supervisor and final project report shall be submitted only in semester VIII for its evaluation.

Table 9 Semester-wise breakup of credit in B.Sc and B.Ed components

S. No.	Semester	B.Sc. Content Part	B.Ed. Education Part	Total Credits	Total Marks
1	I	20	7	27	650
2	II	20	7	27	650
3	III	20	8	28	700
4	IV	16	12	28	600
5	V	12	14	26	700
6	VI	12	12	24	600
7	VII	9	14	23	600
8	VIII	21	8	29	600
	Total	130	82	212	5100

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Semester I

B. Sc. B. Ed. (CBCS) Semester- I

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester I

AEC1(I): LANGUAGE SKILLS (HINDI)-I

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

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

COURSE CONTENTS

Unit I: History of Language and Literature-1

Hindi Bhasha aur Sahitya ka Itihas [Aarmbha se Lekar 1857 Tak]

Unit II: Short Story-1 [Pre-Independence Literature]

Swatantratapurva Hindi Kahani Ka Vikas

1. Chandradhar Sharma Guleri- Usne Kaha Tha
2. Jayshankar Prasad- Puraskar
3. Premchand- Panch Parmeshwar
4. Jainendra- Ek Raat

Unit III: Short Story-2 [Post-Independence Literature]

Swatantrayottar Hindi Kahani Ka Vikas

1. Mohan Rakesh- Uski Roti
2. Kamleshwar- Dilli Mein ek Maut

3. Phanishwar Nath Renu- Teesari Kasam
4. Bhism Sahani- Cheef ki Dawat

Unit IV: Communication skills

Group Discussion [Samooh Charcha]

Introduction – Definition – Characteristics – Types of Discussion –Round table, Symposium, Lecture forum etc. – Relevance of Group Discussion – Exercises.

Reference:

1. Hindi Sahitya Ka Itihas: Ramchandra Shukla Rajkamal Prakashan,Delhi
2. Hindi Sahitya Ka Itihas: Dr Nagendra, Mayoor Paperbacks, Delhi
3. Hindi Sahitya Ki Bhoomika: Hajari Prasad Divedi Rajkamal Prakashan,Delhi
4. Hindi Sahitya Ka Adikaal: Hajari Prasad Divedi Rajkamal Prakashan,Delhi
5. Hindi Sahitya Ka Udbhav Aur Vikas:Hajari Prasad Divedi Rajkamal Prakashan,Delhi
6. Hindi Sahitya Ka Ateet: Viswanath Prasad Mishra, Rajkamal Prakashan,Delhi
7. Bhakti Aandolan Aur Bhaktikavya: Shivkumar Mishra,Lokbharti Prakashan, Delhi
8. Bhakti Aandolan aur Surdaska Kavya: Maneger Panday, Vani Prakashan, Delhi
9. Bhakti Ke Aayam: Dr P Jayraaman, Vani Prakashan, Delhi
10. Bhartiya Bhakti Sahitya: Dr Rajmal Bora, Vani Prakashan, Delhi
11. Bhaktikavya ka Samajdarshan: Dr Premshankar, Vani Prakashan, Delhi
12. Hindi Sahitya Ka Sanchhipt Itihas: Nanddulare Bajpayee, Swaraj Prakashan, Delhi
13. Hindi Sahitya ka Sanchhipt Itivritt: Shivkumar Mishra, Vani Prakashan, Delhi
14. Hindi Kahani- Antarang Pahchan: Dr Ramdars Mishra, Vani Prakashan, Delhi
15. Hindi Kahani-Sanrachana aur Samvedana: Dr Rachna Saah, Vani Prakashan, Delhi
16. Galp Ka Yatharth-Kathaloochan ke Aayam: Suvas Kumar, Vani Prakashan, Delhi
17. Hindi Ka Gadyaparva: Namvar Singh, Rajkamal Prakashan,Delhi
18. Sahitya ki Pahchan: Namvar Singh, Rajkamal Prakashan,Delhi
19. Katha Vivechan aur Gadyashilp: Ramvilas Sharma, Vani Prakashan, Delhi
20. Kahani Anubhav aur Abhivyakti: Rajendra Yadav, Vani Prakashan, Delhi

Suggested Activities:

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 .

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester I

AEC1(I): LANGUAGE SKILLS (ENGLISH) –I

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

Students develop proficiency in English which equips them to:

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

COURSE CONTENTS

Unit I: Descriptive Grammar

1. Tenses:

a) Simple Present: Habitual action, General truths, Future time, Verbs of state, Verbs of perception, Verbs of sensation, Narration, Use of simple present for demonstration and commentaries, Present perfect, present perfect continuous, Present continuous also indicative of future action.

b) Simple past: Past time reference, Present time reference, Future time reference, Past continuous, Past perfect, past, perfect continuous

Unit II: Skills in Communication

1. Negotiating a point of view – learning to talk persuasively so as to get across one's perspective.
2. Debating on an issue – agreeing / disagreeing.

Unit III: Study and Reference Skills

Note making; Note- taking; Summary writing.
Comprehension Skills
Extracts from literary, scientific and educational journals.

Unit IV: Skills of Communication

Advanced Writing Skills, writing advertisement copy; Writing a project proposal and Writing Resume, sending an application.
Listening effectively; Talking about one self (likes, dislikes, interests, beliefs, personality traits, ambitions); Expressing an opinion about personal belief on a current issue. (Ability to speak fluently for 3-4 minutes. Focus would be on organized, logical, sequential presentation of thought through spontaneous speech).

Suggested Activities:

- Politeness competitions- students with partners take turns in using a given number of utterances for negotiation / requests/complaints/small talk.
- Students introduce themselves though using symbols/ metaphors.
- Students collect newspaper/magazine cuttings on topical and/ or cultural issues of interest-write and share their opinion with peers.

References:

- 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

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester I

AEC2(I): INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION-I

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical :20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives of the course:

On completion of the course the students will be able to:

- Appreciate the historical development of various educational media.
- Identify and demonstrate an understanding of the main components of the computer hardware in use.
- Differentiate various operating system and explain main functions of the system and application software environment.
- Use a word processor, spread sheet, drawing and presentation software to produce various teaching learning resources for educational use.
- Use internet technologies efficiently to access remote information, communicate and collaborate with others.
- Model collaborative knowledge construction using various web 2.0 tools and technologies.
- Understand the social, economic, security and ethical issues associated with the use of ICT.

Course Contents

Unit I: Learning and Technology

- How technology enhance learning: basic theories of communication, system theory and learning theory
- Historical account of the development of various educational media (audio, video, print, storage, display, projection)
- Communication process and role of technology in communication
- Information and Communication Technology: Meaning, nature and advantages
- Media literacy and digital literacy – need and importance

- Digital divide and enhancing access
- National ICT policies, curriculum, schemes and programmes
- Cyber security: privacy, hacking, virus, spy ware, misuse, abuse, antivirus, firewall, and safe and ethical practices

Unit II: Fundamentals of Information and Communication Technology

- Computer hardware fundamentals (anatomy, input devices, output devices, storage devices, display devices)
- Computer Network-LAN, WAN. Internet – concept and architecture ; Locating internet resources – browsing, navigating, searching, selecting, evaluating, saving and bookmarking
- Licenses – software license, document license, fare use and piracy
- File formats and conversion, utility tools
- Cloud computing: meaning, types, and advantages

Unit III: Computer Software

- Digitalization, software –meaning and types
- Source and binary code. Proprietary software, Open Source software, shareware and freeware- concept, philosophy, types, and advantages.
- Operating systems –meaning, types –Windows, Linux, Macintosh – Navigating the desktop, control panel, file manager, explorer, and accessories
- Software as Service – Online software tools and applications and their educational use
- Managing the ICT infrastructure: software installation, troubleshooting of hardware, seeking and providing help, storage and backup, updating and upgrading software

Unit IV: Application Software

- Application software- meaning and types
- Word processing, spreadsheet, presentation: Features and educational applications (Unicode)
- Drawing tools – diagrams, concept maps, timelines, flow charts:educational applications of these tools
- Web 2.0 technology and tools: meaning characteristics and types
- Social networking and social book marking – educational applications
- Blog and micro blog – reflective journaling and other educational applications
- Wiki – collaborative authoring and projects
- Instant messaging and its educational applications
- Online forums/discussion groups and chats: educational applications
- Social media sharing – video, presentations, audio (podcasts), graphics, and text
- Web 2.0 tools for creating, sharing, collaborating, and networking

Sessional activities:

- Hands on experience in setting up a desktop PC and working with various input devices, output devices, storage devices, and display devices

- Practicing word processing using Indian language software
- Practice in installing various system and application software
- Using word processor, spread sheet, and presentation software to produce various teaching learning resources and sharing it online
- Locating internet resources – navigating, searching, selecting, saving and evaluating (use standard internet evaluation criteria)
- Creating social bookmarking account and creating social bookmarking of internet resources using any social bookmarking tools (diigo,delicious,stumbleupon)
- Creating digital concept maps, flow charts, timelines for a particular content using online and offline tools
- Creating account in teachertube/slideshare and sharing your video/presentation. View and comment on others contributions
- Creating account in wikispace/wikipedia/mediawiki and adding/editing content
- Developing an educational blog in www.blogger.com, www.wordpress.com, or www.edublog.com
- Review of national ICT policy and curriculum

Suggested Readings:

1. Andrew A Kling(2010). Web 2.0 (Technology 360). Lucent Books: New Delhi
2. Andrew M. St. Laurent. (2004). Understanding Open Source and Free Software Licensing. Oreilly: Cambridge
3. Bharihok Deepak. (2000). Fundamentals of Information Technology. Pentagon Press: New Delhi
4. Crumlish Christian (1999). The Internet No Experience Required. BPB Publications: New Delhi
5. Evant, M: The International Encyclopedia of Educational Technology.
6. Gwen Solomon, Lynne Schrum. (2014). Web 2.0 How-to for Educators, Second Edition. ISTE
7. James, K.L. (2003). The Internet: A User's Guide. Prentice Hall of India Pvt. Ltd: New Delhi
8. Jean-Eric Pelet (2014). E-Learning 2.0 Technologies and Web Applications in Higher Education (Advances in Higher Education and Professional Development (Ahepd)). Idea Group: U.S.
9. Mishra, S. (Ed.) (2009). STRIDE Hand Book 08: E-learning. IGNOU: New Delhi.Available at http://webserver.ignou.ac.in/institute/STRIDE_Hb8_webCD/STRIDE_Hb8_index.html
10. Sarkar, S.K. & Gupta, A.K.(1998). Elements of Computer Science. S. Chand & Company: New Delhi

GROUP C: CORE COURSE (CC)

Semester I

Core Course1(I): PHYSICS: RELATIVITY, MECHANICS, OSCILLATIONS AND ACOUSTICS

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Acquaint with the key concepts of special theory of relativity, mechanics, oscillations and acoustics.
- Appreciate the applications of the concepts in real life situations.
- Solve the problems based on special theory of relativity, mechanics, oscillations and acoustics.
- Apply the theory in execution of practicals.

COURSE CONTENTS

UNIT I:

Relativity: Reference systems, inertial and non-inertial frames, Galilean transformation, Galilean invariance and conservation laws, propagation of light, Michelson – Morley experiment. Postulates of the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition theorem, variation of mass with velocity, mass-energy equivalence, particle with a zero rest mass.

UnitII:

Mechanics: Motion under central force, Kepler's laws, Gravitational law and field, Potential due to a spherical body, Gauss and Poisson equations for gravitational potential, gravitational self-energy, Rigid body motion, Rotational motion, Moment of inertia and their products, principal moments and axes, Euler's equations. System of particles, centre of mass, equation of motion, single stage and multistage rocket, energy and momentum conservation, concepts of elastic and inelastic collisions.

UnitIII:

Oscillations: Potential well and periodic oscillations, cases of harmonic oscillations, different equations and its solutions, Kinetic and potential energy, Simple Harmonic

oscillations in – Spring and mass system, Simple and compound pendulum, Torsional pendulum, Bifilar oscillations, Helmholtz resonator, LC circuits, Vibration of a magnet, Oscillation of two masses connected by a spring, Superposition of two mutually perpendicular simple harmonic vibrations of same frequency, Lissajou's figures.

UnitIV:

Coupled Oscillations & Acoustics: Two coupled oscillators, normal modes, N-coupled oscillators, damped harmonic oscillators, Power dissipation, Quality factor, Driven harmonic oscillator, Transient and steady state, Power absorption, Resonance in system with many degrees of freedom.

Acoustics: Noise and Music, The human ear and its responses, limits of human audibility, intensity and loudness, bel and decibel, the musical scale, temperament and musical instruments, Production and detection of ultrasonic and infrasonic waves and applications,

Transducers and their characteristics, recording and reproduction of sounds, various systems, measurements of frequency, waveform, intensity and velocity, acoustics of halls, reverberation period, Sabine's formula.

Suggested Readings:

1. Robert Resnick, Introduction to special relativity (Wiley India Pvt. Ltd., 2006)
2. Charles Kittel, Berkeley Physics Course vol.-1, Mechanics (McGraw-Hill, 1966)
3. R P Feynman, R B Ligton and M Sands, The Feynman Lectures on Physics, vol-1(Narosa Publishing House)
4. N K Bajaj, The Physics of Waves and Oscillations (Tata McGraw-Hill Pub. Com. Ltd., 2006)
5. R S Gambir, Mechanics (CBS Publishers and Distributors, New Delhi)
6. S Garg, C K Ghosh, S Gupta, Oscillations and Waves (PHI Learning Pvt. Ltd., 2009)
7. R K Ghosh, The Mathematics of Waves and Vibrations, (Mc Milan, 1976)
8. Frank S Crawford Jr., Berkely Physics Course: Vol.4, Waves (McGraw Hill book company, 1968)
9. I G Main, Vibrations and Waves (Cambridge University Press, 1986)
10. H J Pain, The Physics of Vibrations and Waves (John Wiley & Sons Ltd., 2006)

30.3.13

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Course Outline:

1. To study the variation of power transfer to different loads by a DC source and verify maximum power transfer theorem. (Plotting of the graph).
2. Conversion of a Galvanometer into a ammeter (Range 1A).
3. Conversion of a Galvanometer into a Voltmeter (Range 1V).
4. To study the random decay and determine the decay constant using the statistical board.
5. To determine internal resistance of Lechlanche Cell using a Voltmeter
6. To study the characteristics of a semiconductor junction diode and to determine forward and reverse resistances
7. To determine the band gap using a PN junction diode.
8. To study the normal modes of oscillators of system of coupled oscillator and to study the effect of coupling mass on the frequency of normal modes
9. To study the effect of damping on motion of a simple pendulum and determine damping constant for simple pendulum as damped harmonic oscillation.

30.8.13

GROUP C: CORE COURSE (CC)

Semester I

Core Course2(I): CHEMISTRY: INORGANIC CHEMISTRY

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To provide a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective.
- To acquire basic knowledge to students teachers about atomic structure, periodic properties, Chemical Bonding and Ionic solids, Understanding the chemistry of s- and p-block elements, the fundamentals of the chemistry of the main group elements, and important real world applications of many of these species and Acids and Bases and solvent system.
- Students will be able to describe the fundamentals of acid/base chemistry, including pH calculations, buffer behaviours.

COURSE CONTENTS

Unit I: Atomic Structure and Periodic trends

Atomic Structure: Idea of de-Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrödinger wave equation, significance of Ψ and Ψ^2, quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d and f orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule, effective nuclear charge.

- **Periodic Properties**
  Atomic and Ionic radii, Ionization energy, electron affinity and electronegativity-methods of determination or evaluation, trends in periodic table and applications in predicting and expecting the chemical behaviour.

Unit II: Chemical Bonding and Ionic solids

- **Structure and Bonding**: Covalent Bond -Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and

shapes of simple inorganic molecules and ions, valence shell electron pair repulsion (VSEPR) theory with special reference to NH_3, H_3O^+, SF_4, ClF_3, ICl_2^- and H_2O, MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules such as Boranes, bond strength and bond energy, percentage ionic character from dipole moment and electro-negativity difference.

- **Ionic solids** – Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule, Metallic bond-free electron, valence bond and band theories.
- **Weak Interactions-** Hydrogen bonding, Van der Waals' forces.

Unit III: Chemistry of sand p block elements

- **s-Block Elements**: Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies including their function in bio-systems, an introduction to alkyls and aryls.
- **p-Block Elements**: Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxy acids and halides of group 13-16, hydrides of boron-diborane and higher boranes, borazine, borohydrides, fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetra nitride, basic properties of halogens, interhalogens and polyhalides.
- **Chemistry of Noble Gases**: Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

Unit IV: Acids and Bases and solvent system

- **Theories of Acids and Bases**: Arrhenius, Bronsted-Lowry, Lux-Flood, solvent system and Lewis concept of acids and bases. Solvent system of acids and bases with special reference to liquid Ammonia, liquid BrF_3
- **Concept of Hard and Soft Acids and Bases (HSAB):** Classification of acids and bases as hard and soft, Pearson's HSAB concept, acid-base strength and hardness and softness, Symbiosis, theoretical basis of hardness and softness, electro negativity.
- **Solvent Systems:** Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2.

Suggested Readings:

1. Lee, J.D. Concise Inorganic Chemistry, ELBS.
2. Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry
3. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications.
4. Shriver and Atkins Inorganic Chemistry, W. H. Freeman and Company
5. James Huheey, Inorganic chemistry: Principles of Structure and Reactivity, Pearson Education India
6. B.N. Figgis, J.E Huheey, P.W. Atkins Inorganic Chemistry, Pearson Education

7. Duward Shriver, Inorganic Chemistry, W. H. Freeman
8. Gary Wulfsberg, Inorganic Chemistry, University Science Books
9. A. R. West, Solid State Chemistry and its Applications, Wiley

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Outline:

1. **Inorganic Chemistry:**
   Semi micro analysis: Detection of the presence of three cations and three anions (including interfering) in a given mixture qualitatively.
2. **Quantitative Analysis: Volumetric Analysis**
   a. Determination of acetic acid in commercial vinegar using NaOH.
   b. Determination of alkali content – antacid tablet using HCl.
   c. Estimation of calcium content in chalk as calcium oxalate by permanganometry.
   d. Estimation of ferrous and ferric by dichromate method.
   e. Estimation of copper using thiosulphate.

30.8.18

GROUP C: CORE COURSE (CC)

Semester I

Core Course3(I): ZOOLOGY: NON-CHORDATA

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: To enable students to understand invertebrates, the organizational hierarchies and complexities, the evolutionary trends in external morphology and internal structure; identification and classification with examples, to enable them to understand various modes of adaptations in animals.

COURSE CONTENTS

Unit: I

- General principles of taxonomy and classification. Outline classification of Protozoa up to order.
- General Structural organization of *Amoeba, Euglena and Plasmodium.*
- Habit and habitat, structure, nutrition, osmoregulation and reproduction in *Paramecium*
- Locomotion in Protozoans- pseudopodial, ciliary and flagellar.
- Nutrition in Protozoa
- Reproduction in Protozoa.

Unit: II

- Outline classification of Porifera and Coelenterata up to order.
- Habit, habitat and general account of internal structure& reproduction in*Sycon*
- Canal system and skeleton in Sponges
- Habit, habitat, morphology, internal structure, nutrition and reproduction in *Obelia*
- Polymorphism in coelenterates, coral reefs
- Outline classification of Platyhelminthes and Aschelminthes up to order.
- Habit and habitat, reproduction and life–cycle of *Fasciola*, and *Ascaris*
- Parasitic adaptations in Helminthes

Unit: III

- Outline classification of Annelida and Arthropoda up to order.
- Habit and habitat, structure, nutrition, respiration, circulation, excretion, nervous system and reproduction of
  (i) Hirudinaria
  (ii) Palaemon
- *Peripatus*: structure and affinities
- Mouth parts and feeding habits of Insects.

Unit: IV

Outline classification of Mollusca and Echinodermata up to order

- Habit and habitat, structure, nutrition, respiration, blood vascular system, excretion, nervous system and reproduction of *Pila*
- Torsion in Gastropoda
- Habit and habitat, structure, nutrition, respiration, blood vascular system, excretion, nervous system and reproduction of *Asterias*
- Larval forms of Echinoderms.

Suggested Readings:

1. Modem Textbook of Zoology Invertebrates by R.L. Kotpal –(Rastogi Publication , Meerut 10th Revised Edition)
2. Invertebrate Zoology series (Protozoa of Echinnodermata) by R.L. Kotpal - – (Rastogi Publication , Meerut)
3. Invertebrate Zoology by E.L. Jordan and P.S. Verma – S. Chand & Co., Delhi
4. Invertebrate Zoology by J.K. Dhami and P.S. Dhami – S. Chand & Co., Delhi
5. A textbook of Invertebrate Zoology by S.N. Prasad – (KitabMahal, Allahabad)
6. Life of Invertebrate Zoology by Russel and Hunter – (Macmillan)
7. Invertebrate Zoology by R.D. Barnes :- (W.B. Saunders, Philadelphia)
8. A manual of Zoology Vol. I by EkambernathaAyyar (Vishwnathan,Madras)
9. The invertebrate series of L.H. Hyman – (McGraw Hill)
10. A student's textbook of Zoology by Adma Sedgwick Vol .I, II & III (Central Book Depot, Allahabad)
11. A textbook of Zoology Vol. I by Parkar and Haswell – (Macmillan)
12. Lower non chordate, Dr VS Pawar, Hindi Edition, College book centre, Chaura Rasta, Jaipur
13. Higher non Chordate, Dr VS Pawar, Hindi Edition, College book centre , Chaura Rasta, Jaipur
14. Animal taxonomy and evolution, Dr VS Pawar, Hindi Edition, College book centre, Chaura Rasta, Jaipur

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva voice	5
Record	5
Total Marks	**20**

Course Outline:

- Study of Microscopes: Simple and compound microscope, working mechanism and maintenance, use of Micro-image projection system.
- Study of museum specimens with respect to levels and patterns of organization biosystematics, biodiversity, adaptations, development stages, population dynamics, ecological implications:
- **Porifera**: *Sycon, Spongilla, Euplectella, Leucosolenia, Hylonema , Hippospongia, Euspongia;*
- **Coeleterata**: *Hydra, Tubularia, Millepora, Physalia, Porpita, Vellela, Aurelia, Tubipora, Alcyonium, Metridium, Pennatula, Grantia, Fungia, Gorgonia.*
- **Helminthes**: *Fasciola, Taeniasolium, Planaria, Ascaris, Ancyclostoma;*
- **Annelida**:*Nereis, Heteroneresis, Aphrodite, Chaetoptrus, Arenicola, Pheretima, Hirudinaria*
- **Arthropoda**:*Palaemon, Eupagurus, Scolopendra, Apis, Peripatus.*
- **Mollusca**: *Chiton, Pila, Aplysia, Helix, Dentalium, Mytilus, Pinctada, Unio, Sepia, Loligo Octopus:*
- **Echinodermata**:*Antedon, Holothuria, Cucumaria, Astropecten, Asterias, Echinus*
- Study of Permanent slides*Paramecium, Paramecium* in Conjugation, *Paramecium* binary fission, *Euglena, Vorticella, Sycon* L.S., *Sycon* T.S. , *Hydra* L.S., *Hydra* T.S, Cercaria larva, Metacercaria, Miracidium larva, Sporocyst larva, Redia larva , *Ascaris* male and female T.S. , T.S. through pharynx region, Gizzard and intestinal region of Earthworm, T.S. through buccal cavity of *Hirudinaria*, Zoea, Metazoea, Nauplius, Mysis, T.S. of gill of Unio. T.S. of the shell & mantle of *Unio*,Glochidium larva of *Unio.*
- Dissections and/or its demonstration through Charts/Models/Video/CD/digital alternative etc and/or preparation of working models of the different systems of the following animals.
- Earthworm: Alimentary canal, Nervous system and Reproductive system.
- Leech Alimentary canal
- Cockoach : Mouthparts Digestive system, nervous system
- Prawn : Nervous system
- Pila : Nervous system
- Microsopic preparation or their observation of the following.

30.5.18

Paramecium, *Englena*, Sponge spicules, gemmules, *Obelia*, *Hydra*, parapodium of *Nereis*, statocyst of Prawn, mouth parts of *Cockroach*, radula of *Pila*, gill of *Unio*.

- Culture of *Paramecium*, *Euglena* and *Amoeba*.

Note:

- Use of animals for dissection is subject to the conditions that these are not banned under the Wildlife Protection Act or any other legislation.
- Students are required to submit the following during examination:

a) One assignment on the instrument/ technique about its principle, working, precautions and applications; and /or reagents / solutions preparation.

b) Report on study of animals from their natural habitat from their local surroundings or Vermicompost etc.

GROUP C: CORE COURSE (CC)
Semester I
Core Course1(I): BOTANY: DIVERSITY OF MICROBES AND LOWER PLANTS

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

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

- Understanding diversity that exists in microorganisms.
- Understand the morphology, organization, structure, and reproduction in microbes.
- Appreciate the role and significance of microbes in human welfare and environment.
- Study the symptoms of selected diseases caused by microbes.

COURSE CONTENTS

Unit I: Viruses and Bacteria

- Structure, multiplication, transmission and disease symptoms of viruses
- Structure and economic importance of Mycoplasma
- Bacteria – structure, nutrition, reproduction and economic importance. Gram's staining
- General account and economic importance of Cyanobacteria. Study of *Spirulina, Nostoc* and *Oscillatoria.*

Unit II: Algae

- General account of occurrence, structure, thallus organization, reproduction, economic importance and classification (classification of Fritsch).
  - Study of the structure, reproduction and life-cycle of the following:
  - Chlorophyceae: *Chlamydomonas, Volvox, Oedogonium,*
  - Phaeophyceae: *Sargassum*
  - Rhodhophyceae: *Polysiphonia, Batrachospermum*
  - Bacillariophyceae: General account, structure and reproduction of diatom, economic importance.

Unit III: Fungi

- General characters, thallus organization, reproduction, economic importance and classification (Alexopoulos and Mims).
- Study of structure, reproduction, life-cycle and phytopathology and/or

economic importance of the following:

- Myxomycetes -*Stemonitis*
- Phycomycetes –*Albugo, Phytophthora*
- Ascomycetes – Yeast, *Penicillium*

Unit IV: Lichens

- Study of structure, reproduction, life-cycle, phytopathology and economic importance of the following:
  - Basidiomycetes – *Puccinia, Agaricus,*
  - Deuteromycetes – *Cercospora, Colletotrichum, Alternaria*
- Lichens – General characters, distribution, types, structure, reproduction, economic and ecologicalimportance.

Suggested Readings:

1. Smith, G.M.,1971, Cryptogamic Botany Vol.I, Algae & Fungi, TMH Publishing Co., NewDelhi.
2. Sharma,O.P.,1992,TextbookofThallophytes,TMHPublishingHouse,NewDelhi.
3. Pandey, B.P., A Text book of Algae, Sultan Chand & Co., NewDelhi.
4. Sharma, P.D. 2005, The Fungi, Rastogi Publications,Meerut.
5. Singh, V., P.C.Pande & D.K.Jain, 2007, Diversity of Microbes and Cryptogams, Rastogi Publications,Meerut.
6. Singh.V.P.C.Pande & D.K.Jain, 2006. A Text book of Botany, Rastogi Publications, Meerut.
7. Kumar, H.D., A Textbook ofAlgae.
8. Alexopoulos.C.J. IntroductoryMycology.
9. Dubey H.D. A Text book of Fungi, Bacteria andViruses.
10. Chopra, A Class book of Fungi, S.Nagin & Co.,Jullandar.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Outline:

- Gram staining of bacteria.
- Identification, Observation and Section cutting of diseased material infected by Fungi, Bacteria, Viruses and Mycoplasma.
- Study of the genera included in theory syllabus of Algae and Fungi by making temporary micro preparations and observation of permanent slides.
- Study of crustose, foliose & fruticose Lichens.

GROUP C: CORE COURSE (CC)
Semester I
Core Course 3(I): MATHEMATICS: CALCULUS

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: At the end of course, learner will be able to:

(i) Apply concepts of differentiation in single variable and several variables.

(ii) Apply concept of definite integral in finding area between curves, length of curve, surface area, volume of solid of revolutions including applications of double and triple integral.

(iii) Apply concepts of Vector calculus i.e; Vector functions, Vector fields, directional derivatives, gradient, divergence and curl of Vector, line integrals and surface integrals.

COURSE CONTENTS

Unit I:

Tangents and Normal, sub tangent and subnormal (Cartesian and polar forms), Derivative of an arc (Cartesian and polar), pedal equations, curvature, Asymptotes, multiple points, curve tracing (Cartesian, parametric and polar), Envelops and Evolutes.

Unit II:

Functions of several variables, Partial differentiation with Euler's theorem and its applications, total derivative, change of variables (polar to Cartesian and vice-versa), concept of tangent plane and normal to a surface, maxima and minima of two variables including method of undetermined multipliers.

Unit III:

Applications of definite integral: Area between two curves, Polar coordinates, Cylindrical and Spherical coordinates, Graphs of polar coordinates, Area between two curves when their equations are given in polar coordinates, Length of a curve, Surface area, Area of surface of revolution, method of Lagrange multipliers. Double

integral, Volumes and Areas. Change of variable in a double integral, special case: Polar coordinates, Triple integral, Applications. Change of variables in a triple integral.

Unit IV:

Continuity and differentiability of vector functions, unit tangent vector, Vector fields, Directional derivatives, Gradient, Divergence and Curl of a vector field, Line integrals, Surface integrals, Green's Theorem, Gauss divergence theorem, Stokes' Theorem.

Suggested Readings:

1. Advanced Engineering Mathematics: E. Kreyszig, 9th ed., Wiley Eastern, 2011.
2. Engineering Mathematics: Ram Babu, Pearson, India, 2010.
3. Calculus Vol. 1 and 2: T.M. Apostol (2007) Wiley
4. Calculus: M. Spivak (2006) Cambridge
5. Calculus: J. Stewart (2012) Cengage Learning
6. Calculus and AnalyticGeometry: G.B. Thomas, R. Finney (1995) Addison-Wesley.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester I
PEBE 101: BASICS IN EDUCATION

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Understand and analyze educational concepts, their premises and contexts that are unique to education.
- Understand the nature and purpose of education with reference to school knowledge.
- Learn to avail opportunity for interactive and reflective modes of learning.
- Understand the concepts of teacher and learner's autonomy.
- Become aware of importance to values and value formation process in education.

COURSE CONTENTS

Unit I: Education: Nature, Purpose and Process

- Meaning, Nature, Purpose and Importance of Education: Education as a purpose of development (individual, social and harmonious).
- Education as an intentional (intellectual and self- critical) and unintentional.
- Agencies of education: Family, Society and Institute.
- Processes and Modes of Education: Education is a natural and social process. Education as an ability to question.and imagine alternatives. Education in schools and its linkage with outside school experience.

Unit II: Knowledge and Knowing

- Concept, Meaning and Nature of Knowledge and Knowing.
- Differentiate between information, knowledge, belief and truth.

- Knowing Process: Different ways of knowing, Knowledge construction, Process of Construction of Knowledge. Relative roles of knower and known in knowledge transmission and construction, Limitations of knowing, role of culture in knowing.
- Facets of knowledge: Different facets of knowledge and relationship, such as: local and universal, concrete and abstract, theoretical and practical, contextual and textual, school and out of school with an emphasis on understanding special attributes of school knowledge.
- Reflection on knowledge in the form of curriculum, syllabus and textbooks.

Unit III: Autonomy of Teacher and Learner

- Autonomy of teacher- why, what and to what extent. Difference between autonomy and freedom. Teacher's autonomy and its importance in enriching learning environment. Relationship between autonomy and accountability. Hindering factors that affect teacher's autonomy.
- Autonomy of learner- why, what and to what extent, Restrains on learners in schools. Learning without burden, Joyful, collaborative and cooperative learning. Individual autonomy and collective responsibility of teacher and learner.

Unit IV: Education and Values

- Concept and nature of values- Relative and absolute. Education with reference to human rights and values. Values prevalent in Indian Constitution and society. Education is a normative endeavor.
- Process of value formations in schools and out of schools and its impact on learners' value perspective. Role of education in transmission of values in society. School system to nurture a culture of peace.

Modes of Learning Engagement:

- The Course is visualized to be conducted through group discussion, self- study and reflection.
- The study of themes in each unit will be done through a range of activities such as: initiation of the dialogue within the group, organizing study groups, organizing discussion in small groups, or planning for short presentations.
- The sub-themes organized as units of the course, can be discussed by student teachers (using their own experiences and common-sense understanding, to begin with).
- Teacher educators will be present and participate in the plenary discussions as 'facilitators'.

Practicum/Tutorials:

Some activities for practicum are listed below.

- Individual self-study of a text/ article, with theme questions in mind
- Group study of a text/ article on a given theme
- Observational studies and activities: it may be worthwhile to carry out observations in the field, record what is observed and use the information while discussing with either teacher educator or peers.

- Observation with a purpose to reflect on knowledge preservation, transmission/construction and generation in oral, written, and technological traditions.
- Observation of schools, teachers, student activities in a school context.
- The student- teachers will maintain a portfolio of observations and notes on discussions; these will be submitted periodically to the faculty for appraisal and feedback.

Suggested Readings:

1. Agrawal, A. (1995). Dismantling the Divide between Indigenous and Scientific Knowledge: Development and Change. 26:413-39
2. Ant Weiler, C. (1998). Low Knowledge and Local Knowing: An Anthropological Analysis of Contested "Cultural Products" in the Context of Development. Anthropos. 93:46-94.
3. Chomsky, N. (1986). Knowledge of Language. New York. Prager.
4. Datta, D.M. (1972). Six ways of Knowing. Calcultta. Calcutta University Press,
5. Dewey, John (1997). Experience and Education, Touchstone, New York.
6. Krishna Murthy, J. (1947). On Education, New Delhi. Orient Longman.
7. Kumar Krishna (1996). Learning From Conflict, New Delhi: Orient Longman.
8. Peters, R.S. (1967). The Concept of Education, UK: Routledge.
9. Margaret, K.T. (1999). The open Classroom, New Delhi. Orient Longman.
10. Prema Clarke (2001). Teaching & Learning: The Culture of pedagogy, New Delhi: Sage Publication.
11. Steven H. Cahn. (1970). The Philosophical Foundation of Education, New York. Harper & Row Publishers.
12. Sykes, Marjorie. (1988). The Story of Nai Taleem. Wardha. Nai Taleem Samiti.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)

Semester I

WEAP 101: WORK EDUCATION (AGRICULTURE PRACTICE)-I

Time: 1.5 Hours
Credit- 4

Max. Marks: 50
Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

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

- Identify seeds of common crops and vegetables.
- Recognise manures and fertilizers used commonly.
- Understand characteristics of seeds and seedling.
- Identify different summer and winter flowers.
- Acquire skills to horticulture practices.
- Inculcate healthy values related to work culture

Modes of Learning Engagement: Hands on experiences, Activity based learning, Experimentation, Interactive engagement, Group work, Peer learning, Project work.

COURSE CONTENTS

Unit I:

Agriculture: Meaning, definition, scope, history, branches and objectives.

Unit II:

Soil Science: Definition of pedology, soil management, soil erosion, soil conservation practices; structure of soil, soil profile; soil fertility and productivity, essential plant nutrients. Fertilizers and manures including bio-fertilizers. Identification of manures and fertilizers.

Unit III:

Irrigation: Definition, method of irrigation, systems of irrigation, drainage, irrigation pattern of India.

Horticulture: Definition, branches of horticulture, layout of orchards, propagation by seeds and by vegetative means; Pot filling technique; Planning, planting and maintaining lawn; Practice related to landscaping.

Unit IV:

Agricultural practices: Preparation of land, selection of seeds, watering, thinning, hoeing and weeding, harvesting of crop, identification of important agricultural tools, trees and crop plants. Minor project preparation on agriculture.

Suggested Readings:

1. Jitendra Singh, Basic Horticulture (Kalyani Publishers, New Delhi, 2012).
2. Dr. Jaiveer Sing, Plant Propagation & Nursery Husbandry (Rama Publishing House, Meerut, 2002).
3. Dr. Rajveer Singh & Dr. O.P. Rajput, Principles of Agronomy, Scientific Crop Production (Kushal Publications and Distributors, Varanasi, 2008).
4. Dr. K.N. Dubey, Fruit Production in India (Rama Publishing House, Meerut, 2008).

PRACTICAL

Practicum: All the following experiments are to be done. Few more experiments may be set at the institutional level.

(a) **Identification of agronomy of following crops:**

- Wheat
- Bajra
- Maize
- Rose etc.

(b) **Agricultural Processes:**

- Irrigation
- Training and Pruning
- Hoeing and Weeding
- Seed Bed preparation
- Nursery Management.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)

Semester I

WEEE 101: WORK EDUCATION (ELECTRICITY & ELECTRONICS)-I

Time: 1.5 Hours
Credit- 4

Max. Marks: 50
Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: on completion of the course, the students will be able to-

- Recognize and use different tools/materials/instruments.
- Read the sketch/drawing of the job/project.
- Develop the skills for making simple projects/models.
- Acquire skill to assemble/prepare simple electric circuits.
- Acquire skill to use electronic components.
- Identify faults in electronic components.
- Develop the ability in repairing simple instruments used at secondary level.
- Inculcate healthy values related to work culture.

Modes of Learning Engagement:

Constructivist Approach: Hands on Experience, Activity used Learning, Experimentation Interactive Engagement, Group work, Peer Learning, Project Work

COURSE CONTENTS

Unit I:

Symbols, Tools and Soldering: Precautions used for making any electrical connection, Identification of conductors & insulators. Symbols for electrical components, knowledge of electrical accessories and their rating.
Tools used for making any electrical connection, their sizes and use.
Hand soldering, Soldering alloy, soldering flux and de-soldering pump. Practice of hand soldering.

Unit II:

Wires, Wirings and connections of lamps: Different types of wire, use of SWG, Different types of wiring such as: Batten wiring, CTS wiring, casing capping wiring, Cleat and conduit wiring. Their advantage and disadvantage on each other. Series

and parallel connections of lamps (up to four lamps). Staircase wiring of one, two and three lamps, Go-down wiring, connection for fan.

Unit III:

Electrical Components and Appliances: Color coding in resistor and Capacitor, use of resistor and capacitor in electrical appliances,

Understanding the working of electrical appliances: Electric iron, room heater, Immersion heater, geyser, Electric bell, emergency light

Unit IV:

Electronic Components and Their Use: Semiconductor materials, Semiconductor diode, Diode testing, Zener diode, LED, Photo diode, Solar cell, Rectification by diodes, Voltage multiplication by diodes.

Suggested Readings:

1. Electrician - I Year- Trade Theory Published by National Instructional Media Institute, Chennai re-print 2007
2. Electrician - II Year- Trade Theory Published by national Instructional Media Institute Chennai re-print 2007
3. Electrical Machinery Published by Krishna Publisher Delhi Author P.S. Bhimbhara re-print 2007
4. N.N. Bhargava, D.C Kulshrestha and S.C Gupta, Basic Electronics and Liner Circuits. Tata Mc. Graw Hills Ltd. New Delhi(2000)
5. B.L. Theraja, Basic Electronics, S.Chand New Delhi, (2005)

Practical

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Preparation of Projects/Models based on the following **(Only Suggestive)**-

1. Clap switch
2. IR Remote switch (fan, tube light)
3. Remote operated musical bell
4. Alarm for luggage security
5. Mobile cell-phone charger using cell
6. Power supply failure alarm
7. Blown fuse indicator
8. Rectifier
9. Voltage Multiplier
10. Transistor Amplifier

Semester II

B. Sc. B. Ed. (CBCS) Semester- II

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester II

AEC1(II): LANGUAGE SKILLS (HINDI)

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

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

COURSE CONTENTS

Unit I: History of Language and Literature-2

Aadhunik Hindi Sahitya ka Itihas [1857 Se Lekar Ab Tak]

Unit II : Modern Poetry-1 [Pre-Independence Literature]

Swatantratapurva Hindi Kavita Ka Vikas

1. Maithilisaran Gupt- Nar Ho Na Nirash Karo Man ko
2. Jayshankar Prasad- Himadri Tung Sring Se Prabudh Sudhha Bharti
3. Suryakant Tripathi Nirala- Joohi ki Kali
4. Sumitranandan Pant- Drut Jharo Jagat Ke Jirn Patra
5. Mahadevi Verma-MaiNeer Bhari Dhukh Ki Badli,

Unit III : Modern Poetry-2 [Post-Independence Literature]

Swatantrayottar Hindi Kavita Ka Vikas

1. Gajanan Madhav Muktibodh- Bhool Galti,
2. Kedarnath Agrawal- Chandra Gahna Se Lautati Ber
3. Raghveer Sahay- Aapki Hansi
4. Nagarjun- Aakal Aur Uske Bad
5. Kedarnath Singh- Aakal Me Saras

Unit IV : Communication skills Conversation [Varta]:

Characteristics – Definition – Styles of conversation – Higher order skills- Telephonic conversation, Role Play, – Models, etc. – Exercises.

References:

1. Hindi Sahitya Ka Itihas: Ramchandra Sukla, Vani Prakashan, Delhi
2. Hindi Sahitya ka Aadikal: Hajari Prasad Divedi, Vani Prakashan, Delhi
3. Hindi Sahitya Ka Itihas: Dr Nagendra , Mayoor Paperbacks, Delhi
4. Hindi Sahitya Ka Sanchhipt Itihas: Nanddulare Bajpayee, Swaraj Prakashan, Delhi
5. Hindi Sahitya Ka Dusara Itihas: Bacchan Singh, Vani Prakashan, Delhi
6. Aadhunik Hindi Sahitya ka Itihas: Bacchan Singh, Lokbharti Prakashan, Delhi
7. Hindi Sahitya ka Sanchhipt Itivritt: Shivkumar Mishra, Vani Prakashan, Delhi
8. Hindi Sahitya ka Sanchhipt Itihas:Viswanath Tirpathi, Orient Longman, Delhi
9. Sawtantrayotar Hindi Sahitya Ka Itihas: Dr Laxmisagar Vasney, Delhi
10. Hindi Sahitya Aur Samvedana Ka Vikas: Ramswaroop Chaturvedi, Lokbharti Prakashan
11. Bhasha, Yugbodh aur Kavita: Dr Ramvilas Sharma, Vani Prakashan, Delhi
12. Kavita ka Vartmaan: Dr P Ravi, Vani Prakashan, Delhi
13. Hindi Kvaya ka Itihas: Ramswaroop Chaturvedi, Lokbharti Prakashan, Delhi
14. Kavita ki Zameen aur Zameen ki Kavita: Namvar Singh, Rajkamal Prakashan, Delhi
15. Nayee Kavita aur Astitvawad: Ramvilas Sharma, Rajkamal Prakashan,Delhi
16. Chhayavad: Namvar Singh, Rajkamal Prakashan, Delhi
17. Kavita ke Naye Pratiman: Namvar Singh Raajkamal Prakashan, Delhi
18. Hindi Kavita ka Atit aur Vartmaan: Maneger Panday, Vani Prakashan, Delhi
19. Hindi Kavita Ki Tisari Dhara: Mukesh Manas, Swaraj Prakashan, Delhi
20. Effective Communication Skills, by Omkar N Kour
21. Prayojanmoolak Hindi- Madhav Sontakke, Rajkamal Prakashan Samooh, Delhi
22. Prayojanmoolak Hindi ki Nayee Bhoomika- Kailash Nath Panday, Rajkamal Prakashan Samooh, Delhi
23. http:// www.hindisamay.com

Suggested Activities:

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 .

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Semester II

AEC1(II): LANGUAGE SKILLS (ENGLISH)-II

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives :

Students develop proficiency in English which equips them to:

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

COURSE CONTENT

Unit I: Descriptive Grammar

Function of Auxiliaries; Modals; Question form
Clauses: Noun Clause; Reported Speech and Change of Voice.

Unit II: Development of Language Competence

To be based on the use of multiple texts which address issues of multiculturalism, gender, racism and texts which relate with current issues and contemporary trends. Short stories, comic strips, cartoons and animations (both print and non-print media)

to be used. Speeches of famous persons, diaries, travelogues can also be used.

Unit III: Writing for Functional Purposes

Letter-writing (Professional / Personal)

Unit III: Creative Skills in Writing

Writing dialogues, poems and essays

Unit IV: Basic Phonetics

Sounds of English language, intonation and transcription using IPA.

References:

1. Chan. et al. (1997) Professional Writing Skills, San Anselma, CA
2. Fiderer, A. (1994) Teaching Writing: A Workshop Approach. Scholastic.
3. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
4. Mckay. et al. (1995). The Communication Skills Book, 2 nd Ed. New Harbinger Publications.
5. Merrriam, E. (1964). It Doesn't Always Have to Rhyme. Atheneum.
6. Hyland, Ken (2004) Second Language Writing. University of Michigan Press.
7. Graves,D (1992). Explore Poetry: The reading /writing teacher's companion. Heinemann
8. Stone Douglas (1999). Difficult conversations: How to discuss what Matters Most, New York.:Penguin Books.
9. Gabor Don (2001). How to start a Conversation and Make Friends, New York: Fireside.

GROUP A: ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)
Semester II
AEC2(II): INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION-II

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives of the course: On completion of the course the students will be able to:

- Explain the process and stages of instructional design.
- Design anddevelopteчnologyintegratedlearningexperiencesusing ICT tools.
- Explain the different pedagogical approaches of ICT integration in education.
- Develop skills in using various e-learning tools and technologies.
- Plan, develop, and use multimedia based learning content using open source authoring software.
- Create and use Open Educational Resources under different CC licenses.
- Use various online and offline ICT tools for assessment.
- Appreciate the scope of ICT for improving the personal productivity and professional competencies.
- Explain the emerging trends in information and communication technology.

Course Contents

Unit I: Instructional Design and E-content

- Instructional Design – concept, principles, models and stages of instructional design.
- Basic Understanding of Audio-Visual Studio
- Basic Photography Aesthetics
- Types of Camera and Microphones
- Multi Camera Setup
- Various Formats of Video and Audio
- Shot Division/ Types of Shot Sizes and their impact on narrative/ continuity

- Genres in Video Communication
- Steps in the Video Production
- Multimedia tools- Audio editing, video editing, screen casting, graphic editing, and basics of animation, and creating interactive media.
- Designing, developing and using Massive Open Online Courses (MOOCs).

Unit II: ICT and Pedagogy

- Approaches to integrating ICT in teaching and learning.
- Techno pedagogical content knowledge (TPCK). E-learning: concept, types, characteristics, advantages and limitations. E-learning tools and technologies, Learning Management Systems (LMS).
- Flipped classrooms: meaning and possibilities.
- Web quest and virtual field trips: concept, process, and use in the classroom. Subject specific ICT tools for creating and facilitating learning. Designing technology integrated authentic learning designs and experiences.
- ICI integrated Unit plan – Web 2.0 for creating constructivist learning environment.
- Assistive technology for special needs and inclusion: tools and processes, ICT and Universal design for Learning (UDL).
- ICT for Assessment: Online and offline assessment tools – rubrics, e-portfolio, survey tools, puzzle makers, test generators, reflective journal, question bank.

Unit III: Designing and Developing E-Content

- Learning theories – implications for instructional design
- E-learning courseware (e-content) design
- Identifying and organizing course content: need analysis(learner, content, task), learning objectives, course sequence.
- Designing instructional media, evaluation, and delivery strategies.
- Creating interactive content – story board, courseware outline, interactivity and interface.
- Courseware delivery and evaluation.
- Reusable learning objects (RLO)– meaning, types and characteristics, RLO repositories, metadata and standards.
- E-content authoring tools- open source and proprietary alternatives.
- Open Educational Resources – Meaning and importance, various OER initiatives, creative common licensing.

Unit IV: ICT for Educational Management and Professional Development

- ICT for personal management: email, task, events, diary, networking.
- ICT for educational administration: scheduling, record keeping, student information, electronic grade book, connecting with parents and community, Library Automation.
- ICT for professional development: tools and opportunities.

- Electronic teaching portfolio- concept, types, tools, portfolio as a reflective tool for professional development.
- Self-directed professional development: role of ICT.
- Teacher networks and community of practice, web conferencing- tools and techniques.
- Technology and design based research and its pedagogical implications for professional development.
- Emerging Trends in ICT and its educational implications: augmented reality, 3D printing, learning analytics, digital games, artificial intelligence.

Sessional activities:

- LMS experience- hands on various features of LMS – the ICT course may be provided through LMS.
- Enrolling and completing some MOOC courses of interest.
- Creating resources for flipped classroom and practicing flipped learning in school.
- Evaluating OER resources. Creating and sharing OER materials- may be in NROER.
- Developing technology integrated unit/lesson plan and trying out this in the school.
- Hands on experience on subject specific software tools like geogebra.
- Evaluation of RLO repositories and creating RLO and uploading to repositories.
- A critical study of some e-learning courses and enrolling and completing some free e-learning courses.
- Developing a multimedia e-content for a topic using eXe Learning.
- Creating screen cast video of a lesson.
- Creating a podcast using audacity and sharing it on podcasting site.
- Shooting, editing, producing and sharing of videos segment on any educational topic.
- Creating a simple 2D animation using pencil or Tupi.
- Creating and editing various graphics.
- Planning and creating digital rubrics for any topic.
- Organize web conferencing using Skype.
- Review of ICT labs (plans and equipments/resources) in school from internet.
- Interview of computer hardware engineer/ICT specialist regarding Hardware planning, evaluation, maintenance and up gradation.
- Developing an electronic assessment portfolio.
- Developing an electronic teaching portfolio.
- Readings on emerging ICT trends in education.
- Using FOSS tools for timetabling, grade sheet.

Suggested Readings:

1. Athanassios Jimoyiannis (Editor) (2011). Research on e-Learning and ICT in Education. Springer: USA

2. Costantino, P.M., DeLorenzo,M.N., Kobrinski,E.J. (2006).Developing a professional teaching portfolio: a guide for success. Pearson
3. Christopher Moersch(2009). Beyond Hardware-Using Existing Technology to promote Higher-Level thinking. Viva Books: New Delhi.
4. David Moursund (2009).Project Based Learning- Using Information Technology- Second Edition. Viva Books: New Delhi.
5. Howard Pitler, Elizabeth R. Hubbell, and Matt Kuhn.(2012)Using Technology with Classroom Instruction That Works, 2nd Edition. ASCD:Denver
6. Liz Arney (2015)Go Blended!: A Handbook for Blending Technology in Schools
7. M. D. Roblyer, Aaron H. Doering (2012). Integrating Educational Technology into Teaching (6th Edition)
8. Mohit K (2003). Design and implementation of Web-enabled Teaching Tools : IRM Press, UK.
9. Pradeep Kumar (2011). Web Resources in Pedagogy . Apple Academics: Oakville.
10. Sonny Magana, Robert J. Marzano (2013).Enhancing the Art & Science of Teaching With Technology (Classroom Strategies)

GROUP C: CORE COURSE (CC)

Semester II

Core Course 1(II): PHYSICS: MATHEMATICAL BACKGROUND, PROPERTIES OF MATTER AND ELECTROMAGNETIC WAVES

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Acquaint with the key concepts of mathematical background, properties of matter and electromagnetic waves.
- Apply the concepts in various real life situations.
- Solve the problems based on mathematical background, properties of matter and electromagnetic waves.
- Apply the theory in execution of practicals.

Course-Contents

Unit: I

Scalars and Vectors: dot products, triple vector product, gradient of scalar field and its geometrical interpretation, divergence and curl of a vector field, line, surface and volume integral, Flux of a vector field, Gauss divergence theorem, Green's theorem and Stoke's theorem. Functions of two and three variables, Partial derivatives, geometrical interpretation of total differential of a function of two and three variables, Higher order derivatives and their applications.

Unit: II

Elasticity, Small deformations, Young's modulus, bulk modulus and modulus of rigidity for anisotropic solid, Poisson's ratio, relation among elastic constants,Theory of bending of beams and cantilever, Torsion of a cylinder, Bending moments and Shearing forces.

Unit: III

Kinematics of moving fluids, Equation of continuity, Euler's equation, Bernoulli's theorem, viscous fluids,Streamline and turbulent flow, Poiseuill's law, Capillary flow,

Reynold's number, Stoke's law, Surface tension and surface energy, molecular interpretation of surface tension, Pressure on a curved liquid surface, wetting.

Unit: IV

Faraday's law (it's integral and differential form), Energy in a static magnetic field, Measurement of self-inductance by Rayleigh's method, Maxwell's displacement current, Maxwell's equations, Electromagnetic field and Energy density.

Plane electromagnetic wave in vacuum, Pointing vector, Reflection and Refraction at a plane boundary of dielectrics, Polarization by Reflection and total internal Reflection, Faraday effect, Wave in conducting medium, Reflection and Refraction by the ionosphere.

Suggested Readings:

1. Haliday and Resnik, Physics-VI Ed.
2. D.J Griffith "Introduction to electrodynamics", (Prentice Hall of India A.M parties, Electomagnetic field.
3. V.V Sarvate, Electromagnetic field and Waves , (Wiley Eastern Ltd., New Delhi)
4. S.N Ghosh, Electromagnetic theory and wave propagation, (Narosa Publishing House.)
5. D.S. Mathur, Mechanics, (S. Chand Publishing)
6. R.K. Shukla, AnchalSrivastava, Mechanics, (New Age International Publishers)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To determine Young's modulus by bending of beam.
2. To determine Y, η and σ by Searle's method.
3. To determine dispersive power of prism.
4. To determine modulus of rigidity of material of wire using Maxwell's needle.
5. To determine modulus of rigidity by static vertical method.
6. To determine modulus of rigidity by static horizontal method.
7. To study the characteristics of transistor and determine and common base and common emitter configuration.
8. To determine the frequency of AC Mains.
9. To study the frequency response and phase relationship of A.C. in a R.C. series circuit.

GROUP C: CORE COURSE (CC)

Semester II

Core Course2(II): CHEMISTRY: PHYSICAL CHEMISTRY

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To acquire basic knowledge to students teachers about Mathematical concepts and learn the basic concepts of nuclear radioactivity and Nuclear reactions.
- To enhance the understanding of students in concepts related to Liquid, Colloidal states & Structure of Ionic solids, Behaviour of Gases, concepts in thermodynamics, different thermodynamic quantities such as heat and work and how are they measured, related or transformed from one to the other.

Course Contents

Unit I: Mathematical concepts and Nuclear Chemistry

- **Mathematical Concepts**: Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of functions like k_x, e^x,x^n, sin x, log x; maxima and minima, partial differentiation and reciprocity relations, Integration of some useful/relevant functions; permutations and combinations, Factorials, Probability.
- **Nuclear Chemistry:** Radioactive decay – decay law, disintegration constant, half-life and average life, alpha and beta disintegration reactions, group displacement law, nuclear reactions fission, fusion, artificial radioactivity, applications of radioactivity, nuclear power, carbon dating, biological effects of various types of radiations, nuclear chemistry for peace, Nuclear chemistry in Medicine and diagnostic techniques.

Unit II : Liquid, Colloidal states & Structure of Ionic solids

- **Liquid State:** Intermolecular forces, structure of liquids (a qualitative description).Structural differences between solids, liquids and gases, Liquid

crystals: Difference between liquid crystal, solid and liquid, Classification, structure of nematic and cholestric phases, Thermography and seven segment cells.

- **Colloidal States:** Definition of colloids, classification of colloids, Solids in liquids (sols): properties – kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze law, gold number. Liquids in liquids (emulsions): types of emulsions, preparation, Emulsifier, Liquids in solids (gels): classification, preparation and properties, inhibition, general application of colloids, colloidal electrolytes.
- **Structure of Ionic solids**: Definition of space lattice, unit cell; Laws of crystallography – (i) Law of constancy of interfacial angles, (ii) Law of rationality of indices (iii) Law of symmetry, Symmetry elements in crystals. X-ray diffraction by crystals, Derivation of Bragg's equation, Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).

Unit III : Behaviour of Gases

- **Gaseous States:** Postulates of kinetic theory of gases, deviation from ideal behaviour, Vander Waals' equation of state;
- **Critical Phenomena**: PV isotherms of real gases, continuity of states, the isotherms of van der Waals equation, relationship between critical constants and Van der Waals' constants, the law of corresponding states, reduced equation of state.
- **Molecular Velocities**: Root mean square, average and most probable velocities, Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter, Liquification of gases (based on Joule – Thomson effect).

Unit IV : Thermodynamics

- *First Law of Thermodynamics*: Statement, definition of internal energy and enthalpy.Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law-Joule-Thomson coefficient and inversion temperature. Calculation of w, q, dU, &dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process, temperature dependence of enthalpy, Kirchhoff's equation.
- *Second law of thermodynamics*: Need for the law, different statements of the law. Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature. Concept of entropy: entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.
- *Third law of thermodynamics*: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A &G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G with A with P, V and T.

Suggested Readings:

1. Engel, Physical Chemistry, Pearson Publications.
2. Mary Anne White, Physical Properties of Materials, Taylor & Francis second edition.
3. D N Bajpai, Advanced Physical Chemistry, S. Chand Publishing
4. S Lewis and D Gladstone, Elements of Physical Chemistry, Macmillan.
5. Peter Atkins Julio de Paula, The elements of Physical Chemistry, Oxford University Press.

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

1. Colloids

- To prepare arsenious sulphide sol and compare the precipitating power of mono - , bi- and trivalent anions.

2. Viscosity

- To determine the percentage composition of a given mixture (non interacting systems) by viscosity method.
- To determine the percentage composition of a given binary mixture by viscosity method (acetone & ethyl methyl ketone)

3. Surface Tension

- To determine the surface tension of amyl alcohol in water at different concentrations and calculate the excess of these solutions.
- To determine the percentage composition of a given surface tension binary mixture by surface tension method (acetone &ethyl methyl ketone).

30.8.18

GROUP C: CORE COURSE (CC)
Semester II
Core Course3(II): ZOOLOGY: CHORDATA

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

To enable students to understand in respect of vertebrates – their organizational hierarchies and complexities, the evolutionary trends in external morphology and comparative studies of internal structures; identification and classification with examples; to enable them to understand various modes of adaptations in animals.

Course Contents

UNIT: I

An outline classification of chordates up to orders but up to subclasses only in case of proto-chordate groups and mammals.

Comparative anatomy of vertebrates from an evolutionary point of view of the following:-

(i) Integument including structure and development of placoid scales, feathers and hair.

(ii) Heart and aortic arches.

(iii) Kidney and associated urinogenital ducts

Habit and habitat, reproduction (excluding development) and affinities to following types:-

a) Hemichordate: *Banlanoglossus*

b) Urocohordata:*Herdmania,* ascidian tadpole larva and its metamorphosis.

c) Cephalochordata: *Amphioxus*

Unit: II

Habit, habitat, of the following types:

a)Agnatha: Petromyzon (affinities with other vertebrate groups), affinities of Cyclostomates.

b) Pisces: *Scoliodon* (Digestive system, respiratory system, blood vascular system, urinogenital system, nervous system (central and peripheral) including sense organ)

c) Scales and fins of fishes.

Unit: III

Habit, habitat, structure (morphology, digestive system, respiratory system, blood vascular system, nervous system and urinogenital system of the following types:-

a) Amphibia : *Hoplobatrachus tigerinus*

b) Reptilia: *Sara hardwickii*

c) Venomous and non-venomous snakes, poison apparatus and biting mechanism. First aid of snake bite.

d) Parental care in Amphibia.

Unit: IV

Habit, habitat, structure, morophology, digestive system, respiratory system, blood vascular system, nervous system and urinogenital system of the following types:-

a) Aves: *Columba*

b) Mammalia: *Rabbit.*

c) Origin of birds, migration & flight adaptation of birds.

Suggested Readings:

1. Modern Textbook of Zoology: Vertebrate by R.L. Kotpal – Rastogi Publication, Merrut, 3rd Edition,2008
2. A Textbook of Zoology Vol. II by Parkar and Hasswel – (MacMillan)
3. A Textbook of Zoology Vol. II by R.D. Vidyarthi – (S. Chand & Co. Delhi)
4. Life of Vertebrates by J. Z. Young – (Oxford University Press)
5. The Vertebrates by A.S. Romer – (vakils, Ferrer& Simons, Bombay)
6. Elements of Chordate Anatomy by Weichert – (McGraw Hill)
7. The Birds by R.L. Kotpal (4th Edition) – Rastogi Publications, 2008
8. Bird Migration by D.R. Griffin – (Doubleday, Garden city, USA)
9. The Book of Indian birds by salim Ali.
10. Fish and Fisheries by K. Pandey and J.P. Shukla (2nd Edition) (Rastogi Publication, 2008)
11. Indian Fishes by Qureshi – (Brij Brothers., Bhopal)
12. Comparative anatomy of the vertebrates by George C Kent- 3rd Saint Louis: The C.V. Mosby Co 1973
13. Animal taxonomy and evolution, Dr VS Pawar, Hindi Edition, College book centre, Chaura Rasta Jaipur.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Content:

1. Study of Museum specimen with respect to levels and patterns of organization, biosystematics, biodiversity, adaptations, development stages, population dynamics, ecological implications etc.

a) **Hemichordata**: *Balanoglossus.*

b) **Urochordata**: *Herdmania, Pyrosoma.*

c) **Cephalochordata**: *Amphioxus.*

d) **Cyclostomata**:*Petromyzon, Myxine.*

e) **Pisces**: *Scoliodon, Sphyrna, Torpedo, Pristis, Trygon, Lepidosteus, Clarias, Ophiocephalus, Anabas, Exocoetus, Hippocampus, Tetradon, Protopterus.*

f) **Amphibia:** *Icthyophis, Necturus, Proteus, Ambystoma, Axolotl larva, Triturus. Amphiuma, Alytes, Bufo.*

g) **Reptilia:** *Testudo, Trionyx, Sphenodon,Hemidactylus, Draco, Calotes, Chamaeleon, Varanus, Heloderma, Typhlops, Eryx, Hydrophis, Viper, Bungarus, Naja, Alligator;* Identification of Venomous and Non-venomous Snakes.

h) **Aves:** *Pavo, Columba, Psitacula, Passer, Corvus, Archaeopteryx.*

i) **Mammals:** *Ornithorhynchus, Echidna, Macropus, Loris, Manis, Rattus.*

2. **Study of Permanent Slides:**

a) ***Balanoglossus:*** T.S. of proboscis, collar region and trunk

b) ***Amphioxus:*** T.S. or oral hood, pharynx.

c) **Mammals**: T.S. of skin, stomach, duodenum, ileum, liver, Pancreas, spleen, lungs, kidney, Testis, Ovary.

3. **Osteology:**

a) Study of skull bone of Frog, *Varanus*, Bird and Rabbit.

b) Study of vertebral of Frog. *Varanus*, Bird and Rabbit.

c) Study of girdles, forelimb and hind limb bones of Frog, *Varanus*, Bird and Rabbit.

4. Dissections and / or its demonstration through Charts / Models / Video / CD / digital alternatives etc and / or preparation of working models of the different system of the following animals.

a) ***Scoliodon:*** Afferent branchial systems, efferent branchial system, cranial nerves and internal ear.

b) **Frog**: Digestive, system, Urino-genital system

5. **Permanent /Temporary preparation of the following-:**

a) Scales: Placoid, Cycloid

b) Blood film of any vertebrate

c) Filoplumes of birds
d) Thigh muscles of frog
6. **Microtomy**: Fixing, block making, section cutting, staining, mounting and submission of slides.

Note:

- Use of animals for dissection is subject to the conditions that these are not banned under the Wildlife Protection Act or any other legislation.
- Students are required to submit the following during examination.
  a. One assignment on the instrument/ technique about its principle, working, precautions and applications; and /or reagents / solutions preparation.
  b. Report on study of animals from their natural habitat from their local surroundings. Live Zoology Project Report.

GROUP C: CORE COURSE (CC)

Semester II

Core Course1(II): BOTANY: DIVERSITY OF CRYPTOGAMS

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

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

- Understand the structure, classification and life history of Bryophyta andPteridophyta.
- Understand the Geological time scale and the importance offossils.
- Understand the evolutionary trends amongPteridophytes.

Course contents

Unit I: Bryophyta

- General characters, distribution, structure, reproduction, alternation of generations.
- Classification and economic importance.
- Origin and affinities of bryophytes.
- Study of morphology, anatomy and reproduction in-
  - Hepaticopsida:*Marchantia*
  - Anthocerotopsida :*Anthoceros*
  - Bryopsida : *Funaria*

Unit II: Palaeobotany

- General account of geological time scale, types of fossils, fossilization process, radioactive carbon dating, and importance offossils.
- Study of *Rhynia, Calamites* and *Glossopteris.*

Unit III: Pteridophyta

- General characters, distribution, reproduction, life cycle andclassification.
- Study of morphology, anatomy and reproduction in -
  - Psilopsida:*Psilotum*
  - Lycopsida: *Lycopodium, Selaginella*

Unit IV: Morphology, Anatomy and Reproduction

- Study of morphology, anatomy and reproduction in -
  - Sphenopsida :*Equisetum*
  - Pteropsida :*Pteris, Marsilea*
- Evolution of steles inPteridophytes
- Origin and significance of heterospory and seedhabit.

Suggested Readings:

1. Smith.G.M.,1971,CryptogamicBotanyVol.II,TMHPublishingHouse,NewDelhi.
2. Sporne, K.R., 1974, Morphology of Pteridophytes, Hutchinson & Co.,London.
3. Rashid, A. An Introduction toPteridophyta.
4. Pandey, Mishra & Trivedi, 2007, A Textbook of Botany Vol.II, Rastogi Publications, Meerut.
5. Singh,V., P.C.Pande & D.K.Jain 2006, A Textbook of Botany, Rastogi Publications, Meerut.
6. Singh V., P.D.Pande & D.K.Jain 2005, Diversity and Systematics of Seed plants, Rastogi Publications,Meerut.
7. Parihar, N.S.,Bryophyta.
8. Parihar, N.S., Introduction to Embryophyta Vol.IIPteridophyta.
9. Vashishta, P.C.1982, Peridophyta, S.Chand & Co. Ltd., NewDelhi.
10. Gangulee H.C., Kar and Ashok Kumar,1982, College Botany Vol.II, Central Book Agency,Calcutta.
11. Anrold, Introduction to Palaeobotany, McGraw Hill,London.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Course content:

- Study of the morphology, anatomy and reproductive structures of genera included in Bryophyta andPteridophyta by making micro preparations and observation of permanent slides.

30.8.13

Group C: Core Course (CC)

Semester II

Core Course 3(II): MATHEMATICS: DIFFERENTIAL EQUATIONS

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: At the end of the course students will be able to understand the principles and techniques of Differential Equations in problem solving.

Course Contents

Unit-I

Linear equations and equations reducible to linear form. Exact differential equations, integrating factors, first order andhigher degree equations solvable, for x, y, p. Clairaut's form and singular solutions, Geometric meaning of a differential equation, orthogonal trajectories, linear differential equations with constant coefficients, homogeneous linear ordinary differential equations.

Unit: II

Ordinary simultaneous differential equations, total differential equations. Linear differential equations of second order, transformation of the equation by changing dependent independent variable, method of variation of parameters.

Unit: III

Series solution of differential equations, power series method, Bessel, Legendre and hyper geometric equations, Bessel, Legendre and hyper geometric functions and their elementary properties.

Unit: IV

Partial differential equations of the first order, Lagrange's solution, some special type of equations which can be solved easily by methods other than the general method, Charpit general method of solution.

Suggested Readings:

1. Differential Equations Vol I:J.L. Bansal and H.S. Dhami, JPH, 2004.
2. Ordinary and Partial Differential Equations: M.D. Raisinghania and R.S. Aggarwal, S. Chand & Company, New Delhi, 2ndedition 1983.

3. Theory and problems of Differential equations: Frank Ayres, McGraw-Hill Book Company, Singapore, 1st edition 1972.
4. An Introduction to Ordinary Differential Equations, Dover Books on Mathematics: E. Coddington (1990) Dover
5. Differential Equations and Dynamical Systems: L. Perko (2010) Springer
6. Theory of Ordinary Differential Equations: Codington and Levinson (1987) Tata McGrawHill.

-60-

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester II
PECG 102: CHILDHOOD AND GROWING UP

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

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

- Situate individual development in a socio-cultural context.
- Develop an understanding about the impact/influence of socio-cultural context in shaping human development, especially with respect to the Indian context.
- Acquire theoretical perspectives and develop an understanding of dimensions and stages of human development and developmental tasks.
- Understand a range of cognitive skills and affective processes in human learners.
- Become aware of different contexts of learning and situate schools as a special environment for learning.
- Reflect on their own implicit understanding of the nature and kinds of learning.
- Gain an understanding of different theoretical perspectives on learning with a focus on cognitive views of learning as well as social– constructivist theories.
- Explore the possibilities of an understanding of processes in human cognition and meaning–making them as basis for designing learning environments and experiences at school.
- Appreciate the critical role of learner's based on differences and contexts in making meanings, and hence draw out implications for schools and teachers.

Course Contents

Unit I: Learner as a Developing Individual and individual differences among learners

- Developmental Influences: Development as a resultant of interactions between individual potential (innate, acquired) and external environment (physical, socio-cultural, economic and technological).
- Nature and nurture, continuity and discontinuity and growth and maturation issues.
- The understanding of cognitive and affective processes influencing the development of the learner and their applications in classroom teaching.
- Dimensions of differences in psychological attributes—cognitive abilities, interest, aptitude, creativity, personality, values.
- Understanding learners from multiple intelligence perspective with a focus on Gardner's theory of multiple intelligence. Differences in learners based on predominant 'learning styles'.

Unit II: Development and Learning

- Meaning and principles of development, relationship between development and learning.
- Dimensions of individual development: physical, cognitive, language, emotional, social and moral, their interrelationships and implications for teachers (relevant ideas of Piaget, Erikson and Kohlberg).
- Stages of development—developmental tasks with focus on processes growth and development across various stages from infancy to post adolescence (special emphasis on concerns of adolescence).

Unit III: Theoretical Perspectives on Learning

- Perspectives on human learning: Behaviourist (conditioning paradigm in brief), Cognitivist and Social Cognitivist (Bandura), Information-Processing view, Humanist, Social-Constructivist Social Cognitive Learning (drawing selectively on the ideas of Skinner, Piaget, Rogers, Vygotsky).
  (i) Concepts and principles of each perspective and their applicability in different learning situations
  (ii) Relevance and applicability of various theories of learning for different kinds of learning situations
  (iii) Role of learner in various learning situations, as seen in different theoretical perspectives
  (iv) Role of teacher in teaching- learning situations: a) transmitter of knowledge, b) model, c) facilitator, d) negotiator, e) co- learner. (The focus is on building understanding of different psychological perspectives of learning and helping student teachers to learn to apply them in different learning situations).

Unit IV: Learning in 'Constructivist' Perspective

- Distinctions between learning as 'construction of knowledge' and learning as 'transmission and reception of knowledge'.
- Social-Constructivist perspective (also Bruner and Ausubel's perspective) and applications of Vygotky's ideas in teaching.
- Understanding processes that facilitate 'construction of knowledge':

(i) Experiential learning and reflection
(ii) Social mediation
(iii) Cognitive negotiability
(iv) Situated learning and cognitive apprenticeship
(v) Meta-cognition.

- Creating facilitative learning environment.
- Teachers' attitudes, expectations– enhancing motivation, Achievement motivation, positive emotions, self-efficacy, collaborative and self-regulated learning. (The focus is on learning as a constructive rather than a reproductive process. The learner- centered orientation has implications for understanding learning as contextual and self-regulated process and following suitable classroom practices).

Modes of Learning Engagement: Modes of learning engagement will include:

- Reflective Written Assignments
- Lecture-cum-discussion
- Study of selected readings and discussions around overviews
- Anecdotes, experiential and reflective writings.
- Audio-visual clips of learning situations and interactions, analysis and discussion in small groups as well as large group
- Group presentations of key themes and concepts
- Exemplars of 'constructivist' learning situations, Case studies, their analysis and discussion
- Close observation of learners (students) in learning situations at school, as well as in other contexts; making field notes
- Interpretation, analysis and discussion of observations
- Assignments based on the above

Practicum/ Tutorials:

- Reflective Written Assignments
- Field observation notes
- Analysis of a learning situation and case study, using theoretical perspectives
- Administration of any one standardized tests (Intelligence/aptitude/attitude/creativity) and preparation of psychological assessment report.
- Prepare a critical report on implications of any one theory for learning – Piaget, Erickson and Bandura.
- Select a child with learning problem (refer 5.5) and carry out academic assessment in any one subject, identify the remedial measures and prepare a report.
- Preparation of learners' profile based on cognitive and non-cognitive characteristics to depict inter and intra individual differences.
- Project work

Suggested Readings:

1. Ambron, S.R. (1981). Child Development. New York. Holt Rinehart & Winston.
2. Atkinson, Richard C. et.al. (1983). Introduction to Psychology. New York. Harcourt Brace Johanovich Inc.
3. Benjafield, J.G. (1992). Cognition. Prentice Hall, Englewood Cliffs.
4. Blackie, J. (1971). How Children Learn in J.C. Stone and F.W. Schneider (eds.) New York. Readings in the Foundations of Education, Vol II, Cromwell.
5. Brown, J.S., Collins, A and Dugrid, P (1989). Situated Cognition and the Culture of Learning, Educational Researcher: 32-42.
6. Dececco. (1970). Italy. Psychology & Learning and Instruction Educational Psychology Prentice.
7. Flavell, J.H. (1963). The Developmental Psychology of Jean Piaget, New York. Van No strand.
8. Gange, R. M. (1985). The Conditions of Learning and Theory of Instruction (4th edition). New York. Holt, Rinehart and Winston.
9. Gardner, H. (1999). The disciplined mind what all students should understand. New York. Simon & Schuster.
10. Gardner, Howard (1989). Frames of Mind. New York. The Theory of Multiple Intelligences, Basic Books.
11. Gardner, Howard (1991). The Unschooled Mind. New York. Basic Books.
12. Hurlock, E.B. (1964). Child Development. New York. Mcgraw Hill Book Co.
13. Phillippe Aives. (1962). Centuries of Childhood. A Sociology of Family Life. New York. Knops.
14. Wolfolk (1987). Educational Psychology. Prentice Hall Eaglewood Cliff.
15. Srivastava, A.K. (1998). Child Development. The Indian Perspective. New Delhi. NCERT.
16. Sibia, A. (2006). Life at Mirambika. New Delhi. NCERT.
17. Chauhan S. S. (2002). Advanced Education Psychology. Delhi. Vikas Publication.
18. Woolfolk, A.E. (2009). Educational Psychology (11th Edition) (My Education Lab Series) Prentice Hall.
19. Wertsch, J.V. (1985). Vygotsky and the Social Formation of Mind. Harvard University Press.
20. Chauhan, S.S. (1990). Advanced Educational Psychology. New Delhi. Vikas Publication House.
21. Sharma R.A. (1996). Fundamentals of Educational Psychology. Meerut. Lal Book Depot.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)

Semester II

WEAP 102: WORK EDUCATION (AGRICULTURE PRACTICE)-II

Time: 1.5 Hours
Credit- 3

Max. Marks: 50
Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

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

- Identify seeds of common crops and vegetables.
- Recognise manures and fertilizers used commonly.
- Understand characteristics of seeds and seedling.
- Identify different summer and winter flowers.
- Acquire skills to horticulture practices.
- Inculcate healthy values related to work culture

Course Contents

Unit I: Identification

- Seeds of common crops.
- Seeds of common vegetables.
- Important weeds.
- Manures commonly used.
- Fertilizers commonly used.

Unit II: Seeds and Seedlings

- Characteristics of a good seed for sowing.
- Calculation of germination percentage of seeds.
- Planting seeds and transplanting seedling.
- Raising seedlings in a nursery
- Study about green-house.

Unit III: Ornamental gardening

- Identification of different summer flowers.

- Identification of different winter flowers.
- Identification of common hedge and creeper plants.
- Preparation and maintenance of rockeries and borders.
- Preparation and maintenance of borders through hedge and flower plantation.

Horticulture Practices

- Agro forestry and related concepts
- Potting and repotting practices.
- Practices related to production of important flowering plants.
- Collection of different types of seeds.
- Preparation of a project.

Unit IV: General Field practices

- Earthing.
- Planting.
- Hoeing.
- Weeding.
- Watering of plants.

Suggested Readings:

1. Jitendra Singh, Basic Horticulture (Kalyani Publishers, New Delhi, 2012).
2. Dr. Jaiveer Sing, Plant Propagation & Nursery Husbandry (Rama Publishing House, Meerut, 2002).
3. Dr. Rajveer Singh & Dr. O.P. Rajput, Principles of Agronomy, Scientific Crop Production (Kushal Publications and Distributors, Varanasi, 2008).
4. Dr. K.N. Dubey, Fruit Production in India (Rama Publishing House, Meerut, 2008).

Practicals

All the following experiments are to be done. Few more experiments may be set at the institutional level.

(a) **Identification of agronomy of following crops:**

- Wheat
- Mustard
- Gram
- Rose etc.

(b) **Agricultural Processes:**

- Irrigation
- Training and Pruning
- Hoeing and Weeding
- Seed Bed preparation
- Nursery Management.

GROUP F: SKILL ENHANCEMENT COURSES (SEC)

Semester II

WEEE 102: WORK EDUCATION (ELECTRICITY & ELECTRONICS)-II

Time: 1.5 Hours
Credit- 3

Max. Marks: 50
Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 8 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

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

- Recognize and use different tools/materials/instruments.
- Read the sketch/drawing of the job/project.
- Develop the skills for making simple projects/models.
- Acquire skill to assemble/prepare simple electric circuits.
- Acquire skill to use electronic components.
- Identify faults in electronic components.
- Develop the ability in repairing simple instruments used at secondary level.
- Inculcate healthy values related to work culture.

Course Contents

Unit I: Lamps

Understanding the working of CFL tubes, Incandescent lamp, arc lamp, sodium vapor lamp, neon lamp, fluorescent lamp, use of choke and starter

Unit II: Transformer

Construction of Transformers, recognition of primary and secondary winding, knowledge of step-up and step-down transformer, use of transformers.

Unit III: Electrical Appliances

Understanding the working of Electrical appliances such as Refrigerator, Air conditioners etc, making Resistance and Capacitance boxes, use of testing board and extension boards for laboratory.

Unit IV: Transistor

Recognition of emitter, base and collector in a transistor, characteristics of transistor, transistor action, Amplification by transistor, Basic idea of integrated

circuits, FET – recognition of drain, source and gate terminals, FET and its characteristics, testing of transistor and FET, LCD.

Suggested Readings:

1. Electrician – I Year Trade Theory Published by National Instructional Media Institute, Chennai re-print 2007
2. Electrician – II Year – Trade Theory Published by national Instructional Media Institute Chennai re-print-2007
3. Electrical Machinery Published by Krishna Publisher Delhi Author P.S. Bhimbhara re-print 2007

Practicals

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Preparation of Projects/Models based on the following **(Only Suggestive)-**

1. Alarm for luggage security
2. Mobile cell-phone charger using cell
3. Power supply failure alarm
4. Blown fuse indicator
5. IR Remote switch (fan, tube light)
6. Remote operated musical bell
7. Voltage Multiplier

30.5.15

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

B. Sc. B. Ed. (CBCS) Semester- III
GROUP B: GENERIC COURSE (GC)
GCEE 201: ENVIRONMENTAL EDUCATION & SUSTAINABLE DEVELOPMENT

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives of the Course

The Course 'Environmental Education' aims to orient student-teachers to analyze and understand environment concerns through the process of inquiry, critical analysis, intellectual discourse and essential projects.

Course Contents

Unit I: Importance and Scope of Environment

Importance need and scope of Environmental Conservation and Regeneration, Structure and functions of different ecosystems, India as a mega biodiversity nation, Role of individual in conservation of natural resources: water, energy and food, Equitable uses of resources for sustainable livelihoods, Environmental legislation: awareness and issues involved in enforcement.

Unit II: Natural Resources

Community participation in natural resource management- water, forests. Deforestation in the context of tribal life, Sustainable land use management, Traditional knowledge and biodiversity conservation, Developmental projects including Government initiatives and their impact on biodiversity conservation.

Unit III: Practices in Environment Management

Consumerism and waste generation and its management, Environmental degradation and its impact on the health of people, Organic farming,

Agricultural waste: their impact and management, Rain water harvesting and water resource management, Biomedical waste management.

Unit IV: Sustainable Environment in Global World

Environmental conservation in the globalised world, Alternative sources of energy, Impact of natural disaster/man-made disaster on environment, Biological control for sustainable agriculture, Heat production and greenhouse gas emission, Impact of industry/mining/transport on environment, Sustainable use of forest produces.

Modes of Learning Engagement:

- Case studies and success stories (involve local material).
- Problem solving and enquiry methods
- Small assignments which may include observation of important relevant days, preparation of bulletin board material, games, crossword puzzles, worksheet etc.
- Setting up of Eco-clubs.
- Conducting a seminar and developing a seminar document
- Project work and writing of project report
- Discussion of activities pertaining to two different classes and subjects.
- Activities on infusion of appropriate concerns.

Practicum:

- The students on completion of each topic of Unit-I will submit a small assignment in the form of an activity. This may include observation of importance of relevant season, preparation of bulletin board material, wall games, crossword puzzles, worksheet etc.
- The class can also form an environment club. The activity has to be on some local specific issue pertaining to the native place of the students.
- From the wide range of topics suggested in Units, the student will be assigned one topic. The student will develop a seminar document, which will be submitted after the seminar.

Suggested Readings:

1. NCERT (1981) Environmental Education at School Level. New Delhi. NCERT.
2. Odum, E.P (1971). Fundamental Ecology. London. W.B. Saunders Company.
3. Palmer, Joy A. (1998). Environmental education in the 21st Century. London. Routledge.
4. Sharma R. C and Tan, Marle C (Eds.) (1990). Resource Book in Environmental education for school lectures. Bangkok. UNESCO.

5. Sharma, R.C. (1981). 'Environmental Education. New Delhi. Metropolitan Publishers.
6. हरिशचन्द्रव्यास (2001). पर्यावरणशिक्षा, नई दिल्ली.
7. सक्सेनाहरिमोहन (2003). पर्यावरण अध्ययन, श्रीगंगानगर. अग्रवालसाहित्य सदन।
8. पंकजश्रीवास्तव (1998). 'पर्यावरणशिक्षा'. भोपाल. मध्यप्रदेशहिन्दीग्रंथअकादमी।
9. सक्सेना ए.वी. (1998). पर्यावरणशिक्षा. नईदिल्ली. आर्ययुकडिपो।
10. UNESCO (1990). Sourcebook in Environmental Education for School Teachers. Bangkok.
11. CEE (1995). Joy of learning handbook of environmental education activities. Vol.I-3 to 5.—Ahmedabad. Centre for Environment Education,
12. CEE (1996) Joy of learning. Handbook of environmental education activities. Vol.II-6 to 8.-- Ahmedabad: Centre for Environment Education
13. Pandya (1999). Mamata, Guide to green material: experiences and learning in developing effective environmental education material. Ahmedbad. Centre for Environment Education,
14. Sharma, R. C. (1981). Environmental Education. Delhi. Metropolitan.
15. Reddy, K. Purushotham. (2007). Environmental education. New Delhi. Neel kamal Publications Pvt. Ltd.
16. NCERT (2009). Project book in Environmental Education for class VII, VII, IX and X. New Delhi. NCERT.
17. NCERT (2011). Teachers' Handbook on Environmental Education for the higher secondary stage. New Delhi.
18. NCERT (2013). Project book in Environmental Education for the higher secondary stage. New Delhi. NCERT.

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B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP C: CORE COURSE (CC)
Semester III
PHY 201: PHYSICS: ELECTRODYNAMICS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Know the fundamental concepts of electricity and magnetism.
- Appreciate the link between electricity and magnetism.
- Apply the concepts in understanding the various physical phenomena.
- Solve the problems related to electrodynamics.
- Apply the theory in related practicals.

Course Contents

Unit I: Electro Statics:

Coulomb's law, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields, Work done on a charge in an electrostatic field, conservative nature of the electrostatic field, Electric potential,relation between electric field and electric potential, torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, Gaussian pillbox, Fields at the surface of conductor, Screening of E field by a conductor, capacitors, electrostatic field energy, force per unit area of the surface of conductor in an electric field, conducting sphere in a uniform electric field, point charge in front of a grounded infinite conductor.

Unit II: Dielectrics

Parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector, displacement vector D, molecular interpretation of Claussius – Mossotti equation, boundary conditions satisfied by E and D at the interface between two homogenous dielectrics, illustration through simple example

UnitIII: Electric Currents (steady and alternating)

Steady current, current density J, non-steady currents and continuity equation, Kirchoff's law and analysis of multi loop circuits, rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits, AC circuits, complex numbers and its application in solving AC circuit problems, complex impedance and reactance, Measurement of capacitance using impedance at different frequencies, series and parallel resonance, Q factor, power consumed by an AC circuit, power factor, Y and ∇ networks and transmission of electric power.

UnitIV: Magneto statics

Force on a moving charge: Lorentz force, equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, Torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio.

Motion of charged particles in electric and magnetic fields

Linear accelerator, E as deflecting field – CRO, sensitivity, Transverse B field, curvatures of tracks for energy determination of nuclear particles, principle of a cyclotron, Mutually perpendicular E and B fields- mass spectrograph, velocity selector, its resolution.Response curve for LCR circuit and resonance frequency, quality factor.

Magnetic Fields in Matter

Biot-Savart law, calculation of H in simple geometrical situations, Ampere's Law, the divergence and curl of B, field due to a magnetic dipole, magnetization current, magnetization vector, magnetic permeability (linear cases), interpretation of a bar magnet as a surface distribution of solenoidal current, the field of a magnetized object.

Plane electromagnetic wave in vacuum, Wave equation for E and B of linearly, Circularly and elliptically polarized electromagnetic waves, Poynting vector, Reflection and Refraction at a plane boundary of dielectrics, Polarization by Reflection and total internal Reflection, Faraday effect, Wave in conducting medium, Reflection and Refraction by the ionosphere.

Suggested Readings:

1. Barkeley Physics Course; Electricity and Magnetism, Ed. E.M. Purcell (McGraw-Hill).
2. Halliday and Resnik; Physics, Vol 2.(Wiley Eastern)
3. D.J. Griffith; Introduction to Electrodynamics (Prentice-Hall of India).
4. Reitz and Milford; Electricity and Magnetism (Addison-Wesley).
5. A.M. Portis; Electromagnetic Fields.
6. Pugh and Pugh; Principles of Electricity and Magnetism (Addison-Welsley).
7. Panofsky and Phillips; Classical Electricity and Magnetism (India Book House).
8. S.S.Atwood; Electricity and Magnetism (Dover).

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To Study resonance in a series LCR circuit and determine Q of the circuit.
2. To determine difference between two small resistances using Carey Foster's bridge.
3. To study the variation of current in RC circuit for different time constants (using a DC source).
4. To find the e/m of electron by Milikan's oil drop experiment.
5. To determine the self inductance of a coil by Anderson's bridge.
6. To compare the two capacities by De Sauty's bridge.
7. To study the variation of magnetic field along the axis of a current carrying circular coil. Plot the graph and find radius of the coil.

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Group C: Core Course (CC)
Semester III
CHM 201: CHEMISTRY: ORGANIC CHEMISTRY

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To acquire basic knowledge to students teachers about the concept of hybridization and geometry of atoms and the three-dimensional structure of organic molecules, Stereochemistry and Reaction Mechanism, General aspects of Organic Reactions; an understanding of nucleophiles, electrophiles, electronegativity and resonance.
- To acquire basic knowledge to students teachers about understanding of Cyclo alkanes, Cyclo Alkenes and Alkadienes, how to use their understanding of organic mechanisms to predict the outcome of reactions, the fundamentals of electronic structure and bonding in aromatic systems, reactivity patterns of aromatic molecules, chemical properties of Alkyl and Aryl Halides and general periodicity patterns of (organic/inorganic) molecules and the ability to design synthetic approaches to such species.

Course Contents

Unit I: Stereochemistry and Reaction Mechanism

A. **Stereochemistry of Organic Compounds**

Concept of isomerism, Types of isomerism; Optical isomerism – elements of symmetry, molecular chirality, enantiomers, stereogeniccenter, optical activity, properties of enantiomers, chiral and achiral molecules with two

stereogeniccenters, diastereomers, threo- and erythrodiastereomers, meso compounds, resolution of enantiomer, inversion, retention and racemisation.

Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.

Geometric isomerism – determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Conformational isomerism – conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives, Newman projection and Sawhorse formulae, Fischer and flying wedge formulae, Difference between configuration and conformation.

B. **General aspects of Organic Reactions:**

Inductive effect,hyperconjugation, conjugation and Resonance, Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking, Types of reagents – electrophiles and nucleophiles, Types of organic reactions, Energy considerations.Reactive intermediates – Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit II: Chemistry of Cyclo alkanes, Cyclo Alkenes and Alkadienes

A. **Cycloalkanes**: Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring, banana bonds, Stereochemistry of cyclo alkanes.

B. **Cycloalkenes**: Methods of formation, conformation and chemical reactions of cycloalkenes.

C. **Alkadienes:** Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes, Structure of allenes and butadiene, methods of formation, polymerization, chemical reaction – 1, 2 and 1, 4 additions, Diels-Alder reaction.

Unit III: Aromatic Hydrocarbons

A. **Arenes and Aromaticity:** Nomenclature of benzene derivatives, the aryl group, Aromatic nucleus and side chain, Structure of benzene; molecular

formula and Kekule structure, stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture. **Aromaticity**: The Huckle rule, aromatic ions.

B. **Aromatic Electrophilic Substitution**: General pattern of the mechanism, role of σ- and π- complexes, Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts' reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio, Side chain reactions of benzene derivatives, Birch reduction; Methods of formation and chemical reactions of alkylbenzenesalkynylbenzenes and biphenyl, naphthalene and Anthracene.

UnitIV:Alkyl and Aryl Halides

Nomenclature and classification of alkyl halides, methods of formation, chemical reactions, Mechanisms of nucleophilic substitution reactions of alkyl halides, SN^2 and SN^1 reactions with energy profile diagrams, Polyhalogencompounds: Chloroform, carbon tetrachloride.

Methods of formation of aryl halides, nuclear and side chain reactions, addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions,relative reactivities of alkyl halides vsallyl, vinyl and aryl halides, synthesis and uses of DDT and BHC.

Suggested Readings:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994.
5. Jerry March, Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, Sixth Edition
6. Peter Sykes, A Guidebook to Mechanism in Organic Chemistry Paperback – 2003.
7. Harkishan Singh and V. K. Kapoor. Medicinal and Pharmaceutical Chemistry. VallabhPrakashan Publishers, Delhi. 1996.

8. R L Madan Chemistry for Degree Students B.Sc. 2Nd Year S. Chand Publishing.
9. Hashmatali, Reaction Mechanism in Organic Chemistry S. Chand publishing.
10. John Leonard, Barry Lygo, Garry Procter Advanced Practical Organic Chemistry, Third Edition

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

1. **Organic Chemistry: Laboratory techniques**

- **Calibration of Thermometer**
  Naphthalene (80-82°C), Acetanilide (113.5-114°C), Urea (132.5-133°C), Distilled Water (100°C)
- **Distillation**
  Simple distillation of ethanol-water mixture using water condenser
  Distillation of nitrobenzene and aniline using air condenser
- **Crystallization**
  Concept of induction of crystallization, Phthalic acid from hot water (using fluted filter paper and stem less funnel), Acetanilide from boiling water, Naphthalene from ethanol,Benzoic acid from water
- **Decolourisation and crystallization using charcoal**
  Decolourisation of brown sugar (sucrose) with animal charcoal using gravity filtration.
  Crystallization and decolorisation of impure naphthalene (100g of naphthalene mixed with 0.3g of Congo Red using 1g decolorizing carbon) using ethanol.
- **Sublimation (simple and Vacuum)**
  Camphor, Naphthalene, Phthalic acid and Succinic acid.
- **Determination of melting point/ boiling points**
  Determination of melting point: Naphthalene, Benzoic acid, Urea, Succinic acid, Cinnamic acid, Salicylic acid, Acetanilide, m-Dinitrobenzene p-Dichlorobenzene, Aspirin.
  Determination of boiling points: Ethanol, Cyclohexane, Toluene, Aniline and Nitrobenzene.

2. Functional Group Analysis

a. Detection of extra elements (N, S and halogens), solubility behavior and functional groups (Alcoholic, phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and anilide) in simple organic compounds.

b. Identification of an organic compound through the functional group analysis and preparation of suitable derivatives.

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GROUP C: CORE COURSE (CC)

Semester III

ZOO 201: ZOOLOGY: ANIMAL CELL BIOLOGY AND GENETICS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

To enable students to comprehend the modern concepts and applied aspects of Cell Biology and modern concepts of Genetics and to create awareness regarding inheritance.

Note: The paper is divided in four independent units.

Unit I: Cell

Introduction to cell: Discovery, characteristics of prokaryotic (bacterial) and eukaryotic cells (plant and animal cells), cell theory, viruses and viroids.

Cell membrane: Ultra structure, chemical composition, models, unit membrane concept, fluidity, glycocalyx and functions of cell membrane. Transport across cell membrane: Passive transport (osmosis, diffusion), facilitated (mediated) diffusion; active transport (primary and secondary) and endocytosis and exocytosis.

Mitochondria: Ultra structure, chemical composition, functions, origin, electron transport chain and generation of ATP molecules.

Unit II: Cell Organelle

Ultrastructure, types, chemical composition and functions of

(i) ER and Golgi-complex
(ii) Lysosome, Ribosome,
(iii) Centriole,
(iv) Cilia and flagella

Nucleus: occurrence, number, shape, size and structure (nuclear envelopes, nuclear matrix and nucleolus)

Chromosomes: Introduction, structure (chromatids, primary and secondary constrictions, nucleolar organizer and telomeres) types; Chemical composition and functions. Chromosomal organizations: Nucleosome concept, Euchromatin, heterochromatin.

Unit III: Cell Cycle and Division

a) Cell reproduction: Cell cycle and significances of mitosis and meiosis. Regulation of Cell cycle.
b) Mendelian principles of inheritance- monohybrid and di-hybrid cross, back cross and test cross.
c) Deviation of Mendelism – incomplete dominance, co-dominance with examples.
d) Gene interactions: Epistasis, complementary, supplementary, duplicate genes with cumulative effects and collaborator genes.
e) Multiple alleles: Characters, examples pseudoalleles, inheritance of A, B , AB, O and Rh blood groups (antibody reactions)

Unit IV: Genetics

a) Chromosomal mutations-
   i. Variation in chromosome number (aneuploidy and euploidy)
   ii. Structural changes in chromosomes (deletion, duplication, inversion and translocation).
b) Sex–determination: Genetic (sex chromosome, genic balance and haplo-diploidy mechanisms), hormonal and environmental control of sex determinations with examples.
c) Sex-linked inheritance: white eye colour in Drosophila, colour blindness and hemophilia in man.
d) Linkage: Definition, difference between linkage and independent assortment, chromosomal theory of linkage, kinds, linkage groups and significances.
e) Crossing over- Definition, mechanism, theories, kinds, frequency, factors affecting crossing over and significances.

Suggested Readings:

1. Molecular Biology of the Cell, Alberts et al, *5thed Garland Science 2008.*
2. Molecular Cell Biology, H Lodish MP Scott et al 7th Ed, McMillan Pub 2013.
3. Biochemistry, Molecular Biology and Genetics 5th ED, Lippincott Willaims and Wilkinson, 2013.
4. Cell Biology Gerald Karp, 7thed, Wiley Pub 2014

5. Cell and Development Biology by Sastry, Singh &Tomar- (Rastogi Publications . 2008)
6. Essentials of Molecular Biology ,2nded, David Freifileder, Panima Publishing N Delhi 1996
7. Biochemistry and Molecular Biology , K Wilson & J Walker, 7th Cambridge 2010.
8. Cell and Molecular Biology by P.K Gupta – (RastogiPublications 2008)
9. Cell Biology by C.B Power –(Himalaya publishing House, Bombay)
10. Cell Biology by de Robertis et. al-(W.B Saunders , Philadelphia)
11. A textbook of Cytology by R.C Dalela& S.R. Verma – (Jaiprashnath& Co. Meerut)
12. Cell Biology by J.D. Burke – (Scientific Book Agency , Calcutta)
13. Cell Biology : A molecular approach by R.D Dyson- Allyn& Bacon, Boston)
14. Cell Biology by R.M. Dowben – (Harper & Row, New York)
15. Cell function by L. L Langley – (Affiliated East West Press, New Delhi)
16. Cytology by C.D. Darlington
17. Cell and Molecular Biology by de Robertis EDP & de Robertis EMI Jr. (1996) . Holt WB Saunders Internationl
18. Genetics- P.S. Verma& V.K. Agarwal , S. Chand&Co.Delhi
19. Principles of Genetics Gardner , Ed 7th Wiley Eastern Pvt Ltd 2013
20. Genetic – Winchester , Oxford IBH Publications
21. Genetic – Stickberger, Macmillian Publications.
22. Immunology , Kuby 7thed, Owen Punt Stenford McMillan, 2013

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents

- Microscope : Simple and compound microscope, working mechanism and maintenance
- Study of bacterial and enkaroytic cell.
- Slides of sub cellular components (Cell organelles)
- Erythrocyte plasma membrane permeability.
- Study of Karyotype and Idiogram of man.

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- Study of Barr Bodies in human buccal epithelial cells.
- Identification of blood groups (ABO) and Rh factor in man.
- *Drosophila* culture and life cycle.
- Sexual Dimorphism in *Drosophila,* Identification of wild or mutant varieties.
- Study of salivary gland chromosomes of Drosophila
- Problems on pedigree analysis.
- Meiotic studies of testes of cockroach.

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GROUP C: CORE COURSE (CC)
Semester III
BOT 201: BOTANY: GYMNOSPERMS AND REPRODUCTIVE BIOLOGY IN FLOWERING PLANTS

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

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

- Understand the morphology, anatomy, reproduction and classification of Gymnosperms;
- Understand the structure, development and processes associated with Angio spermembryology;

Course Contents

Unit I: Morphology and Anatomy of Gymnosperms

- General characters, distribution, classification, affinities and economic importance of Gymnosperms
- Study of morphology, anatomy and reproduction in Cycadopsida: *Cycas.*
- Study of morphology, anatomy and reproduction in Coniferopsida:*Pinus* and Gnetopsida:*Ephedra*

Unit II: Reproduction in Gymnosperm Part - I

- Flower – Structure, morphology, embryological perspective.
- Microsporangium – Development of wall layers, tapetum types, microsporogenesis, tetrad types.
- Male gametophyte – Development and structure; vegetative and generative cells; male gametes.
- Mega sporangium (ovule): Development, types, mega sporogenesis, tetrad

types.

- Female gametophyte: Development, ultra structure, mono, bi and tetrasporic embryo sacs.

Unit III: Reproduction in Gymnosperms Part - II

- Pollination and fertilization: Definitions, types of pollination, pollen-pistil interaction, self-incompatibility ,double-fertilization.
- Endosperm: Definition, types – cellular, nuclear and helobial; endo spermhaustoria.
- Embryo: Classification, types, development of Crucifertype.

Unit IV: Angiosperm Embryology

- Fruit and seed: Development, structure of monocot and dicot seeds, dispersal mechanisms, importance.
- Fruits- Types, classification with examples.
- Brief account of apomixis andpolyembryony, causes and applications.
- Brief account of anther/ pollen culture, endosperm, embryo and protoplast culture, Applications of tissueculture.
- Origin and evolution of Angiosperms, Fossil Angiosperms.

Suggested Readings:

1. Sporne, K.R., 1974, Morphology of Gymnosperms, Hutchinson & Co.,London.
2. Gangulee, S.C., Kar and Ashok Kumar, College Botany Vol.II, Central Book Agency, Calcutta.
3. Singh V., P.C.Pande & D K Jain 2006 Diversity and Systematics of Seed Plants, Rastogi Publications,Meerut.
4. Pandey, Mishra and Trivedi, 2000, A Text book of BotanyVol.II.
5. Chopra G.L., 1972, Gymnosperms, S. Nagin & Co., Jullandar.
6. Bhojwani S S and S P Bhatnagar, 2007. The Embryology of Angiosperms, Vikas Publishing House,Delhi.
7. Raven P.H, R.F.Evert and S.E.Eichhorn, 1999, Biology of Plants, 5th Ed., W.H.Freeman and Co., Worth Publishers, NewYork.
8. Swamy B.G.L. and K.V. Krishnamurthy, 1980, From Flower to Fruit, TMH Publishing House, NewDelhi.
9. Johri B.M.(Ed.),1984, Embryology of Angiosperms, Springer-Verlag,Germany.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Course Contents

- Study of morphology, anatomy and reproductive structures of genera of Gymnosperms included in theorysyllabus.
- Study of structure of anther, microsporogenesis and pollen grains using permanent slides andmounts.
- Study of structure of ovules and embryosac development (monosporic type) using permanentslides.
- Examination of a wide range of flowers for study ofpollination.
- *In vitro* germination of pollengrains.

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GROUP C: CORE COURSE (CC)
Semester III
MTH 201: MATHEMATICS: LINEAR ALGEBRA

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: At the end of the course students will be able to:

(i) Understand concepts, principles and techniques of matrix and determinants in problem solving.

(ii) Understand the concept of Vector space, Isomorphism of Vector spaces, quotient spaces and Euclidean Vector spaces and apply these in problem solving.

(iii) Understand 3-Dimensional shapes viz. Sphere, Cone, Cylinder, Ellipsoid, Hyperboloid, its equations and applications in problem solving.

Unit: I

Matrices, determinants, Basic properties of determinants, Co-factor expansion, system of linear equations, Gauss elimination method, Elementary matrices, invertible matrices Gauss-Jordan method for finding inverse of a matrix. Vector space, subspaces, Linear combinations, Linear span, Linear dependence and Linear independence of vectors, Basis and Dimension, Finite dimensional vector space-some properties.

Unit: II

Quotient spaces, Homomorphism of vector spaces, Isomorphism of vector spaces, Direct sum, inner product spaces, Euclidean vector spaces, Distance, Length, Properties, Orthogonal vectors, Gramm Schmidt Orthogonalisation Process, Orthogonal Complement.

Unit: III

Matrices of lineartransformations, Change of basis and the effect of associated matrices, Kernal and Image of a Linear transformation, Rank Nullity theorem, Singular and Nonsingular linear transformations, Elementary matrices and transformations, Similarity, Eigen values, Eigen Vectors, Diagonalisation, Characteristic polynomial, Cayley-Hamilton theorem, Minimal polynomial.

Unit: IV

Quadratic curves, Surfaces, Sphere, Cylinder, Cone, Ellipsoid, Hyperboloid, Paraboloid.

Suggested Readings:

1. Theory and Problems of Linear Algebra, Seymour Lipschutz, Schaum Outline Series
2. Linear Algebra: K. Hoffman and R. Kunze (2009) Prentice-Hall
3. Introduction to Linear Algebra: G. Strang (2009) Wellesley CambridgePress
4. Linear Algebra done right: S. Axler (2014) Springer
5. Linear Algebra with applications: Bretscher (2012) Pearson
6. Calculus and Analytical Geometry by Thomas and Finney.

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GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester III
PESS 201: SCHOOLING, SOCIALIZATION AND IDENTITY

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Become aware of the processes of socialization at home and school that act as shaping factors in identity formation of the school going child (in Indian contexts)
- Reflect critically on factors that shape identity formation and influence sense of self of the growing 'student' as well as 'teacher' in school as well as out of school.
- Understand the processes that have shaped/continue to shape one's own sense of identity as 'student' and a 'person' located in multiple social contexts and roles
- Reflect on one's aspirations and possibilities in order to develop a growing sense of agency as a 'teacher', a 'professional', as well as a 'human being'.

Course Contents

Unit I: Socialization and Development of Self

- Understanding the nature and processes of socialization
- At home: family as a social institution; impact of parenting style/child rearing practices; transmission of parental expectations and values.

- In the community: neighbourhood, extended family, religious group and their socialization functions.
- At school: impact of entry to school; school as a social institution; value-formation in the context of schooling.

Unit II: Emergence of 'person' and 'identity' and Schooling for identity formation

- Understanding 'identity formation'; emergence of multiple identities in the formation of a person placed in various social and institutional contexts; the need for inner coherence; managing conflicting 'identities'.
- Determinants of identity formation in individuals and groups: such as caste, class, gender and religion.
- The influence of peer group, media messages, technology, and globalization on identity formation in contemporary Indian society.
- Schooling as a process of identity formation: ascribed, acquired and evolving.
- Potential role of school in developing national, secular and humanistic identities.

Unit III: Coping with social complexities: Role of education

- Expanding human activities and relations; decreasing unhealthy competition, uncertainty and insecurities and the resultant identity conflicts.
- Indian concept of 'vasudhaiva kutumbakam' and 'sarvadharm sambhava'.

Unit IV: Evolving a 'holistic identity' as a teacher

- Reflections on one's own aspirations and efforts in becoming a 'teacher'.
- Evolving an identity as a teacher, which is progressive and open to re-construction.
- Teachers' professional identity and Teachers' professional ethics.

Modes of Learning Engagement:

- Introductory lectures-cum-discussion, to introduce key themes of the course – socialization, identity formation, sociological notions and experiential sense of 'self' etc.
- Observations of schools and classrooms through the lens of course themes; interviews with teachers; making field notes.
- Group discussion and exploration, around selected readings and key questions.
- Viewing selected documentaries and film clippings.
- Writing critical reviews of readings and films viewed.
- Presentations of reviews.

- Reflective, autobiographical writing, towards self-understanding, on given topics.
- Journal writing, on course experiences (to be initiated with this course; to be continued through the year, with occasional sharing with a 'mentor').

Practicum/ Tutorials:

- Visit to a school and studying the role of school in socialization of the child.
- Preparing notes on ways of managing conflicting identities with illustrations.
- Studying the school activities which enhance secular identity in children.
- Observing school processes that contribute to peaceful living of teachers and students.
- Describing ones' own process of socialization quoting some experiences.
- Presentations based on readings and film reviews.
- Reflective written assignments (towards critical awareness of issues, for self-understanding and formulating aspirations as a teacher.
- Journal writing.
- Notes from field observations/interviews and linking these with course themes.

Suggested Readings:

1. Pathak, Avijit (2002). Social Implications of Schooling. New Delhi. Rainbow Publishers.
2. Kumar Krishna (2004). What is Worth Teaching? 3rd edition, Orient Longman.
3. Krishnamurti, J. Education and the Significance of Life. KFI Publications.
4. Butler, J. (1990). Gender Trouble Feminism and the subversion of Identity. New York. Routledge.
5. Sharma, R&E. Annamalai. (2003). Indian Diaspora In Search of Identity. Mysore. CIIL.
6. Kumar,K. (2001). Prejudice and Pride School Histories of the Freedom Struggle. New Delhi. Viking/Penguin.
7. Amalendu Misra (2004). Identity and Religion Foundations of Anti-Islamism in India. New Delhi. Sage Publications.
8. Dipankar Gupta (Ed.) (2004). Caste in question Identity or Hierarchy. New Delhi. Sage Publications.
9. Kamala Ganesh & Usha Thakkar (Ed.) (2005). Culture and Making of Identity in India. New Delhi. Sage Publications.

10. Saraswati, T.S. (Ed.) (1999). Culture, Socialization and Human Development. Theory Research and Applications in India. New Delhi. Sage Publication.
11. Sen Amartya (2006). Identity and Violence. The Illusion of Destiny. New Delhi. Allen and Lane Penguin Books India Pvt. Ltd.
12. Shashi Tharoor (2007). The Elephant, the Tiger &The Cell phone. (Particularly part two of the book). New Delhi. Penguin Viking.
13. Srinivas M.N. (1986). Social Changes in Modern India. Bombay. Allied Publishers.
14. Vidyanathan, T.G. (1989). 'Authority and Identity in India', in 'Another India.' Dae dalus, Fall, 118 (H): 147-69.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester III
EPYH 201: YOGA, HEALTH AND WELL BEING

Time: 3 Hours | Max. Marks: 50
Credits- 4 | Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 08 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 08 marks each.

iv) All questions will carry equal marks.

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

- Understand the importance of games, sports and yoga for development of holistic health.
- Know the status, identify health problems and be informed of remedial measures.
- Know about safety and first aid.
- Acquire the skills for physical fitness.
- Practice yogasanas, meditation and relaxation.
- Understand various policies and programmes related to health, physical education and yoga.

Course Contents

Unit I: Concept of Health, Body, First Aid

- Concept of health, importance, dimensions and determinants of health, health needs of children and adolescents including differently abled children.
- Understanding of the body system – skeleton, muscular, respiratory circulatory and digestive in relation to health.

- Common health problems and diseases- causes, prevention and cure, immunization and first aid.

Unit II: Food - habits, hygiene, diseases and their prevention, Safety, security and physical fitness

- Food and nutrition, food habits, nutrients and their functions.
- Preservation of food value during cooking, indigenous and modern ways of preserving food.
- Practices related to food hygiene, malnutrition, obesity, food and waterborne and deficiency diseases and prevention.
- Safety and security – disasters in and outside schools, ways of prevention.
- Safety from snake and dog bites, animal attacks, prevention and treatment.
- Physical fitness, strength, endurance and flexibility, its components, sports skills and self- defence activities.

Unit III: Athletics and Games

- Athletics – general physical fitness exercises.
- Games – lead up games, relays and major games.
- Rhythmic activities, gymnastics and their impact on health.

Unit IV: Yoga, Policies and Programmes for Health

- Yogic practices – importance of yoga, yogasanas and pranayamas
- Role of institutions in developing healthy individuals- family, school and sports
- Health services, policies and health and physical education related programmes, blood banks and role of media

Modes of Learning Engagement:

- Interactive discussions, group work, sharing experiences, organizing activities, analyzing topics on health related issues.
- Demonstrations, observations, field visits, preparing work books, maintaining diary, participating in school health checkup, practical classes of first aid, projects and assignments.
- Playing games and sports and performing Asanas and Pranayamas

Practicum/ Tutorials:

- Rules regulations related to games, sports and yoga.
- Playing Volleyball, Basketball, Badminton and recreation games.
- Performing Suryanamaskara and selected yogasanas, mudras and pranayamas.
- Standing Asanas- Konasana, Trikonasana, Vrikshasana, Veerebhadrasana
- Sitting Asanas – Vajrasana, Gumukhasana, Navasana, Veerasana
- Lying on the stomach – Bhujangasana, Dhanurasana

- Body twisting asanas – Ardha Matsyendrasana, Vakrasana
- Back bending – Ushtrasana
- Mudras – Arham, Ananda Mudra
- Pranayama – Anuloma viloma, Bhramari

Suggested Readings:

1. Pande, P. K. (1988). Sports Medicine. Delhi. Khel Sahitya Kendra.
2. Larry G. Shaver. (1982). Essentials of Exercise Physiology. Delhi. Surjeet Publications.
3. Kanabur, Vyjayanthi V. (2007). Sports Nutrition the Scientific Facts. New Delhi. Kanishka Publishers.
4. Dheer. S. Kamal Radhika (2002). Organization and Administration of Physical Education. Friends Publications.
5. Chandler Timothy, Mohin Mike, Vamphew Wary (2007). Sports and Physical Education. London. Routledge Taylor Francis Group.
6. Verma, Veena (1999) Sports Psychology. Delhi. Sports Publication.
7. Prakash, Agam (1999) A Textbook of Health Education. Delhi. Sports Publication.
8. Uppla AK. (1996). Physical Fitness. New Delhi. Friends Publication.
9. Thani Lokesh (2003) Rules of Games and Sports. New Delhi. Sports Publication.
10. Sonkar Sathish. (1998). Methods, Measurement and Evaluation in Physical Education. Jaipur, Book Enclave.
11. NCERT, Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
12. Seetharam AR (1996) Yoga for Healthy Living. Mysore. Paramahamsa Yogashrama.
13. Ganguly, S.K., Bera, T.K., Gharote, M.L.(2003) Yoga in relation to Health related physical fitness and academic achievement of school boys. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
14. Gharote, M.L. (1976). Physical Fitness in relation to the practice of selected yogic exercises. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
15. Kulkarni,D.D. (1997).Yoga and Neurophychology. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
IV: Engagement with the field (EF)
Semester III
EFWC 201: WORKING WITH COMMUNITY

Time: 2 weeks Max. Marks: 50
Credits- 2 External Assessment: 10

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

- Acquaint themselves with the factors working in the society/community i.e. knowledge of social realities.
- Develop the dignity of labour among them.
- Arouse their interest in the social and economic reconstruction oj the country.
- Make themselves aware of the educational problems and needs of thi society.
- Enable themselves for preparing youth for sustainable development.
- Develop their personality through community service.

Methodology: The students will spend 2 weeks at a stretch during the academic year in the identified village. Separate activities will be undertaken every year out of the following or given by the Institute.

Suggested Activities:

1. Shramdaan and beautification
2. Study of educational scenario of a community. Reporting the profile of each Institution/NGO/social organization, which is directly or indirectly concerned with educational /literacy programme.
3. Micro planning exercises for assessing the educational status of the community.
4. Organization of "Nukad Natak" "Cultural Programmes", "Rallies" etc. for motivating the villagers for sending their wards to schools.
5. School mapping exercises for assessing the educational need of the community.
6. Study of enrolment, stagnation and dropout problems.

7. Exploring the community resources and finding means and ways of using them for betterment of school.
8. Adopting a community and implementation of the Lab Area Concept in adopted community.
9. Survey of nearby community (adopted community) and assessing its educational needs, social needs etc.
10. Conducting awareness programmes in the community- like Environment conservation, tree plantation, watershed management, health programmes like vaccination, polio drop etc. AIDS awareness, electoral awareness, load safety, human rights, women rights etc.
11. Organization of Literacy programmes in the community
12. Cleanliness drives in the community and awareness about their needs.
13. Character building programmes
14. Developing healthy food habits among the community
15. Conducting Vocational training programmes for self- employment.
16. Promoting peace oriented values in the community.
17. Remedial teaching work for poor and needy in the community.
18. Action Research regarding local problems in consultation with the community.
19. Promoting peace oriented values in the community.
20. Conducting Adult Education programmes
21. Assistance and working with local community in actual relief work whenever needed.
22. Training of community in First Aid.
23. Helping the children with special needs.
24. Conducting Vocational training programmes for self- employment.

Modes of Learner Engagement:

Proposed activities of the programme will be organized keeping in view the budgetary provision and the time of duration along with the required available facilities at the time of organization of the programme.

Modes of Internal Assessment:

Internal assessment of Punctuality, Regularity, Discipline, Cooperation and Performing Arts will be done through observation of the students and viva-voce will be conducted on their experiences and written report prepared by the student teachers.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCPH-I-201: PHYSICS: RENEWABLE ENERGY SOURCES

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Describe about the exploration of renewable energy systems and their effective tapping technologies.
- Discuss the source of energy in various renewable energy systems.
- Estimate the amount of energy in different types of renewable energy systems.
- Explain the feasibility of different types of energy sources.
- Apply the concepts learnt in new types of renewable energy.

Course Contents

Unit I: Solar Energy

Sun as Source of Energy, Availability of Solar Energy, Nature of Solar Energy, Solar Energy & Environment. Various Methods of using solar energy–Photothermal, Photovoltaic, Photosynthesis, Present &Future Scope of Solar energy. Hybrid wind energy systems-wind & diesel power, wind+ conventional grid, wind & Photovoltaic system etc.

Unit II: Wind Energy

Wind Energy: Basics &Power Analysis, Wind resource assessment, Power Conversion Technologies and applications, Wind Power estimation techniques, Principles of Aerodynamics of windturbine blade ,various aspects

of wind turbine design, Wind Turbine Generators: Induction, Synchronous machine, constant V&F and variable V&F generations, Reactive power compensation. Site Selection, Concept of wind form & project cycle, Cost economics & viability of wind farm.

Unit III: Geothermal, Tide and Wave Energy

Availability of Geothermal Energy – size and Distribution, Recovery of Geothermal Energy, Various Types of Systems to use Geothermal Energy, Direct heat applications, Power Generation using Geothermal Heat, Sustainability of Geothermal Source, Status of Geothermal Technology ,Economics of Geothermal Energy.

Unit IV: Hydrogen Energy and Nuclear Energy

HydrogenProduction: Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production.

Hydrogen Energy: Hydrogen as a renewable energy source, Sources of Hydrogen, Fuel for Vehicles.

Nuclear Energy: Potential of Nuclear Energy, International Nuclear Energy Policies and Regulations. Nuclear Energy Technologies–Fuel enrichment, Different Types of NuclearReactors, Nuclear Waste Disposal and Nuclear Fusion.

Suggested Readings:

1. L L Freris, Wind energy Conversion Systems (PrenticeHall, 1990).
2. D A Spera, Wind Turbine Technology: Fundamental concepts of wind turbine technology(ASMEPress,NY,1994).
3. G L Johnson, Wind Energy Systems(PrenticeHall,1985).
4. J F Manwell, J GMcGowanandA LRogers, Wind Energy Explained(John Wiley & SonsLtd., 2010)
5. N K Bansal, et al., Renewable Sources of Energy and Conversion Systems (Tata McGraw-Hill, 1990)
6. Kreith and Kreider, Solar Energy Handbook (McGraw Hill, 1982)
7. M A Green, SolarCells,(Prentice Hall, 1981)
8. T Ohta, Solar Hydrogen Energy Systems (Pergamon Press, 1979)
9. D Methis, Hydrogen Technology for Energy(Knowledge Pubns, 2007)

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCPH-II-201: PHYSICS: NANO SCIENCE

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Nano Science.
- Know about synthesis and characterization of nano materials.
- Understand various applications of nano science.
- Establish multi-disciplinary links.

Unit I: Overview

Size effects and crystals, nanoscopic scale and quantum confinement, one dimensional, two dimensional and three dimensional nanostructured materials, quantum Dots, types of nanostructure and properties of nanomaterials: shell structures, metal oxides, semiconductors, composites, mechanical, physical, chemical properties, carbon age, new form of carbon (CNT to Graphene), influence of nano over micro/macro,effects of nano scale dimensions on various properties –structural, thermal, chemical, magnetic, optical and electronic properties, effect of nano scale dimensions on mechanical properties - vibration, bending, fracture, emergence and challenges of nanoscienceand nanotechnology.

UnitII: Synthesis of Nano materials

Top-down and bottom-up approaches, Mechanical alloying and Ball milling, Plasma synthesis, Sol-Gel Synthesis, Inert gas Condensation, Electro deposition and other techniques,chemical vapour deposition, physical vapour deposition, Laser ablation, pulsed laser deposition.

Unit III: Characterization tools

X-ray powder diffraction, Single crystal diffraction techniques, Thermogravimetry, Differential Thermal Analysis and Differential Scanning Calorimetry, Electron Energy Loss Spectroscopy, High Resolution Imaging Techniques- Scanning Electron Microscopy, Atomic Force Microscopy and Transmission Electron Microscopy,Optical characterization techniques- Raman spectroscopy and Ultra Violet-Visible (UV-Vis) spectroscopy

Unit IV: Applications

Functional materials, Biomedical applications, Molecular Electronics and Nanoelectronics, Nano coating, Nanomaterials for renewable energy, Nanobots, Molecular electronics and Nanoelectronics, Environment related application, Membrane based application, Polymer based application.

Suggested Readings:

1. W R Fahrner,Nanotechnology and Nanoelectronics, (Springer (India) Private Ltd., 2011).
2. MMadou, Fundamentals of Microfabrication, (CRC Press, New York, 1997).
3. N Taniguchi, Nano Technology, (Oxford University Press, New York, 2004).
4. W Ahmed and MJ Jackson, Emerging Nanotechnologies for Manufacturing, (Elsevier Inc.,2014).
5. C P Poole, F J Owens, Introduction to Nanotechnology, (John Wiley and Sons, 2004).
6. CN R Rao and A K Sood, Graphene synthesis, properties and Phenomena (Wiley VCH, 2010).
7. A Krueger, Carbon Materials and Nanotechnology (Wiley-VCH, 2010).

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCCH-I-201: CHEMISTRY: GREEN CHEMISTRY

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Green Chemistry.
- Know about green synthesis.
- Understand various applications of green materials.
- Understand Future trends in Green Chemistry.

Unit I:

Green Chemistry: History, need, and goals. Green chemistry and Sustainability.Dimensions of sustainability, Limitations/Obstacles in pursuit of the goals of Green Chemistry.Opportunities for the next generation of materials designers to create a safer future.

Unit II:

Examples of green synthesis/reaction:

Green starting materials, Green reagents, Green solvents and reaction conditions, Green catalysis, Green synthesis- Real world cases, Traditional processes and green ones), Synthesis of Ibuprofen, Adipic acid etc and selected examples from US Presidential, Green Chemistry Challenge Award Winners.Basic principles of Green Chemistry and their illustrations with examples.Prevention of waste/by-products.Maximum incorporation of the materials used in the process into the final product (Atom Economy): Green metrics, Prevention/Minimization of hazardous/toxic products.Designing

safer chemicals - different basic approaches, Selection of appropriate auxiliary substances (solvents, separation agents etc.), Energy requirements for reactions—use of microwave, ultrasonic energy, Selection of starting materials—use of renewable starting materials. Avoidance of unnecessary derivatization—careful use of blocking/protection groups.Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents. Designing biodegradable products.Prevention of chemical accidents. Strengthening/development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.Development of accurate and reliable sensors and monitors for real time in process monitoring.

Unit III:

Examples of green synthesis/reaction: Green starting materials, Green reagents, Green solvents and reaction conditions, Green catalysis, Green synthesis- Real world cases, (Traditional processes and green ones) Synthesis of Ibuprofen, Adipic acid etc. and selected examples from US Presidential Green Chemistry Challenge Award Winners.

Unit IV:

Future trends in Green Chemistry: Oxidation-reduction reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solvent less reactions; Non-covalent derivatization. Biomass conversion, emission control. Bio catalysis.

Text Books and Reference Books:

1. Green Chemistry: Theory and Practice. P.T. Anastas and J.C. Warner.Oxford University Press.
2. Green Chemistry: Introductory Text. M. Lancaster Royal Society of Chemistry (London).
3. Introduction to Green Chemistry. M.A. Ryan and M.Tinnesand, American Chemical Society (Washington).
4. Real world cases in Green Chemistry, M.C. Cann and M.E. Connelly. American Chemical Society (Washington).
5. Real world cases in Green Chemistry (Vol. 2) M.C. Cann and T.P.Umile. American Chemical Society (Washington)

PRACTICUM/ PROJECT WORK:

Candidate will be given a topic of project at the beginning of Semester III. The candidate is expected to collect pertinent literature and make a presentation based on the literature and the proposed plan of work at the end of Semester III.

Assignments will also be given based on different aspects of green chemistry. A committee of faculty members of chemistry section will evaluate the projects and assignment.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCZO-I-201: ZOOLOGY: BIODIVERSITY

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Biodiversity.
- Understand the faunal Biodiversity.
- Understand the Duties of the central and the State Government, Biodiversity management committees in conservation.

Course Contents

Unit I: Biodiversity General Account

1. Introduction to Biodiversity (Elements and concept of biodiversity).
2. Types of Biodiversity
3. Climatic Zones or zoogeographic zones of India
4. Indian Biodiversity, Vegetational Zones, Zones of Faunal distribution
5. Major Biodiversity areas of the world and India
6. Biodiversity Hot Spots
7. National Parks and Sanctuaries of Rajasthan and their biodiversity

Unit II: Faunal Biodiversity

1. Mammalian morphology, Adaptations in various groups of mammals.
2. Behavior and social organization in mammals; social and mating systems; territories; communication.
3. Bird's morphology, Adaptations in various groups of birds, morphological and physiological adaptations.

4. Bird migration, breeding behavior, parental care.
5. Biology of major Indian amphibians, fresh water and marine turtles, crocodilians, lizards and snakes.
6. Identification and study of venomous snakes, action of their venom and first aid for snake bites.

Unit III: Conservation Biology

1. Introduction to conservation biology, values of biodiversity and conservation ethics.
2. Patterns and process of biodiversity, losses and threats to biodiversity.
3. Significance of ecological restoration in conservation.
4. Duties of the central and the State Government, Biodiversity management committees.
5. Red Data Book and its significance. Role of NGOs in conservation, International NGOs; UNEP, GEF, WCS, Bird Life International, Important NGOs in India& their contributions WWF, ATREE, BNHS, WTI, Kalpavriksha etc.
6. Important NGO movements, Chipko movement, Narmada BachavoAandholan, PaniPanchayats, Seed Movement etc.
7. Wildlife Protection Act, Biodiversity Act, Forest Act and other Rules and Acts for Biodiversity protection and conservation.

Unit IV: Tools and Techniques

1. Counting Methods or Population assessment (Total Count, Road Side Count, Waterhole Count, Nest Count, Camera trap Methods, Pugmark Census, Call Census, Radio tagging, Line transect, Quadrate Method, Mark-Recapture)
2. Sampling techniques and strategies (random, stratified and systematic).
3. Concept of species richness, evenness and diversity and their measures, Diversity indices.
4. Basic introduction of GPS and GIS

Suggested Readings:

1. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.
2. Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Coexistence? Cambridge University.
3. Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5th edition. The Wildlife Society, Allen Press.
4. Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy. Blackwell Sciences

5. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing.

Practicals:

- Identification of mammalian fauna, avian fauna, herpeto-fauna
- Identification of Venomous and Non venomous snakes
- Demonstration of basic equipment needed in biodiversity studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
- Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.
- Demonstration of different field techniques for flora and fauna
- Visits to nearby Zoo, Museum, Forest, sea-shore, Nursery, Aquaria or any other relevant site must be arranged. The report of these visits will be submitted as part of the Practical work.

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B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCBO-I-201: BOTANY: BIODIVERSITY

Time: 3 Hours | Max. Marks: 80
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Understand the plant biodiversity and its significance in human lives
- Understand the threats to plant biodiversity
- Understand about biodiversity conservation.

Course Contents

Unit I: Biodiversity

Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agrobiodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Uses of plants.

Unit II: Biodiversity Management

Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss.

Management of Plant Biodiversity: Organizations associated with biodiversity management- Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR;

Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit III: Biodiversity Conservation

Conservation of Biodiversity- ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit IV: Importance of Forestry

Role of plants in relation to Human Welfare; Importance of forestry in relation to medicine, timber, gums and resins.

Suggested Readings:

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and
   Practices.Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
2. Sharma P.D., 2010 Ecology and Environment. Rastogi Publications, Meerut

Practicals:

- Visit to nearby botanical gardens, biological park. The report of this needs to be submitted.
- Study of aquatic biodiversity by visit to some pond or lake.
- Study of aquatic biodiversity by making temporary micropreparations of the phytoplanktons, algae etc.
- Herbarium sheets preparation.

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B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCMT-I-201: MATHEMATICS: DISCRETE MATHEMATICS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: At the end of the course students will be able to:

(i) Understand the concepts of Set Relation and function
(ii) Understand the concept of Graphs and planar graphs apply these in problem solving.
(iii) Explain the concept of Boolean algebra and lattices.

Course Contents

Unit I:

Set Relation and function, binary relations, equivalence relations and partitions, partial order relation and lattices chains and anti chains, pigeon hole principle, principle of inclusion and exclusion.

Unit II:

Computability and formal languages ordered sets languages, phase structure grammars types of grammars and languages permutations, combinations' and discrete probability

Unit III:

Graphs and planar graphs; basic terminology, multigraphs, weighted graphs paths and circuits travelling sales person problem, plannar graphs, trees.

Unit IV:

Boolean algebra: lattices, algebraic structures, duality, distributive and complemented lattices, boolean lattices, and boolean algebras, boolean functions as expressions.

Suggested Readings:

1. Elements of Discrete mathematics: C.L. Liu, McGraw Hill, International editions, 2008.
2. Graph Theory: NarsinghDeo, Prentice Hall of India, 2004.
3. Discrete Mathematics: N.L. Biggs, Oxford Science Publication, 1985.
4. Discrete Mathematics and its Applications: Kenneth H. Rosen, McGraw Hill, 1999.
5. Discrete Mathematics with Applications: T. Koshy, Academic Press, 2005.

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GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCED-I-201: EDUCATION: GUIDANCE & COUNSELLING IN SCHOOL

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Develop an understanding of the concepts of guidance and counselling.
- Develop an understanding of educational, vocational and personal guidance.
- Acquaint the students with the testing devices and techniques of guidance.
- Develop an understanding of collection and dissemination of occupational guidance.
- Sensitize student-teachers to the problems faced by students in the contemporary world.
- Create an awareness of the working of guidance centers.
- Provide guidance &counseling for school level students.

Course Contents

Unit I: Concept of Guidance and Counseling

- Meaning, Nature & Functions of Guidance.
- Principles of Guidance.
- Need of Guidance at various stages of life.
- Types of Guidance:
  (i) Educational Guidance – Meaning and need at Secondary level.
  (ii) Vocational Guidance – Meaning and need at Secondary level.

(iii) Personal Guidance – Meaning and need at Secondary level.

Unit II: Concept of Guidance and Counseling

- Meaning, Nature and Functions of Counseling
- Theories of Counseling:
  - Theory of Self (Rogers)
  - Rational Emotive Behavioural Therapy (Albert Ellis).
- Types of Counseling: Directive, Non directive, Eclectic.
- Process of Counseling (Initial disclosure, in depth exploration and commitment to action).

Unit III: Testing and Non- testing devices for the study of an Individual

- Tests: Aptitude, Attitude, Interest, Achievement, personality, IQ and Emotional, Mental ability, Intelligence etc.
- Techniques used in guidance: Questionnaire, Interview schedule, Case study, Diary and Autobiography.
- Professional efficacy and interest.

Unit IV: Contemporary issues and Skills in Guidance & Counselling

- Dealing with depression and academic stress (with regard to their identification and intervention). Guidance Implication in (Current Indian scenario, Education and Guidance: Democracy and Guidance, Individual Differences and Guidance, planning of Guidance cell in school.
- Skills in Counseling (Listening, Questioning, Responding, Communicating.
- Role of Teacher as a counselor and professional ethics associated with it.
- Career Counseling and Dissemination of Occupational Information.

Practicum/ Tutorials:

- Organize a workshop in school on guidance for secondary level students.
- Group discussion among pupil teachers on types of guidance.
- Pupil Teacher should guide at least one school student in any area of guidance and prepare a report to this effect.
- Organize an orientation program for student teacher on skills in counseling (listening, questioning, communicating etc.)
- Organize a Counseling program for the student who is guided by teacher student in the area/type of Guidance.Student teacher would practice on Counseling skill (at least three Time duration with 5-7 Minute per skill)
- Apply "Professional Interest test" on secondary student on the basis of interprelation, and give professional guidance to the students.
- Prepare a case study of one student with special needs at school level and give suggestions for remedial measure, too.
- Make a flow chart on Job Analyze opportunities and present it in school

among secondary students.

- Organize a programme on occupational detail Information (like area, agencies and future etc.) for school level
- Prepare a plan and establish a guidance and Counseling cell in school.
- Make a stress releasing strategy for school students and find out its effectiveness.

Suggested Readings:

1. Sharma, Shati Prabha. Career Guidance and Counselling: principles and techniques. Kanihka publisher. 2005
2. Sharma, RN & Sharma, Rachana. Guidance and Counselling in India. Atlantic Pub. & Distributors, New Delhi, 2004
3. Singh, Y.K. Guidance and Career Counselling. APH Publishing New Delhi. 2007 4. Nayak, AK. Guidance & Career Counselling. APH Publishing corp. 2007
4. Abraham, Jessy. Guidance & Counselling for Teacher Education. Sarup & sons. New Delhi. 2003

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B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCED-II-201: EDUCATION: PEACE ORIENTED VALUE EDUCATION

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Understand the importance of peace education.
- Analyse the factors responsible for disturbing peace.
- Appreciate the role of peace in life.
- Develop insight of understanding of concept of Indian values according to time, space and situation.
- Scientifically analyse values in Indian culture and tradition.
- Develop positive attitude about Indian human values
- Understand the Indian values according to Shradhha and logic.
- Understand the co-ordination with Indian values and life style.
- Analyse the ethical, artistic and pleasant values.
- Analyse absolute values in globalization and universlization.
- Develop the teaching learning method for adoptation and assimilation in life value.
- Explain fundamental aims and values that provide the intellectual basis of contemporary education policy and practice.
- Engage with issues in a manner that make them sensitive to promote certain educational values while marginalizing others.
- Explore the meaning of Ethics and values.
- Understand the process of value education.

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Course Contents

Unit I: Understanding Education for Peace

- Meaning, aims, objectives of Peace and Peace Education.
- Need and Importance of Peace Education.
- Barriers: Psychological, Cultural, Political.
- Peace promoting values: compassion, cooperation and love.
- Empowerment of self through critical self- reflection.
- Reducing prejudices and nurturing ethical behaviour.

Unit II: Nature andsources of values, Classification of values

- Meaning, concept need and importance of values and ethics.
- Personal and Social values
- Intrinsic and extrinsic values on the basis of personal interest and social good.
- Social, moral, spiritual and democratic values on the basis of expectation of society and one's self inspiration.
- Identification of Analysis of emerging issues involving value conflicts
- Design and development of instructional material for nurturing values.

Unit III: Values in religious scriptures

- Bhagwadgita- Nishkam Karma, Swadharma, Laksagrah and Stithpragya.
- Bible – Concept of truth, compassion, forgiveness
- Dhamnipada- Astangmarg, Aryastya and Madhyamarg
- Gurugranth Sahib- Concept of Kirath, Sungat, Pangat & Jivanmukti
- Quran – Concept of spiritual and moral values (adah, raham & theory of justice) & social responsibilities.

Unit IV: Methods and Evaluation of Value Education

- Traditional Methods: Story Telling, Ramleela, Tamasha, street play and folk songs.
- Practical Methods: Survey, role play, value clarification, Intellectual discussions.
- Causes of value crisis: material, social, economic, religious evils and their peaceful solution.
- Role of school- Every teacher as teacher of values, School curriculum as value laden.
- Moral Dilemma (Dharmsankat) and one's duty towards self and society

Practicum/Tutorials:

- Preparation of a report on school programmes for promotion of peace.
- Observation of classroom situation and identification of factors promoting peace.
- Analyse morning assembly programme of a school from the point of view of value education.

- Analysis of a text book of a school subject from the point of view of values hidden.
- Practice of role- play in two situations and preparation of report.
- Report on value conflict resolution in a situation.

Suggested Readings:

1. अवस्थी शशि – प्राचीन भारतीय समाज, हिन्दी माध्यम कार्यान्वयन निदेशालय, दिल्ली विश्वविधालय, दिल्ली 1993
2. उर्वशी, सरती – नैतिक शिक्षा एवं बालविकास, प्रभात प्रकाशन, चावडी बाजार, दिल्ली , 1979
3. काणे पी.वी. – धर्मशास्त्री का इतिहास, उ.प्र. हिन्दी संस्थान, हिन्दी भवन, महात्मा गांधी मार्ग, लखनऊ।
4. गुप्ता नत्थूलाल – मूल्यपरक शिक्षा पद्धति, जयकृष्ण अग्रवाल, महात्मा गांधी मार्ग, अजमेर 1989
5. गोयनका जयदयाल – महत्वपूर्ण शिक्षा, गीताप्रेस गारे खपुर।
6. पाण्डेय गोविन्दचन्द – मूल्य मीमांसा – राजस्थान हिन्दी ग्रन्थ अकादमी, तिलक नगर, जयपुर, 1973।
7. प्र सहस्र बुद्धे : जीवन मूल्य, सुरूचि साहित्य, केशवकुंज, झण्डे वालान, नई दिल्ली,
8. भारती धर्मवीर – मानव मूल्य और और साहित्य, भारतीय ज्ञानपीठ, काशी, 1972
9. मानव सेवा संघ, वृंदावन – मानवता के मूल सिद्धान्त 1981
10. मिश्र विधानिवास – अध्यापन, भारतीय दृष्टि, एनसीटीई, नई दिल्ली 1988
11. विमल कुमार – मूल्य मीमांसा, राजकमल प्रकाशन, दिल्ली
12. Acharya Mahaprija : Towards Inner Harmony, New Delhi, B. Jain Publishers, 1999
13. Dutt, N.K. and Ruhela S.P. : Human Values and Education, Sterling Publishers Pvt. Ltd., New Delhi, 198
14. Gandhi K.L. : Value Education, Gyan Publishing House, New Delhi, 1993
15. Gupta, Nathu Lal : Value Education : Theory and Practice : Jaikrishan Agarwal,Mahatma Gandhi Road, Ajmer – 2000
16. I.A. Lolla : Value Certification : An advanced Handbook for trainers and Teachers, Calif, University Associate Press, Krischan Boum, Howard 1977
17. Prem Kripal : Value in Education, NCERT, New Delhi 1981
18. Rajput, J.S. (2001). Values in Education, New Delhi, Sterling Publishers, 2005
19. Rokeach M. : The Nature of Human Values, The Free Press , New York 1973
20. Sharma R.S. : The Monk who sold his Ferrari, Mumbai, Jaico Publishing House, 2003
21. Swami Ragunath Anand: Eternal Values for a Changing Society, BVB Bombay 1971.
22. Gupta, K. M. (1989). Moral Development of School Children Gurgaon: Academic Press.
23. Krishnamurthy, J. (2000). Education and the Significance of Life. Pune: KFI.

24. Dhokalia, R. P. (2001). External Human Values and World Religious. New Delhi: NCERT.
25. Sheshadri, C., Khadere, M. A., & Adhya, G. L. (ed.) (1992). Education in Value. New Delhi: NCERT, London, Allen and Unwin.
26. Singh, R. N. (ed.) (2003). Analytical study of Sikh Philosophy, Commonwealth Publishers: New Delhi- 02.
27. Khan Masood Alia (ed.) (2006). Islamic Thought and its Philosophy. Commonwealth Publishers: New Delhi- 02.
28. Khan, Intakhab Alam (2007). Peace, Philosophy and Islam, Academic Excellence. Delhi- 31.

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GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCLH-201: LANGUAGE: रचनात्मक लेखन एंव अनुवाद

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

इकाई 1:

रचनात्मक लेखन परिभाषा, परिचय, उपयोगिता रचनात्मक लेखन के विविध रूप – कविता, कहानी उपन्यास, नाटक, एकांकी

इकाई 2:

❖ अनुवाद एवं रचनात्मक लेखन

- अनुवाद का अर्थ, स्वरूप और महत्व
- अनुवाद : इतिहास और परंपरा
- अनुवाद के तत्व – स्रोत भाषा, लक्ष्य भाषा, संप्रेषण कोशगत अर्थ, अनुवाद सामग्री भावार्थ
- अनुवाद के स्वरूप – शाब्दिक अनुवाद, भावानुवाद छायानुवाद, सारानुवाद।

इकाई 3:

❖ अनुवाद प्रक्रिया : आयाम एवं प्रमुख पक्ष

❖ अनुवाद प्रक्रिया के विभिन्न चरण — प्रमुख पक्ष

रचना का चयन	(अ) रचनाकार
पठन	(ब) अनुवादकर्ता
विश्लेषण	(स) पाठक
भाषिक अंतरण	
पुनरीक्षण	

संशोधित भाषातंरण

इकाई 4:

❖ अनुवाद एवं रचनात्मक लेखन : सम्यक मूल्यांकन
- अनुवाद कार्य की आवश्यकता एवं महत्व
- बौद्धिक – सांस्कृतिक आदान–प्रदान में अनुवाद कार्य की भूमिका

संदर्भग्रंथः

1 अनुवाद विज्ञान –सिद्धांत और अनुप्रयोग हिन्दी माध्यम कार्यान्वयन निदेशालय
2 भारतीय भाषाएँ एवं हिन्दी अनुवाद : समस्या समाधान डॉ. कैलाशचंद भाटिया (गूगल पुस्तक)
3 रचनात्मक लेखन – संपादक प्रो रमेश गौतम भारतीय ज्ञानपीठ दिल्ली
4 अनुवाद : अवधारणा एवं अनुप्रयोग सं. डॉ. चन्द्रभान रावत नेशनल पब्लिशिंग हाउस, दिल्ली

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GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCLE-201: LANGUAGE: LANGUAGE LITERATURE & EDUCATION

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Acquaint themselves with literary creations in other Indian language.
- Appreciate literary pieces from other languages of India.
- Understand the literary and cultural ethos of the country.

Unit I: Language, Society & Culture

- Language and Society
- Language and Culture
- Language and Identity
- Language and Gender

Unit II: Literature, Society & Culture

- Concept and Scope of Literature
- Literature and Society
- Importance of Literature for Society
- Impact of Literature on Society and Vice Versa

Unit III: Language and Education

- Language for Education
- Role of Language in Education
- Relationship between Language and Education
- Impact of Language on Education

Unit IV: Literature and Education

- Literature for Education
- Role of Literature in Education
- Relationship between Literature and Education

- Impact of Literature on Education

Suggested Readings:

1. Hall, G. *Literature in Language Education.* London: Palgrave Macmillan. 2005.
2. Aldama, Frederick Luis. *Why the Humanities Matter: A Commonsense Approach.* Austin: University of Texas Press. 2008.
3. Yadav, Saryug. *Language, Literature and Education.* New Delhi: Academic Excellence. 2008.
4. Mishra, A. K. *Literature, Culture and Language Education.* New Delhi: Lakshi Publishers. 2012.

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GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCGE-201: GEOGRAPHY: BASICS OF GEOGRAPHICAL INFORMATION SYSTEM- GIS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: The students will be able to:

- To introduce elementary concepts of GIS
- To explain main characteristics of geographical data
- To understand the application of GIS in solving problems of spatial nature.

Unit I:

Definition and components of GIS – hardware, software, data, people or 'liveware'; Structure of GIS

Unit II:

Geographical data: types and characteristics; Spherical and plane coordinate systems in GIS;
Implications of earth's shape and datum in geo-referencing,

Unit III:

Digital representation of geographic data: Data structure, Spatial data model, Raster and Vector models;
GIS data standards: concepts and components; Digital Elevation Model (DEM).

Unit IV:

Recent trends in GIS; Mobile GIS; Global Position System; Integration of Remote sensing and GIS; GIS data base management systems; GIS information products; Applications of GIS.

Suggested Readings:

1. Burrough, P.A. and McDonnell, R. (1998): Principles of Geographic Information Systems. Oxford University Press, Oxford.
2. Chang, K.T. (2003): Introduction to Geographic Information Systems. Tata McGraw Hill Publications Company, New Delhi.
3. Chauniyal, D. D. (2004): Remote Sensing and Geographic Information Systems, Sharda Pustak Bhawan, Allahabad. (in Hindi).
4. Demers, M. N. (2000): Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore.
5. ESRI (1993): Understanding GIS. Redlands, USA
6. Fraser Taylor, D.R. (1991): Geographic Information Systems. Pergamon Press, Oxford.
7. George, J. (2003): Fundamentals of Remote Sensing. Universities Press Private Ltd, Hyderabad.
8. Glen, E. M. and Harold, C. S. (1993): GIS Data Conversion Handbook. Fort Collins, Colorado, GIS Word Inc.
9. Guptill, S.C., and Morrison, J.L. (1995): Elements of Spatial Data Quality. Elsevier/ Pergamon, Oxford.
10. Heywood, I. (2003): An Introduction to Geographical Information Systems. 2nd edition, Pearson Publishing Company, Singapore.
11. Korte, G. M. (2002): The GIS Book. On Word Press: Thomson Learning, New York and Singapore.
12. Lo, C.P. and Yeung, A. K. W. (2002): Concepts and Techniques of Geographic Information Systems. Prentice Hall of India, New Delhi.
13. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. (1999): Geographic Information Systems.
14. Principles, Techniques, Management, Applications. John Wiley and Sons, New York.
15. Martin, D. (1996): Geographic Information Systems: Socioeconomic Implications. Routledge, London.
16. Michael F. G. and Karan K. K. (ed.) (1990): Introduction to GIS. NCGIA, Santa Barbara, California.
17. Demers, M. N. (2000): Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore.
18. ESRI (1993): Understanding GIS. Redlands, USA
19. Fraser Taylor, D.R. (1991): Geographic Information Systems. Pergamon Press, Oxford.
20. George, J. (2003): Fundamentals of Remote Sensing. Universities Press Private Ltd, Hyderabad.

21. Glen, E. M. and Harold, C. S. (1993): GIS Data Conversion Handbook. Fort Collins, Colorado, GIS Word Inc.
22. Guptill, S.C., and Morrison, J.L. (1995): Elements of Spatial Data Quality. Elsevier/ Pergamon, Oxford.
23. Heywood, I. (2003): An Introduction to Geographical Information Systems. 2nd edition, Pearson Publishing Company, Singapore.

Practical: Basics of Geographical Information System

- Principles of GIS; Properties of EMR
- Geographical data: types and characteristics;
- Spherical and plane coordinate systems in GIS;
- Implications of earth's shape and datum in geo-referencing
- Preparation of choropleths maps

Practical Record File: Students will be required to prepare a practical record file consisting of all exercises in the paper.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination may carry:
  - Lab Work (Any 2 out of 3 exercise)
  - Record File
  - Viva

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GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCHS-201: HISTORY: HERITAGE & TOURISM

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: The students will be able to:

- Understand the different facets of heritage, Tourism and their significance.
- Highlights the legal and institutional frameworks for heritage protection in India as also the challenges facing it.
- The implications of the rapidly changing interface between heritage and history will also be examined.
- The course will be strongly project- based on visits to Museum/Heritage Sites

Unit I:

- Heritage- Meaning and Significance,
- Types- Cultural Heritage, Natural Heritage, Living Heritage (Folk Art, Festivals, Living Styles etc.)
- Tangible and Intangible Heritage

Unit II:

- Heritage Organization/ Structure: Forts, Palaces
- Museums, Natural Reserves.
- Role and Significance of Heritage in tourism, Heritage Tourism, Cultural Tourism and Eco Tourism

Unit III:

- Museum and the Cultural Heritage: India's Cultural Policy

- Policy of Government of Rajasthan
- General Principles and Societies role for maintenance of Rajasthan

Unit IV:

- World Heritage sites of India with special reference to Rajasthan
- Role of UNESCO in Heritage
- Guidelines of UNESCO

Tutorials/Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any may be resolved during tutorials. Visit to Tourist site and Preparation of report (Practical).

Suggested Readings:

- गढ़वीर. माथुर. पर्यटनः दशावदिशा दृ लिटरेरीसर्किल. जयपुर
- सहाय, शिवस्वरूप. पर्यटन सिधान्त और प्रबंधन तथा भारत में पर्यटन. मोती लाल बनारसी दास
- सहाय, शिव स्वरूप. पर्यटकों का देश भारत. मोती लाल बनारसी दास
- Roy Chowdhury, Maduparna. Diplaying India's Heritage. Orient Blackswan
- David Lowenthal. The past :The Heritage Crusade and the Spoils of History.Cambridge,2010
- Layton R.P. Stone and J. Thomas. Destruction and conservation of cultural property, London :Rutledge,2001
- Lahiri N. Marshaling .The Past –Ancient India its Modern Histories, Ranikhet: Permanent Black.2012, Chapter 4 and 5
- S S Biswas. Protecting the cultural heritage (National Legislations and International Conventions). New Delhi : INTACH, 1999
- Agarwal O.P. Essentials of conservation and Museology, Delhi, 2006

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCPS-201: POLITICAL SCIENCE: DEMOCRACY AT WORK

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – teacher will be able to:

- Acquire knowledge about the working of democracy in India.
- Understand the societal basis of democracy as providing opportunities to flourish diversity through civil liberties.
- Understand Democracy as Representative, Responsible and Participatory.
- Appreciate the Democratic process as not merely a rule of Majority but Tolerance to words dissent.
- Acquaint themselves with the dividends of Democracy in India.

Unit I:

Democratic society: Understanding of Diversities, Fundament Rights, Fundamental Duties, Mass Media, Political Parties, Pressure Groups.

Unit II:

Democratic Government: Universal Adult Franchise, Representation, Parliamentary Government, Federal system, Local government at Rural and Urban areas.

Unit III:

Democratic Process: Accommodation of Social, Economic and Cultural diversities, Rule of law, Independent Judiciary

Unit IV:

Redressal of Public Grievances, Right to Information, Right to Education, MGNREGA.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

1. D.D. Basu : An Introduction to the Constitution of India, New Delhi. Prentice Hall, 1994.
2. G. Austin : Working a Democratic Constitution the Indian Experience. Delhi, Oxford University Press, 2000.
3. R. C. Agarwal :Indian Government and Politics (India Political System) 5th ed. S.Chand and Co., New Delhi 2000
4. N.G. Jayal (ed.), Democracy in India, Delhi, Oxford University Press. 2001.
5. A.G.Noorani, Constitutional Questions in India : The President, Parliament and the States Delhi, Oxford University Press, 2000.
6. Payl, Flather : Recasting Indian Politics – Essays on a Working Democracy Palgsave 2002.
7. Niraja Gopal Jayal. Democratic Governance in India : Challenges of Poverty Development and identity. Sage Publications, New Delhi
8. S.N.Singh, Caste Tribe and Religion in Indian Politics, Sai, New Delhi, 2006
9. डॉ जयराम उपाध्याय – भारत का संविधान, सेन्ट्रल लॉ एजेन्सी, इलाहाबाद, 2007
10. बी. एल. फड़ीया – भारतीय शासन एवं राजनीति, साहित्य भवन पब्लिकेशनस, आगरा, 2007
11. डॉ ए पी अवस्थी – भारतीय शासन व राजनीति, लक्ष्मी नारायण अग्रवाल, आगरा 2006
12. एस एम सईद – भारतीय राजनीतिक व्यवस्था, सुलभ प्रकाशन,लखनऊ 2004

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 3RD SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCEC-201: ECONOMICS: RECENT TRENDS & PRACTICES IN ECONOMICS

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:
The objective of this course is the make the students aware of the fundamentals of economics and also the contemporary issues

Unit I: Educational Economics

- Review of Economic Principles
- Human Capital Theory
- Job Signalling
- Educational Production Functions
- The Market for Teachers
- Teacher Incentives
- Market Dimensions of Higher Education
- Student Aid Policy and Collegiate Outcomes
- Financial Issues in Higher Education

Unit II: Social Economics

- Discrimination, the market, statistical discrimination, minimum wage, gender
- Discrimination, exclusion
- Income inequality and poverty, causes of income inequality and poverty (inflation)
- Income distribution over time, the official poverty rate

- Unemployment, measurement, types and cost of unemployment, interpreting theunemployment rate, social security

Unit III: Entrepreneurship and development

- The critical roles played entrepreneurship in Innovation systems.
- The differences between industrial and agricultural start-ups?
- Role of government in fostering entrepreneurship

Unit IV: Technology and globalization

- The importance of foreign technology in national innovation systems.
- Role played by global value chains play in evolution of innovation systems.
- Contribution of Policy approaches by emerging economies to tap into global value chains.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*:

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

1. Cohn and Geske, The Economics of Education, Chapter 1.
2. Hirshleifer, Jack (1985). The Expanding Domain of Economics. The American Economic Review, 75(6): 53-68. http://catalog.flatworldknowledge.com/catalog/editions/rittenberg-principles-ofmicroeconomics-1-0
3. Cohn and Geske, The Economics of Education, Chapter 2-4.
4. Ashenfelter, O. and Krueger, A. (1994). Estimates of the Economic Return to Schooling From A New Sample of Twins. American Economic Review, 84(5): 1157-1173.
5. Acemoglu, D., Introduction to Modern Economic Growth, Princeton University Press, 2009
6. Spence, M. (1973). Job Market Signalling. Quarterly Journal of Economics, 87(3): 355-374.
7. Cohn and Geske, The Economics of Education, Chapter 9.
8. Bound, J., Hershbein, B., and Long, B. (2009). Playing the Admissions Game: Student Reactions to Increasing College Competition. Journal of Economic Perspectives, 23(4): 119-146.
9. Deming, D., Goldin C., and Katz, L. (2012). The For-Profit Postsecondary School Sector:Nimble Critters or Agile Predators? Journal of Economic Perspectives, 26(1): 139-164.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 4th SEMESTER SYLLABI AS PER CBCS PATTERN

B. Sc. B. Ed. (CBCS) Semester- IV
GROUP B: GENERIC COURSE (GC)
GCIR 202: INDIAN CONSTITUTION AND HUMAN RIGHTS

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Know the importance, preamble and salient features of Indian Constitution
- Appreciate the significance of Fundamental Rights, Duties and Directive Principles of State Policy.
- Develop an understanding of the strength of the Union Government.
- Understand the functioning of the State Government for the unity and the strength of the Democracy.
- Know the importance of local self-Government and Panchayati Raj Institutions in India.
- Know the meaning, significance, the growing advocacy of Human Rights.

Transaction Mode: Through Lectures, Group discussions, Interactive sessions, field activities and use of Education Technology.

Course Contents

Unit I: Meaning and Importance of the Constitution

Preamble, Salient features, Constituent Assembly and the Spirit of the Indian Constitution.

Unit II: Fundamental Rights, Duties and Directive Principles

Fundamental Rights, Fundamental Duties, and the Directive Principles of the state policy of the Indian Constitution.

Unit III: Union, State and Local Self Governments

Union Government: Parliament, the President and Prime Minister: State Government: Governor and the Council of Minister: Judiciary: Functions and Powers: Panchayat Raj System.

Unit IV: Human Rights

Origin and Development of Human Rights, Growing Advocacy and Declining Trends of Human Rights, Rights of Scheduled Casts, Scheduled Tribes, Minorities, Children and Women, Human Rights Defenders, Human Rights Violation and Human Rights Organizations.

Suggested Readings:

1. M.V.Pylee, Indian Constitution, OUP, New Delhi
2. Granveille Austin, Indian Constitution, OUP, New Delhi
3. RajaniKotari, Politics in India, OUP, New Delhi
4. Johari, J C, Indian Government and Politics.
5. S R Maheswari, Local Governments in India (Latest Edition)
6. R K Arora and RajaniGoyal, Indian Public Aministration 1995.
7. C P Bhambri, Introduction to Indian Constitution.
8. Subash C Kashyap, The Working of Indian Constitution, NBT, New Delhi
9. Subash C Kashyap,Our Parliament, NBT, New Delhi
10. Granveille Austin, Functioning of the Indian Constitution, NBT, New Delhi.
11. Bipan Chandra, India after Independence. Roopa, New Delhi 2000.
12. Arjun Dev, Source Book on Human Rights, NCERT, New Delhi.
13. Human Rights in India: Theory and Practice, National Book Trust, 2001.

GROUP C: CORE COURSE (CC) 1(IV)
PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Know the fundamental concepts of Optics and Laser.
- Understand the design and working of Laser.
- Apply the concepts in understanding the various optical phenomena.
- Solve the problems related to optics.
- Analyze the optical phenomena in experiments of optics.

Course Contents

Unit I:

Interference of a light:

Division of wave front and division of amplitude, The principle of superposition, two-slit interference, Fresnel biprism, thin film interference, Newton's rings, application of interference in determination of wavelength and precision measurements.

Haidinger fringes:

Fringes of equal inclination, Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines, Intensity distribution in multiple beam interference, Fabry-Perot interferometer.

Unit II:

Fresnel diffraction:

Fresnel half-period zones, Types of zone plates, Circular aperture, Circular disc, Diffraction at a straight edge, Construction and working principle of Zone plate and its application as a lens.

Fraunhofer diffraction:

Diffraction at a single slit, double slits & N parallel slits and their intensity distribution, plane transmission diffraction grating, reflection grating and blazed

grating, Concave grating and different mountings, diffraction at a circular aperture. Rayleigh criterion of Resolution, Resolving power of Telescope, Microscope, Grating and Prism.

UnitIII:

Polarization and Optical Rotation:

Meaning and representation of Polarized light, Types of polarized light, Production of Polarized light, Brewster law, Malus law, double refraction, Phase retardation plates, Analysis of Polarized light as plane polarized, circularly polarized and Elliptically polarized light, Rotation of plane of polarization, Specific rotation and its experimental determination, Polarimeter (Laurent and Biquartz).

Unit IV:

Lasers: Laser system, Radiative and Non-radiative Transition mechanisms, Basic necessity for a Lasing device, Einstein's A and B coefficients, Spontaneous and Induced emissions, conditions for laser action, population inversion, Construction, Working principle and Applications of Ruby laser, He-Ne Laser and Semiconductor lasers. Basic concepts of Holography, Construction of a Hologram and reconstruction of the image.

Suggested Readings:

1. A K Ghatak, Physical Optics (Tata McGraw-Hill Publishing Co. Ltd, New Delhi).
2. D P Khandelwal, Optics and Atomic Physics (Himalaya Publishing House, Bombay, 1998).
3. F Smith and J Thomson, Manchester Physics series; Optics (English Language book Society and John Wiley, 1977).
4. Bom and Wolf, Optics.
5. K D Moltev, Optics (Oxford University Press)
6. Sears, Optics.
7. Jenkins and White, Fundamental of Optics (McGraw-Hill)
8. Smith and Thomson, Optics (John Wiley and Sons).
9. A K Ghatak, Physical Optics
10. B B Laud, Lasers and Non-linear Optics (Wiley Eastern 1986)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To determine the wavelength of sodium light by Newton's Ring Method.
2. To determine the wavelength of three colours using diffraction grating.
3. To determine the wavelength of sodium light using Biprism.

4. To determine the specific rotation of sugar solution by polarimeter.
5. To find out the wavelength of a given monochromatic (Sodium light) source using Michelson's interferometer and determination of D_1& D_2.
6. To determine the thickness of carbon paper by interference method.
7. To determine the wavelength of light using Helium-Neon Laser in I & II order diffractions.

GROUP C: CORE COURSE (CC) 2 (IV)
CHM 202: CHEMISTRY: INORGANIC CHEMISTRY

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To gain an understanding of the chemistry of transition and inner transition metals, coordination compounds, organometallic compounds, metal carbonyls of Transition Elements, Coordination chemistry and magnetic behaviour of complexes, Chemistry of Lanthanide and Actinides, concepts of Oxidation and Reduction and Principles involved in the extraction of the elements.

Course Contents

Unit I:

Transition Elements

General group trends with special reference to electronic configuration, variable valency, magnetic and catalytic properties, colour and spectral behaviour, ability to form complexes, stability of various oxidation states and e.m.f. comparative studies of Chemistry of the first, second and third transition series.

Inorganic Reaction Mechanism

Thermodynamic and Kinetic stability. Introduction to inorganic reaction mechanisms. Substitution reactions in square planar Complexes, Trans-effect, theories of trans effect. Determination of binary formation constant by pHmetry and spectrophotometry

Unit II: .

Chemistry of Lanthanide and Actinides

Chemistry of Lanthanide: Occurrence and separation, electronic structure, oxidation states and ionic radii and lanthanide contraction, spectral and magnetic properties, complex formation and applications.

Chemistry of Actinides: Electronic configuration, oxidation states, actinide contraction, complex formation, spectral and magnetic properties, applications. Chemistry of separation of Np, Pu and Am from Uranium, similarities between the later actinides and later lanthanides.

Unit III:

Coordination Compounds

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes. Limitations of valance bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

Oxidation and Reduction

Use of redox potential data- analysis of redox cycle, redox stability in water-Frost, Latimer and Pourbaix diagrams. Principles involved in the extraction of the elements.

Unit IV:

Organometalic Compounds, Metal Carbonyls &Nitrosyls

A. Organometallic compounds

Definition, nomenclature and classification of organometallic compounds, preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, a brief account of metal-ethylene complexes and homogenous hydrogenation.

B. Carbonyls and Nitrosyls

a) **Metallic Carbonyls**: Metallic carbonyls General methods of Preparation, general properties, structure and nature of Metal carbonyls, bonding in carbonyls, Effective atomic number (EAN) rules as applied to metallic carbonyls. 18-electron rules applied to metallic carbonyls. Preparation, properties and structure of nickel tetracarbonyl, iron penta carbonyls, chromium hexa carbonyls, dimanganesedeca carbonyl, dicobaltocta carbonyl.

b) **Metallic Nitrosyls:** Some metallic Nitrosyls: Metal nitrosyl carbonyls, metal nitrosyl halides, sodium nitroprusside (Preparation properties, structures and uses) structure and nature of M-N bonding in nitorsyl. Effective atomic number (EAN) rules as applied to metallic nitrosyls.

Suggested Readings:

1. R. C. Mehrotra and A. Singh Organometallic Chemistry :A Unified Approach, Wiley
2. A. G. Sharpe: Inorganic Chemistry, Pearson
3. Bell and Lott: Modern approach to Inorganic chemistry, Van Nostrand
4. Emelns and Anderson Principles of Inorganic Chemistry
5. G. L. Miessler and D. A. Tarr: Inorganic Chemistry, Prentice Hall
6. Cotton and Wilkinson, Advanced Inorganic Chemistry, 6th Edition, Wiley
7. Lee, J.D. Concise Inorganic Chemistry, ELBS.

8. Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry
9. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications
10. Shriver and Atkins Inorganic Chemistry, W. H. Freeman and Company
11. James Huheey, Inorganic chemistry: Principles of Structure and Reactivity, Pearson Education India
12. Shriver and Atkins' Inorganic Chemistry, Oxford Press
13. Green wood, Chemistry of The Elements, Elsevier

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Synthesis and analysis

a. Preparation of sodium trioxalatoferrate (III), Na_3 [Fe $(C_2O_4)_3$] and determination of its composition by permanganometry.
b. Preparation of copper tetraammine complex. $[Cu(NH_3)_4]SO_4$.
c. Preparation of Ni-DMG complex, $[Ni(DMG)_2]$.
d. Preparation of *cis*- and *trans* – bisoxalatodiaqua chromate (III) ion.

Gravimetric Analysis

a. Cu as Copper thiocyanate.
b. Ni as Nickel dimethylgloxime

pH metry

a. To determine normality of xN HCl by pH metry.
b. To determine normality and dissociation constant of weak acid (xN CH_3COOH) by pH metry.
c. To determine normality and dissociation constant of dibasic acid (xN oxalic acid/malonic acid/maleic acid) using 0.1N NaOH solution

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 4th SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP C: CORE COURSE (CC) 3(IV)
ZOO 202: ZOOLOGY: ANIMAL PHYSIOLOGY AND ENDOCRINOLOGY

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objective:

To enable students to comprehend the modern concepts of physiological aspects on various organs and systems of animals and human being to comprehend chemical nature, biological molecules and physiological roles.

Course Contents

Unit I:

- Physiology of digestion: Chemical nature of food stuff (including micronutrients), various types of digestive enzymes and their digestive action in the alimentary canal, role of GI hormones in digestion, mechanism of absorption of digested food.
- Physiology of respiration: Mechanism and control of breathing, exchange of gases transport of respiratory gases (oxygen and carbon dioxide)

Unit II:

- Physiology of blood circulation
- Composition and function of blood.
- Blood groups (ABO and Rh)
- Blood coagulation – factors, mechanism, theories and anticoagulants.
- Origin, conduction and regulation of heart beat in mammals.
- Cardiac cycle, ECG
- Nerve physiology: structure and types of neuron, origin and conduction of nerve impulse,
- Synapse-structure, types, properties and signal transmission through synapses.

Unit III:

- Muscle physiology: Ultra-structure and mechanism of contraction of skeletal muscle, summation and fatigue.
- Physiology of Excretion: Nitrogenous wastes, anatomy of mammalian kidney, structure of nephron, mechanism of urea and urine formation (including hormonal regulation)osmoregulation
- Physiology of Reproduction:hormonal control of male and female reproduction, implantation, parturition and lactation in mammals
- Female Reproductive cycle.

Unit IV: Endocrinology

- Hormones: Classification, properties of hormones.
- Mechanism of hormone action (peptide and sterioid hormones)
- Endocrine glands:Pituitary gland: Location, anatomy and functions of hormones with hypothalamic regulation
- Thyroid gland: Location, anatomy, synthesis and function of T3 & T4
- Adrenal gland, Islets of Langerhans, Testes and Ovaries

Suggested Readings:

1. A text book of Medical physiology, Guyten and hall, Elsvier Pub (South Asia) 2013.
2. Animal Physiology, K Schmidt – Nielson, 5thed, Cambridge Pub 2013.
3. Biochemistry D Voet& JG Voet, Wiley 2011
4. Animal Physiology by A. MariaKutikan&N. Arumugam – (Saras Publication, Nagercoil, Tamil Nadu).
5. Animal Physiology and biochemistry by K.V. Sastry – (Rastogi Publications, 2008).
6. Regulatory mechanism in Vertebrates by Kamleshwar Pandey and J.P. Shukla-(Rastogi Publications, 2008)
7. Animal Physiology by K.A. Goyal and K.V. Sastry –(Rastogi Publication 2008)
8. Endocrinology and Reproductive Biology by K.V. Sasyry - (Rastogi Publication 2008)
9. Animal Physiology by Arora M.P. (1989)- Himalaya Pucations House.
10. Textbook of medical Physiology by Guyton A.C. & Hall J.E (1996)- (W.B. Saunders & Co.)
11. General and Comparative Physiology by Hoar W.S. (1983) – Prentice Hall Publication)
12. A textbook of Animal Physiology by Hurtkar P.C. &Mathur P.N. (1976) – S Chand & Co.
13. General Endocrinology by Turner C.D. &Gangara J.T. (1971) - W.B. Saunders & Co.
14. Animal Physiology , Biochemistry and Immunology, Dr KC Soni Hindi Edition , College book centre, Chaura Rasta , Jaipur
15. Animal Physiology and Immunology , Dr KC Soni Hindi Edition, College book centre , Chaura Rasta, Jaipur

16. Mammalian Endocrinology and Animal Behavior , Dr VS Pawar, Hindi Edition , College book centre, Chaura Rasta, Jaipur

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents

1. Effect of temperature and pH on the salivary amylase enzyme activity.
2. Preparation of Blood smears of frog / lizard/ bird / mammals.
3. Identification of blood groups (ABO) and Rh factor in man.
4. Estimation of Hemoglobin by Sahils method.
5. Enumeration of RBC in blood samples.
6. Enumeration of WBC in blood samples.
7. Preparation of Haemin Crystals.
8. Effect of different concentrations of NaCl on RBC.
9. Measurement of blood pressure, Heart beat and Pulse rate.
10. Study of bleeding time, Coagulation time of blood.
11. Dissect and demonstrate the endocrine glands in rat and man (Chart or model).
12. Study of Histological slides of the following endocrine gland of mammal testis, ovary, thyroid, adrenal, pituitary, Islets of Langerhans.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 4th SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP C: CORE COURSE (CC) 1(IV)
BOT 202: BOTANY: PLANT TAXONOMY AND UTILIZATION OF PLANTS

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

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

- Understand the principles of plant nomenclature;
- Understand the evolution of taxonomic thought and the various systems of classification;
- Understand the diversity that exists among angiosperms;
- Make detailed study of selected families;
- Understand the utility of plants and plant products in human welfare.

Course Contents

Unit I:Angiosperm taxonomy: Brief history, aims and fundamental concepts of artificial, natural and phylogenetic system of classification, Bentham & Hooker, Engler & Prantl and Hutchinson, system of classification.
Herbarium; Tools and techniques, important herbaria and botanical gardens of India and their importance.

Unit II: Botanical Nomenclature: Principles and rules of ICBN, type of concept, taxonomical categories, principle of priority, identification keys, floras.
Diversity of flowering plants as illustrated by members of the families – Annonaceae, Fabaceae, Brassicaceae, Malvaceae, Apiaceae.

Unit III: Diversity of flowering plants as illustrated by members of the families –Acanthaceae, Apocynaceae, Asteraceae, Solanaceae, Lamiaceae; Amaranthaceae, Euphorbiaceae, Liliaceae and Poaceae.

Unit IV: Origin, Cultivation and value added products of following:
Cereals: Rice, Wheat and Maize Oil Yielding Plants: Mustard, Groundnut and CoconutFibre Yielding Plants: Cotton, Sun-hemp. Spices: Cardamom, Fennel, Cumin, Coriander.Medicinal plants: Opium, Cinchona, Sarpagandha. Beverages: Tea & Coffee. Rubber: General Account

Suggested Readings:

1. Jones, A.B. and A.Luchsinger, 1979, Plant Systematics, McGrow Hill Book Co., New York.
2. Priti Shukla and Misra, 1988, Taxonomy of Angiosperms, Vikas Publishing House, New Delhi.
3. Hutchinson, J., The families of Flowering Plants, Clarendon Press,Oxford.
4. Davis, P.H. and V.H.Heywood, 1963, Principles of Angiosperm Taxonomy, Oliver and Boyd,London.
5. Heywood, V.H. and D.M.Moore (Ed.)1984, Current concepts in Plant Taxonomy, Academic Press,London.
6. Singh, G.1999, Plant Systematics:Theory and Practice, Oxford and IBH Pvt. Ltd., New Delhi.
7. Stace, C.A. 1989, Plant Taxonomy and Biosystematics (2nd Ed.), Edward Arnold,London.
8. Singh V. and D.K.Jain, 2005, Taxonomy of Angiosperms, Rastogi Publications,Meerut.
9. Kochhar S.L.1981, Economic Botany in the Tropics, MacMillan IndiaLtd.Delhi.
10. Vashista P.C. 1980, Taxonomy of Angiosperms, Sultanchand & Co., NewDelhi.
11. Lawrence, G.H.M. 1950 Taxonomy of Vascular Plants, MacMillan,London.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- Study of selected technical terms and their definitions (used in the description of plant).
- Detailed study of at least one plant specimen per family as given in theorysyllabus.
- Field study (3-5 days) to a nearby forest, for collection, identification and submission of herbariumsheets;
- To recognize the botanical name, family, part used and products of economic

importance as per theorysyllabus;

- Preparation and submission of an illustrated inventory of 5 medicinal plants used in indigenous systems of medicine and allopathy (Write their botanical name, family, part used, active principle and diseases/disorders for which they areprescribed).

GROUP C: CORE COURSE (CC) 3(IV)
MTH 202: MATHEMATICS: ABSTRACT ALGEBRA

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:
By the end of the semester the students will be able to develop understanding of the abstract concepts of groups, rings, special classes of rings which in turn make them appreciate modern mathematical concepts.

Unit I:

Sets, Relations, functions and binary operations, binary operations in contrast to unary and ternary operations, equivalence relation, Group: Definition, examples and simple properties of groups and subgroups.

Unit II:

Permutation groups, cyclic groups, cosets, Lagrange's theorem, homomorphism and isomorphism of groups, Cayley's theorem, Normal subgroups and Quotient groups, fundamental theorem of homomorphism of groups.

Unit III:

Rings: Definition and examples. Residue classes of rings, Special classes of rings, integral domain,field,division ring, simple properties of ring, sub ring, sub field, ring homomorphism and ring isomorphism.

Unit IV:

Ideal, principal ideal, principal ideal ring, quotient ring, prime ideal, maximal ideal, Euclidean rings and its properties, polynomial rings.

Suggested Readings:

1. Topics in Algebra: I.N. Herstein, Wiley Eastern, New Delhi, 2nd ed. 1975.

2. A Course in Abstract Algebra: V.K. Khanna and S.K. Bhambri, Vikas Pub. House, New Delhi, 2nd rev. ed. 1998.

3. Modern Algebra: A.R. Vashistha, Krishna PrakashanMandir, Meerut, 2nd rev. ed., 1971.

4. Algebra: M. Artin (1991) Prentice Hall.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester IV
PEIS 202: INCLUSIVE SCHOOLING

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Demonstrate knowledge on different perspectives in the area of education of children with disabilities;
- Reformulate attitudes towards children with special needs;
- Identify needs of children with diversities;
- Plan need-based programmes for all children with varied abilities in the classroom;
- Use human and material resources in the classroom;
- Use specific strategies involving skills in teaching special needs children in inclusive school;
- Plan and execute appropriate learner-friendly evaluation procedures;
- Incorporate innovative practices to respond to education of children with special needs;
- Contribute to the formulation of policy
- Implement laws pertaining to education of children with special needs.

Course Contents

Unit I: Paradigms in Education of Children with Special Needs

- Historical perspectives and contemporary trends.
- Defining Special Needs: ways of looking of Educational Difficulties -individual deficit view vs. curriculum view.

- Approaches of viewing disabilities:The charity model, the bio-centric model, the functional model and the human rights model.
- Concept of special education, integrated education and inclusive education.

Unit II: Legal and Policy Perspectives

- Recommendations of the Salamanca Statement and Framework of Action, 1994, Educational Provisions in the UNCRPD, 2006.
- Constitutional Provisions; Persons with Disabilities Act, 1995, (PWD Act); Rehabilitation Council of India Act, 1992, National Trust Act 1999 and RTE Act, 2009, Rights of Persons with Disability Act 2016, National Institutes.
- National Policy - Education of Students with Disabilities in the National Policy on Education, 1986, POA 1992.
- Integrated Education for PWD, Children (IEDC, 1974), Scheme for Inclusive Education for PWD (IEDC, 2000) and Education of Special Focus Groups under the Sarva Shiksha Abhiyan (SSA, 2000); Scheme of Inclusive Education for PWD at secondary School (IEDSS, 2009).

Unit III: Inclusive practices in schools

- Visual impairment, Hearing impairment, Locomotor and Neuromuscular disorders, Mental Retardation, Specific learning disabilities.
- Concept and philosophy of inclusive education.
- Teaching competencies required for inclusive classroom.
- Peer tutoring, Cooperative learning, social learning, system approvals Multisensory teaching, reflective teaching.
- Supportive services required for meeting special needs in the classroom.
- Duty of educational institutions, appropriate governments and local authorities to provide, promote and facilitate inclusive education and towards creation of barrier-free environment for persons with disabilities.

Unit IV:Assessment, teaching and development of supportive services for CWSN

- Concept and techniques of assessment.
- Identification and functional assessment of children with special needs.
- Implication of assessment for instructional planning and placement.
- Developing lesson plan and TLM for children with special needs.
- Involving community resources as source of support to Inclusive school.

Modes of Learning Engagement:

- The study materials must be presented to the trainees and discussions and reflections should be encouraged.
- The students should be exposed to good practices of dealing with special needs either through videos or through actual visits.
- It is important to engage the participants in a lot of cooperative group work so that they start valuing alternative points of view and significance of collaboration.

- The student trainees can also be asked to write their reflections on various topics.
- Presentation of case studies and discussion.
- Interaction with children with disabilities studying in schools and spending quality time with them is of great help in changing attitudes and developing empathy.
- Projects on various topics can help the students to acquire in depth knowledge.
- Audio- Visual presentations and demonstrating various practices.

Practicum/ Tutorials:

1. Reflective written assignments
2. Conducting seminar on chosen topics
3. Group reports
4. Field visit reports/ project report
5. Case studies on different disabilities

Suggested Readings:

1. Farrell, M. (2004). Special Educational Needs: A Resource for Practitioners. New Delhi. Sage Publications.
2. Hallahan & Kanffman J.M. (1984). Exceptional Children. Prentice Hall.
3. Hegarty S. & Mithu Alur (2002). Education and children with Special need. New Delhi. Sage Publication.
4. The Persons with Disability Act (1995). Ministry of Social Justice and Empowerment. Government of India, India, MSJE.
5. Chadha, A. (1999). A Handbook for Primary School Teacher of Children with learning Disabilities. New Delhi. Education Consultant of India Limited.
6. UNESCO (1994). The Solamanca Statement and Framework for Action on Special needs Education. Paris. UNESCO.
7. Koul,V.(1993). Early Childhood Education Programme. New Delhi. NCERT.
8. Muralidharan, R. (1990). Early Stimulation Activities for Young Children. New Delhi. NCERT.
9. Panda, K., C. (1990). Education of Exceptional Children. New Delhi. Vikas Publications.
10. Arora, K, Dave, P & Sinclair, S. (1987). Detection and prevention of mentally Handicapped. New Delhi. NCERT.
11. NCERT and UNESCO (2004). Inclusive Education: An Orientation package for Teacher Educators. Department of Education of Groups with special needs. NCERT and UNESCO.
12. NCERT and UNESCO (2000). Assessment of Needs for Inclusive Education. Report of the First Regional Workshop. NCERT and UNESCO.
13. Mani, M., N., G. (2001). Inclusive Education in Indian context. INRDC.
14. Banine, D (1988). Handicapped children in Developing countries: Assessment, Curriculum and Instruction - Edmonton (Alberta). University of Alberta.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester IV
PELT 202: LEARNING AND TEACHING

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: The student teacher will be able:

- To develop scientific attitude for the process of teaching & learning.
- To develop understanding about the relationship of cognitive, social and emotional development with learning process
- To provide an overall view on teaching & learning style and ideas to enhance these activities
- To introduce student – teachers with teaching skill, component and parameters of effective teaching
- To develop insight for perfect teaching by its overall perspectives in detail.

Course Contents

Unit I: Psychological Domains of Learning and Teaching

- Meaning and principles of development, relationship between development and learning.
- Meaning of cognition and its role in learning, socio-cultural factors influencing cognition and learning.
- Social development – Meaning, Importance, Social process and its effect on Teaching & Learning, theory of social construction(Bruner)
- Emotional development: - Meaning, Process, Need to Study its effect on Teaching and Learning Process.

Unit II: Effective Teaching and Learning

- Effective Teaching: Meaning, Component and Parameters of Effective Teaching, Identification of Teaching Skills, Principles of Teaching, Classroom instruction

strategies, Teacher as a Learner, Modernising the classroom, Teacher behaviour and classroom climate (Flanders' interaction analysis system).

- Teaching for culturally diverse students, theory of culturally relevant pedagogy.
- Creative Teaching: Meaning, concept and ways of teaching creatively.
- Unlearning to learn
- Learning- Meaning, and characteristics, factors influencing learning, Types of learning (Insight, Constructivist and Social), Tradition and changes in view of the learning process a shift from teaching to learning.
- Principles of learning, Quality of learning.
- Role of teacher in teaching-learning situations: (a) Transmitter of knowledge (b) Teacher as a Role Model (c) Facilitator for Encouraging Children to Construct knowledge (Constructivist Approach) (d) Co-learner, concept mapping
- Classroom Instruction Strategies (General Introduction)
- Role of motivation in learning- Concept, Motivational Strategies to be used in classroom teaching.

Unit III: Learning Style and Teaching Style

- Diversity among learners and learning needs (with reference to special needs).
- Multilingual background: Concept, Multilingual background of children and its classroom implications.
- Learning Style: - concept, Types and importance in Teaching –Learning process, factors affecting learning style.
- Introduction of teaching Models: Concept attitude, advance organization and inquiry model.
- Teaching Style: - Concept, Types and effect on learners' learning process, factor affecting teaching Style.
- Teacher behaviour, effect of Verbal and Non-Verbal behaviour of Teacher on students' learning.
- Use of out of class experiences of children in classroom teaching, Organisational climate and teaching.

Unit IV: Learning in 'Constructivist' Perspective

- Distinctions between learning as 'construction of knowledge' and learning as 'transmission and reception of knowledge'.
- Social-Constructivist perspective (also Bruner and Ausubel's perspective) and applications of Vygotky's ideas in teaching.
- Understanding processes that facilitate 'construction of knowledge':
  (i) Experiential learning and reflection
  (ii) Social mediation
  (iii) Cognitive negotiability
  (iv) Situated learning and cognitive apprenticeship
  (v) Meta-cognition.
- Creating facilitative learning environment.

- Teachers' attitudes, expectations– enhancing motivation, Achievement motivation, positive emotions, self-efficacy, collaborative and self-regulated learning. (The focus is on learning as a constructive rather than a reproductive process. The learner- centered orientation has implications for understanding learning as contextual and self-regulated process and following suitable classroom practices).

Practicum/ Tutorials:

- Analysing the behaviour of your fellow student-teachers, find out how socio-cultural factors have influenced & shaped their learning.
- Write a report about some best teachers in your past experiences & write some special features of their ways of teaching.
- Conduct a case study of an individual (Educationally exceptional – Differently-abled).
- Conduct and interview of 02 students of multilingual background and list the problems face by them in classroom conditions.
- Trace out some of the odd Non-Verbal behaviour of any 05 fellow student teachers.

Suggested Readings:

1. PkSkcs ,l-ih] 2005]cky fodkl o euksfoKku ds ewy rRo
2. Concept Publishing Company Private Ltd, Mahan Garden, New Delhi.
3. भूषण शैलेन्द्र, 2007–08, शैक्षिक तकनीकी,अग्रवान पब्लिकेशन, आगरा–7
4. शर्मा डॉ. आर.ए., 2008, शिक्षा के मनोविज्ञान आधार,इंटरनेशनल पब्लिशिंग हाउस,मेरठ।
5. कुलश्रेष्ठ एस.पी., 2007–08, शैक्षिक तकनीकी के मूल आधार, अग्रवाल पब्लिकेशन, आगरा
6. ऑवेरॉय डॉ. एस. सी, 1999, शिक्षक तकनीकी के मूल तत्व, आर्य बुक डिपो, करोल बाग, नई दिल्ली
7. शर्मा डॉ. आर.ए., शिक्षण अधिनम में नवीन प्रवर्तन 2005, आर. लाल बुक डिपो, मेरठ।
8. व्यास हरिश्चन्द्र एवं शर्मा अधिगम और विकास के मनोसामाजिक आधार, राजस्थान हिन्दी ग्रंथ अकादमी जयपुर – 4
9. सिंह,रामपाल एवं सिंह, नगेन्द्र (2013)शिक्षण एवं अधिगम के मनोसामाजिक आधार, अग्रवाल पब्लिकेशन, आगरा
10. सिंह नगेन्द्र एवं सेवानी अशोक, (2013): अधिगम का मनोविज्ञान, अग्रवाल पब्लिकेशन, आगर
11. सिंह रामपाल एवं सेवानी अशोक, (2013):शैक्षिक तकनीकी एवं कक्षा कक्ष प्रबंधन, अग्रवाल पब्लिकेशन, आगर
12. ैंतउं त्ण ।ण्ए ।तलं. 2008ए उमहं जतमदके पद पदेजतनबजपवदंस जमबीदवसवहलए ;त्वहतंउउगक पदेजतनबजपवद भ्समंतदपदहए सवबंस इववा कमचवजए डगमतनज ;नचद्ध
13. शर्मा, डॉ. आर.ए. 2005, शिक्षण अधिगम में नवीन प्रवर्तन, आर.लाल बुक डिपो, मेरठ।
14. Siddiqui, Mujebul Hasan, 2009, teachings of teaching (classroom teaching). APH publishing, New Delhi.
15. Mathur, Dr. S.S, Mathur, Dr. Anju. 2007-2008 development of learner and teaching learning process, agrawal publication Agra.
16. Rao. V.K, Reddy, R.s.1992, learning and teaching commonwealth publishers, New Delhi.
17. Bhatnagar, A.B, Bhatnagar, M., Bhatnagar, A 2008, Development of learner and teaching learning process, R.lal book depot, Meerut.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester IV
CPSKC 202: KNOWLEDGE AND CURRICULUM

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: on the completion of course, the student teacher will be able to:

- Gain insight into the various forms of knowledge and disciplines and their implications to school subjects.
- Develop an understanding about how knowledge is organized into curriculum.
- Develop an understanding of the concept of curriculum, curriculum framework and the related concepts.
- Develop an understanding of the various foundations of curriculum planning.
- Acquaint the student with the existing approaches to curriculum design.
- Reflect on various trends in curriculum development.

Course Contents

UnitI: Concept of Curriculum

- Meaning and nature of curriculum, need and importance of curriculum in schools.
- Differentiating curriculum framework, curriculum and syllabus, their significance in school education.
- Facets of curriculum- core curriculum, hidden curriculum, activity based curriculum, interdisciplinary curriculum, spiral curriculum and integrated curriculum.
- Curriculum visualized at different levels: national level, state level, school level, class level and related issues.

Unit II: Curriculum Determinants and Considerations

- Determinants of curriculum (philosophical, psychological, sociological, political).
- Considerations in curriculum development: (at school level)
- Forms of knowledge and its characterization in different school subjects.
- Socio-cultural context of students –multi-cultural, multilingual aspects.
- Learner characteristics.
- Teachers' experiences and concerns.
- Critical issues: environmental concerns, gender differences, inclusiveness, value concerns and issues, social sensitivity.
- Curriculum and school subject knowledge selection process and purpose.
- Selection of school subject knowledge: criteria and agencies.
- Legitimization of knowledge selection: socio-cultural and politico-economic forces.
- Problematizaiton of school knowledge selection: debates to identify change and continuity:
- Constitutional ideals and national priorites.
- Global concerns.

UnitIII: CurriculumDevelopment

- Process of curriculum development
- Formulating aims and objectives.
- Criteria for selecting knowledge and representing knowledge in the form of different subjects.
- Organizing fundamental concepts and themes vertically across levels and integrating themes within (and across) different subject.
- Selection and organization of learning situations.

Unit IV: Curriculum Implementation and Evaluation

- Role of state and national agencies in implementing curriculum.
- Teachers' role in generating dynamic curricular experiences through-
  - Flexible interpretation of curricular aims.
  - Contextualization of learning.
  - Varied learning experiences.
  - Learning resources.
  - Translating curricular objectives into instructional planning.
- Need and evaluation of effective curriculum construction with reference to existing pedagogies and instructional approaches, teacher training, textbooks and instructional materials.
- Approaches and criteria to curriculum evaluation and text-book analysis.
- Role of MHRD, NCERT and the states in curriculum reform.

Modes of Learning Engagement:

A set of readings need to be compiled, which includes those which clarify key concepts, trace the evolution of alternative conceptions of curriculum, contextualize

the problem of curriculum, indicate ways of developing, implementing and reviewing curriculum. In addition, national curriculum documents and relevant secondary school syllabi should also be made available.

The following modes of learning engagement are suggested:

- Introductory lectures on key themes and concepts
- Study and discussions on the process of curriculum development at various levels
- Study of the NCF 2005 as well as the earlier curriculum frameworks and a prescribed syllabus;
- Discussion on purpose of curriculum framework;
- Critical evaluation of the extent to which the curriculum framework is reflected in the syllabus (in small groups)
- Interactions with school teachers and principal about how they operationalize the prescribed curriculum into an action plan; how curriculum is evaluated and revised
- Observing the kinds of curricular experiences, a school provides apart from classroom teaching and discern their relevance vis a vis learner development; for this interactions with teachers and students could be held
- Study of selected readings and presentations based on these

Practicum/ Tutorials:

1. Preparation of any topic from the course content and presenting in the classroom.
2. Analytical study of school- curriculum implementation.
3. Development of a unit test and its try out.
4. Evaluation of a school textbook.
5. Nature and level of participation in discussions.
6. Presentations based on readings.
7. Field notes on observations and interviews in schools, and linking these with concepts introduced.
8. Analysis of curriculum development/implementation processes within a school, based on field notes and observations.

Suggested Readings:

1. Bob moon and Patricia murphy (Ed). (1999). Curriculum in context. London. Paul chapman publishing.
2. Chryshochoos, N.E. (1998). Learner needs and syllabus design. M.A. Dissertation. England. School of english. University of Durham.
3. D.j. Flinders and S.J. Thorton (eds). (1997). My pedagogic creed. New York. The curriculum studies reader, routledge.
4. G.w. Ford and Lawrence pungo. (1964). The structure of knowledge and the curriculum. Chicago. Rand mcnally & company.
5. Groundland, N.E. (1981). Measurement and evaluation in teaching. New York. Macmillan.

6. Kelley, a.b. (1996). The curricular theory and practice. Us. Harper and row.
7. Kumar Krishna. (1997).What is worth teaching. New Delhi. Orient longman.
8. Taba, Hilda. (1962). Curriculum development. Theory and practice. New York. Har court, brace and Wald.
9. Tyler, R.W. (1949). Basic principles of curriculum and instruction. Chicago. University of Chicago press.
10. Kochhars.k. (1970). Secondary school. New Delhi. Sterling Publishers administration.
11. The report of education commission. (1964-66). MHRD govt. ofIndia.
12. भटनागर, सुरेश. (1996). शैक्षिक प्रबन्ध और शिक्षा की समस्याऐं. मेरठ. सुर्या पब्लिकेशन।
13. गुप्ता एल. डी. (1990). उच्च शैक्षिक प्रशासन. हरियाणा साहित्य अकादमी चण्डीगढ.।
14. सुखिया एस. पी. (1965). विद्यालय प्रशासन एवं संगठन. आगरा. विनोद पुस्तक मंदिर।
15. वशिष्ठ के के. (1985). विद्यालय संगठन एवं भारतीय शिक्षा की समस्याऐं. मेरठ. लायल बुक डिपो।
16. देव आचार्य महेन्द्र. (1998). विद्यालय प्रबन्ध,राष्ट्रवाणी. दिल्ली. प्रकाशन।
17. शर्मा आर.ए. (1995). विद्यालय संगठन तथा शिक्षा. मेरठ. प्रशासनसूर्या पब्लिकेशन।
18. व्यास हरिश्चन्द्र. (2003). शैक्षिक प्रबन्ध और शिक्षा की समस्याऐं. नई दिल्ली. आर्य बुक डिपो, 30 नाईवालाकरौलबाग।

Semester V

Group C: Core Course (CC) 1 (V)

PHY 301: PHYSICS: KINETIC THEORY AND THERMODYNAMICS

Time: 3 Hours | Max. Marks: 100

Credit- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: the student teacher will be able to:

- Comprehend the key points of thermodynamics.
- Apply the concepts in understanding the various transport phenomena.
- Solve the problems related to the thermodynamics.
- Understand and appreciate the application of thermodynamics in engines of motor vehicles.
- Perform the experiments related to thermodynamics.

Course Contents

Unit I: Ideal and real gas

Ideal gas: kinetic model, deduction of boyle's law, interpretation of temperature, estimation of rms speeds of molecules, brownian motion, estimate of the Avogadro number, equipartition of energy, specific heat of monoatomic gas, extension to di- and triatomic gases, behaviour at low temperatures, adiabatic expansion of an ideal gas, applications to atmospheric physics.

Real gas: Van der Waals' equation of state, nature of Van der Waals'forces, comparison with experimental P-V curves, the critical constants, gas and vapour, Joule expansion of ideal gas and of a Van der Waals'gas, Joule coefficient, Joule-Thomson effect.

Unit II: Liquefaction of gases

Boyle temperature and inversion temperature, principle of regenerative cooling and of cascade cooling, liquefaction of hydrogen and helium, refrigeration cycles, meaning of efficiency.

Transport phenomena in gases: molecular collisions, mean free path and collision cross sections, estimates of molecular diameter and mean free path, transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure

Unit III: Thermodynamics

The laws of thermodynamics: The zeroth law, various indicator diagrams, work done by and on the system, First law of thermodynamics, internal energy as a state function, reversible and irreversible changes, Carnot cycle and its efficiency, Carnot theorem and the second law of thermodynamics, different versions of the second law, practical cycles used in internal combustion engines, entropy, principle of increase of entropy, the thermodynamic scale of temperature, its identity with the perfect gas scale, impossibility of attaining the absolute zero temperature, third law of thermodynamics.

Unit IV: Thermodynamic relationships

thermodynamic variables- extensive and intensive, Maxwell's general relationships, application to Joule-Thomson expansion and adiabatic cooling in a general system, Van der Waals' gas, Clausius-Clapeyron heat equation, thermodynamic potentials and equilibrium of thermodynamical systems, relation with thermodynamical variables, cooling due to adiabatic demagnetization, production and measurement of very low temperatures.

Blackbody radiation: pure temperature dependence, Stefan-Boltzmann law, pressure of radiation, spectral distribution of blackbody radiation, Wein's displacement law, Rayleigh-Jean's law, Planck's quantum postulates, Planck's law, complete fit with experiment, interpretation of behaviour of specific heats of gases at low temperature.

Textbooks and references

1. M WZemansky, Heat and Thermodynamics (Mcgraw-Hill Book Company)
2. M NSaha, BNSrivastava, a Treatise on Heat (The Indian Press, (Publication) pvt. Ltd. Allahabad)
4. M NSaha, BNSrivastava, a Textbook of Heat (Science Book Agency, Calcutta)
6. A N Matveev, Molecular Physics (Mir Publishers, Moscow, 1986)
6. Joseph OHirschfelder et al, Molecular Theory of Gases and Liquids (John Wiley &Sons, NewYork)
6. K SPitzer, I. Brewer, Thermodynamcs (Mcgraw Hill Book Company)
7. S CGarg, RMBansal, CKGhosh, Thermal Physics (Tata Mcgraw Hill Publishing Company ltd.)
8. Samuel Glasston, Thermodynamics for Chemists (Affiliated East West Press Pvt. Ltd., New Delhi)
9. YU. B. Rumer, M. Sh. Ryvkin, Thermodynamics, Statistical Physics and Kinetics (Mir Publishers, Moscow)
10. S S Singhal, JPAgarwal, Satyaprakash, Heat and Thermodynamics (Pragati Prakashan, Meerut).
11. सक्सेना, सिंह, रावत 'ऊष्मागतिकीसांख्यिकीय भौतिकी' (कॉलेज बुक हाउस, जयपुर)

[illegible]भण्डारी, शिशोदिया, परांजपे, वीरेन्द्रकुमार, 'सांख्यिकीय एवं उष्मागतिकीय भौतिकी' (रमेश बुकडिपो, जयपुर)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To determine the thermal conductivity of bad conductor by lee's method.
2. To determine the melting point of wax using platinum resistance thermometer.
3. To find 'j' by call ender and barne's method.
4. To study the temperature dependence of resistance for thermistor and find temperature coefficient of resistance and material constant.
5. To study the temperature dependence of resistance of a torch bulb's filament.
6. Determine the heat capacity of a brass.

GROUP C: CORE COURSE (CC) 2 (V)

Semester V

CHM 301: CHEMISTRY: PHYSICAL CHEMISTRY

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To learn the basic principles of phase equilibrium, Electrochemistry and phase equilibrium, chemical equilibrium and its relationship with thermodynamic quantities, basic concepts of electrochemistry and its applications, chemical bonding from the valence bond model and molecular orbital theory, the limitations of classical mechanics at molecular length scales, the differences between classical and quantum mechanics, the connection of quantum mechanical operators to observables, probabilities, amplitudes, averages, expectation values, and observables. The connection between common approximation methods and standard chemical frameworks (Born-Oppenheimer approximation, molecular orbitals).

Course Contents

Unit I: Electrochemistry

- Electrical transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution. Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.Applications of conductivity measurements; determination of degree of dissociation,

determination of $K_a$of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

- Types of reversible electrodes-gas-metal ion, metal-insoluble salt anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode-reference electrodes-standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells-reversible and irreversible cells, conventional representation of electrochemical cells.EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH, and K), polarization, over potential and hydrogen overvoltage. Concentration cell with and without, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations. Definition of pH and pK_a determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods.Buffers-mechanism of buffer action, Handerson-hazel equation.Hydrolysis of salts. Corrosion-types, theories and methods of combating it.

Unit II: Chemical Equilibrium

- **Chemical Equilibrium:** Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chatelier's principle. Reaction isotherm and reaction isochore – Clapeyron equation and Clausius – Clapeyron equation, applications.
- **Phase Equilibrium:** statement and meaning of the terms – phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2 and S systems.Phase equilibria of two component system – solid – liquid equilibria, simple eutectic-Bi-Cd, Pb-Ag systems, desilverisation of lead.Solid solutions – compound formation with congruent melting point (Mg-Zn) and incongruent melting point, ($NaCl-H_2O$), ($FeCl_3-H_2O$) system. Freezing mixtures, acetone-dry ice.Liquid-liquid mixtures-Ideal liquid mixtures, Raoult's and Henry's law. Non-ideal system-azeotropes-HCl-H_2O and ethanol – water systems.Partially miscible liquids – Phenol-water, trimethylamine-water, nicotine-water systems.Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, steam distillation. Nernst distribution law-thermodynamic derivation, applications.

Unit III: Chemical Kinetics

Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light catalyst, concentration dependence of rates, mathematical characteristics of simple chemical reactions – zero order, first order, second order, pseudo order, half-life and mean life, Determination of the order of reaction – differential method, method of integration, method of half-life period and isolation method.

Rchaib 01/12/2020 for Chairperson Deptt. of Edu.

- Experimental methods of chemical kinetics: conductometric, potentiometric, optical methods, polarimetry and spectrophotometer. Theories of chemical kinetics: effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis), Expression for the rate constant based on equilibrium constant and thermodynamic aspects.
- Characteristics of catalyzed reactions, classification of catalysis homogeneous and heterogeneous catalysis, enzyme catalysis, miscellaneous examples.

Unit IV: Elementary Quantum Mechanics

De Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

Suggested Readings:

1. S Lewis and D Gladstone, Elements of Physical Chemistry, Macmillan.
2. Moudgil, H. K. Textbook of physical chemistry second edition, PHI
3. B S Bahl, G D Tuli&ArunBahl, Guide to Essentials of Physical Chemistry S. Chand Publishing.
4. Alberty&BawendiSilbey, Physical Chemistry 4th Economy Edition, Wiley.
5. Christopher M. A. Brett, Ana Maria Oliveira Brett, Electrochemistry: Principles, Methods, and Applications, Oxford science publications
6. Keith J. Laidler, Chemical Kinetics, 3rd Edition, Prentice Hall
7. Michael J. Pilling and Paul W. Seakins, Reaction Kinetics 2nd Edition, Oxford Science Publications.
8. Puri, Sharma &Pathania,Principles of Physical Chemistry.
9. Ira N Levine, Physical Chemistry 6 edition McGraw-Hill Higher Education.
10. A K Chandra, Introductory Quantum Chemistry, Tata McGraw-Hill Education.
11. Ira N Levine 7 edition Quantum Chemistry Pearson.

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Note: The students should be given exposure of any research labs and instrumentation center/ reputed university lab/ industry/ government labs of northern region.

1. Electrochemistry

a. pH metric: Acid-Base Titration.
b. To determine the strength of the given acid conductometrically using standard alkali solution.
c. To determine the solubility and solubility product of a sparingly solubility product of a sparingly soluble electrolyte conductometrically.
d. To determine the ionization constant of a weak acid conductometrically.
e. To titrate potentiometrically the given ferrous ammonium sulphate solution using $KMnO_4$/ $K_2Cr_2O_7$ as titrant and calculate the redox potential of Fe^{2+}/Fe^{3+}system on the hydrogen scale.

2. Chemical Kinetics

a. To study the saponification of ethyl acetate kinetically.
b. To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
c. To study the effect of acid strength on the hydrolysis of an ester.
d. To compare the strength of HCl and H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.
e. To study kinetically the reaction rate of decomposition of iodide by H_2O_2

GROUP C: CORE COURSE (CC) 3(V)

Semester V

ZOO 301: ZOOLOGY: DEVELOPMENTAL BIOLOGY

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

To enable students to comprehend the modern concepts of developmental biology to understand the developmental sequences in vertebrates; to compare the developmental of organs and systems.

Course Contents

Unit I: Developmental Biology

- Concepts and scope of developmental biology
- Gametogenesis: i) structure and types of spermatozoa, spermatogenesis.ii) structure and types of eggs, oogenesis
- Fertilization: types, mechanism and significance
- Cleavage: types and patterns of cleavage, fate map.
- Gastrulation: morphogenetic movements and significance.

Unit II: Metamorphosis and Embryogenesis

- Development up to the end of neurulation
- Metamorphosis of tadpole larva, hormonal control of metamorphosis
- Development of frog up to formation of advance tadpole.
- Embryogenesis of chick: development up to neurulation, tabulation.
- Development of chick according to the hours of incubation – 18 hours, 21 hours, 24 hours,33 hours, 48hours, 56hours, 72hours, and 96hours.
- Extra embryonic membranes of chick – development and functions.

Unit III: Parthenogenesis

- Placenta and placentation in mammals.

- Parthenogenesis: natural and artificial
- Regeneration mechanism in animals, steps of limb regeneration in amphibians.
- Stem cells and their significance.

Unit IV: Teratogenesis

- Elementary idea of the following developmental process
  i) Embryonic induction
  ii) Organizer concept
  iii) Differentiation
- Teratogenesis : genetic and environmental teratogenesis
- Ageing and senescence.

Suggested Readings:

1. Development Biology by SFGilbert, 10th , (Sinnauerassciate , 2014)
2. Development Biology by K.V. Sastry&Vinita Shukla – (Rastogi publications 2008)
3. Introduction to Embryology by B.I. Balinskly – (W.B. Saunders, Philadelphia, 1976)
4. Foundations of Embryology by B.M. Paten and B.M. Carison.
5. Foundations of Animal Development by A.F. Hopper and N.H. Hart (Oxford University Press, New York, 1980)
6. Vertebrate Embryology by R.S. McEwen (Oxford &I.B.MPublishing co., New Delhi)
7. Development Biology by J.W. Brook Bank.
8. Patterns and Principles of Animal Development by J.W. Saunders.Jr
9. Embryology by Barth IG (1966) – Holt Rinehart & Winston
10. Embryology by Berril N&Karp G (1960) -Holt Rinehart & Winston
11. Fundamentals of Comparative Embryology of Vertebrates by Huettner AF (1967) – McMillan co.
12. Chordate Embryology by Mohan Arora (1985) – Atma Ram &Sons
13. Laboratory Manual of Vertebrate Embryology by Rugh R-Allied Pacific P.Ltd
14. Chordate Embryology by Verma PS & Agarwal VK –Chand &Co.
15. Modern Development Biology, KCSoni Hindi Edition, College Book Centre, Chaura Rasta Jaipur,
16. KCSoni Hindi Edition, College Book Centre, Chaura Rasta, Jaipur

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents

1. Study of types of sperm smears preparation.
2. Study of different types of eggs (insect, frog, hen)
3. Study of life cycle of *Drosophila.*
4. Study of eggs, cleavage, blastula, gastrula, neurula, tail bud, hatching, mature, tadpole larval metamorphic stages of tadpole / forglet.
5. Study of embryological slides of various stages of frog.
6. Study of embryological slides of various stages of chick.
7. Study of development of chick with the help of charts /CD/s /video/ multimedia etc.
   i) Whole mounts: 18 hrs, 24 hrs, 33 hrs, 48 hrs, 56hrs, 72hrs, and 96 hrs, of incubation period embryos.
   ii) Study of primitive streak stage in living embryo after removal of the blastoderm from the egg or through multimedia film etc.
   iii) Study of the embryo at various stages of incubation in vivo by making a window in the egg shell.
8. Frog embryology – study of spawn, identification of different stages through model / charts / multimedia etc.

GROUP C: CORE COURSE (CC) 1 (V)
Semester V
BOT 301: BOTANY: CELL BIOLOGY AND GENETICS

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to;

- Understand the structural complexity of eukoryoticcell.
- Understand the functioning of cellorganelles.
- Understandthe structure, significance of nucleus andchromosomes.
- Review Mendelian inheritance in the light of geneinteractions and gene expression.

Course Contents

Unit I:Cell Biology

- Basic principles of microscopy – Light, fluorescent, phase contrast, UV and electronmicroscope.
- Ultrastructure of prokaryotic and eukaryotic cells.
- Cell-organelles: Ultrastructure and functions of cell wall, plasma membrane, Golgi complex, Endoplasmic reticulum,Mitochondrion.

Unit II: Cell Organisation

- Ultrastructure and functions of chloroplast, ribosome, lysosome andmicrobodies.
- Nucleus – Ultrastructure of eukaryoticnucleus.
- Chromosomes – Brief account of morphology and organization of prokaryotic and eukaryotic chromosome; Nucleosome model, concept of karyotype and ideogram (brief).

Unit III: Cytogenetics

- Chromosomal alterations: (i) Structural variations – Deletion, Duplication,

Translocation and Inversion. (ii) Numerical Variations – Aneuploidy andeuploidy.

- Mutations – spontaneous and induced, transposable geneticelements.
- Cell Division: Cell-cycle, events of cell division, karyokinesis, cytokinesis, cell-cycle; Mitosis, Meiosis and theirsignificance.

Unit IV: Genetics

- Mendelism – Review of Mendel's laws of inheritance, solving problems related to Mendel'slaws.
- Inheritance of genes: Incomplete dominance, complementary gene action (flower colour in sweet pea), supplementary gene action (coat colour in mice), epistasis (fruit colour in summer squash), multiple factor inheritance (ear size inmaize). Linkage and crossing over.
- Sex determination in plants.
- Cytoplasmic inheritance: Presence and functioning of mitochondrial and plastid DNA, cytoplasmic male sterility.

Suggested Readings:

1. Snustad D.P. and M.J.Simmons 2000, Principles of Genetics, John Wiley & Sons, Inc. USA.
2. Gupta, P.K.1999, A Textbook of Cell and Molecular Biology, Rastogi Publications, Meerut.
3. Wolfe,S.L.1993, Molecular and Cell Biology, Wadsworth Publishing Co., California, USA.
4. Harris, N. and K.J.Oparka, 1994, Plant Cell Biology: A Practical Approach, IRL Press, Oxford Univ.Press, Oxford,UK.
5. Singh, S.P. and B.S.Tomar, 2006, Cell Biology, Rastogi Publications,Meerut.
6. Gupta, P.K. 2005, Elements of Genetics, Rastogi Publications,Meerut.
7. Gardner, A.,1990, Principles of Genetics (6th Ed.), John Wiley & Sons Inc.,USA.
8. GuptaP.K.2000,Cytology,GeneticsandEvolution,RastogiPublications,Meerut.
9. Atherly, A.G. J.R.Girton and J.F.MacDonald, 1999, The Science of Genetics, Saunders College Publishing, Fortworth,USA.
10. Russel,P.J. 1998, Genetics, The Benjamin/Cummings Publishing Co. Inc.,USA.
11. Gunning, B.E.S. and M.W.Steer 1999, Plant Cell Biology, Structure and Function, Jones & Bartlett Publishers, Boston,Massachusettes.

PRACTICALS

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- Comparative study of cell structure in onion cells, *Hydrilla* and *Chara/ Spirogyra*. Study of cyclosis in *Tradescantia* staminal cells.
- Study of plastids to examine pigment distribution in plants (e.g. *Cassia, Lycopersicon*and*Capsicum*)
- Examination of electron micrographs of virus, bacteria, Cyanobacteria. and eukaryotic cells with special reference toorganelles;
- Study of various stages of mitosis and meiosis by preparing slides of suitable plant materials (onion root tips and onion flowerbuds).
- Working out the laws of inheritance using seeds/beads.
- Working out genetic problems related to Mendelian laws of inheritance and interaction ofgenes.

GROUP C: CORE COURSE (CC) 3(V)

Semester V

MTH 301: MATHEMATICS: REAL ANALYSIS

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

By the end of the semester the students will be able to develop understanding of Differentiability, Riemann integral and real sequences & series.

Course Contents

Unit I: Real Numbers and continuous functions

Real Numbers system: completeness axiom, densities of rational/irrational, properties of real numbers, least upper bound axiom of a function, Basic properties of the limits, Continuous functions and classification of discontinuities, properties of continuous functions: boundedness of a continuous function on a closed interval [a,b], existence of a maximum of a continuous function on [a,b], uniform continuity.

Unit II: Differentiability

Differentiability, chain rule, Mean value theorems and their geometrical interpretations, Darboux's intermediate value theorem for derivatives, Taylor's theorem with various forms of remainders.

Unit III: Integral Calculus

Riemann integral, Integrability of continuous and monotonic functions, The fundamental theorem of integral calculus, Mean value theorems of integral calculus.

Unit IV: Sequence and Series

Real sequence, Definition, Theorems on limits of sequences, Bounded and Monotonic sequences, Sequential Continuity, Cauchy's convergence criterion, Infinite series of non-negative terms, Comparison tests, Cauchy's integral test, Ratio tests, Raabe'stest, Logarithmic test, De Morgan and Bertrand's tests, Alternating series, Leibnit'z

theorem, Absolute and conditional convergence, Uniform convergence of series of function.

Suggested Readings:

1. Mathematical Analysis: S.C. Malik,New Age International, New Delhi, 2004.
2. Real Analysis: T.M. Apostol, Narosa Publishing House, New Delhi 1985.
3. Real Analysis: H.L. Royden, Macmillan, 4th edition 1993.
4. Principles of Mathematical Analysis: W. Rudin, McGraw Hill, 3rd edition 1976.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester V
EPCAA 301: ARTS AND AESTHETIC EDUCATION

Time: 2 Hours | Max. Marks: 50
Credit- 2 | Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

v) ***In examination the material required for the components of Unit 3 and Unit 4 (if any) are arranged by the students at their own.***

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

- Express freely their ideas and emotions about different aspects of life through different art forms.
- Learn to appreciate different art forms and distinguish them.
- Develop an insight towards sensibility and aesthetic appreciation and become more creative and conscious about the good and beautiful in their environment, including classroom, school, home and community through an integrated learning approach.
- Integrate the knowledge of art with daily life through learning with different media and techniques by using creative expression and making objects of common use.
- Make learners conscious of rich cultural heritage of their own region as well as that of the nation.
- Get acquainted with the life and work of artists.

Course Components: This course as part of the eight semesters B.Sc. B. Ed. programme should consist of theory, practical, project work and workshop. Also, the arts need to be applied in day to day life from designing classroom materials to notice board, cultural festivals, theme based celebrations, national days, festivals etc. These

occasions will be a forum for students' activities wherein all the art forms will be integrated.

Unit 1

- Concepts and forms of arts and crafts- an introduction: Meaning of arts and crafts, visual and plastic art forms, performing art forms, and heritage crafts.
- Significance of art in education: Importance of art forms in learning.
- Integrating arts and crafts in school curriculum as a pedagogical support/ resource: education through arts and crafts.

Unit 2

- Different ways/methods to integrate arts in education: during the curriculum transaction.
- NCF-2005 and position paper on Arts on Aesthetics.
- Knowing about local art and craft forms: the diversity of India's arts and crafts and its integration in the curriculum.

Unit 3

- Drawing: - Application of point, line, hatching, shading to create different tones - Textures, patterns, decorative effects - Structures (shapes, forms...) - Illustration - Perspective techniques - Use of various media (pastels, charcoal, ink, pencils...)
- Painting: - Theoretical and practical knowledge of colour theory - Use of basic tools - mix and apply colour (shade, tint, tone, hue) in a transparent and opaque manner, and create flat or textured surfaces with paint
- Printing: - Use of stencils, relief and engraving techniques to print and repeat shapes

Unit 4

- Collage: - Use of prefabricated and self-made materials
- Various media: - some experience of modern media techniques e.g. still and video camera, computer graphics, manipulation of images, animation, performance, installation, light shows
- 3D work: - Use of: - additive method: modelling (solid and hollow forms) - subtractive method: carving (soft materials: plaster, polystyrene...) - constructive method: montage: simple 3D forms (paper, wire, wooden profiles, puppets, props for theatre)

Workshops:

A workshop for half a day for one week of working with an artist or a group to learn basics of art or craft forms and understand its pedagogical aspects is required for student teacher in each year. The forms learnt during the course should help student teacher in his/her profession, as a means of exploring different media and creative expression in drawing, painting, rangoli, clay-work/pottery, collage-making, wood-work, toy-making, theatre, puppetry, dance,

music etc. including regional/ folk forms of arts and crafts, which will be helpful in imparting quality education among school children. The focus of the workshops should be on how art forms can be used as tool/ method of teaching-learning.

Modes of Learning Engagement:

- Classroom environment should be interactive and discussions should take place where student teachers can document each other's experiences as an artist and connoisseur both.
- Attending exhibitions and performances, interacting with artists and craft persons, watching and listening art related films, audio and video materials available on different performers, regional/ folk art forms etc. may also be shown from time to time.
- Workshops may be conducted at least once in each year where student teachers can get a first- hand experience of working with artists, handle different materials and media, learn about different aspects of an art form on how it relates to the society and community and can be used as pedagogical tool to transact.

Practicum/ Tutorials:

- Activities related to doing arts, including application of arts in the immediate environment.
- Small activities which enhances the skills including the communication and presentation skills, brings in imagination, creativity and aesthetic sensibility among the student teachers.
- Application of aesthetic and design sensibility in the day to day life, in their profession and environment are some of the practical aspects, which needs to be taken care of. During the celebrations of festivals, functions, special days etc. this should be reflected.

Modes of Internal Assessment:

The engagement of teacher- learners in the above set of experiences should be quantitatively and qualitatively evaluated, based on observations and submissions of projects and assignments that cover: a) submission of work b) participation c) creative potential displayed d) application of aesthetic and design sensibility in campus events or in other course work mentioned in unit 3 and unit 4.

Suggested Readings:

1. Arnold Berleant (2012).Aesthetics beyond the Arts. New and Recent Essays.Ashgate Publishing.
2. Goldblatt D. (2010).Aesthetics- A Reader in Philosophy of the Arts. New Delhi.Pearson Education (Singapore).
3. Dennis Atkinson D Atkinson (2003). Art in Education: Identity and Practice. Springer.
4. Parul Dave- Mukherji (2015).Arts and Aesthetics in a Globalizing World. UK. Bloomsbury Publishing.

5. Perry Ellen (2005). The Aesthetics of Emulation in the Visual Arts of Ancient Rome. Cambridge University Press.
6. Saxena, S. K. (2010). Aesthetics. Approaches Concepts and Problems. D.K. Printworld (P) Ltd.
7. S. S. Barlingay. (2007).Modern Introduction of Indian Aesthetic Theory. D. K. Printworld.
8. Weitz Morris (2005).Philosophy of the Arts: An Introduction to Aesthetics Routledge Chapman & Hall.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
CPSPS 301: PEDAGOGY OF PHYSICAL SCIENCE

Time: 3 Hours | Max. Marks: 100
Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Gain insight about the nature of science and its curriculum.
- Comprehend the approaches and strategies of learning science at secondary level.
- Apply pedagogic aspects in teaching-learning of science effectively by adopting appropriate teaching strategy.
- Discuss a topic in science; construct test items to measure objectives belonging to various cognitive levels.
- Use teaching aids effectively in teaching science.
- Gain the knowledge and comprehend the principles of curriculum and analyse the organization of science content at secondary level.
- Select and use the relevant methods, strategies and approaches in science class and laboratory.
- Develop skills in organizing, using and maintaining the available resources in teaching science.
- Transfer the fundamental experimental skills to the pupils and organize different activities related with science processes/skills to the pupils.

Course Contents

Unit I: Nature of Science and its Curriculum:

Nature of Science: History, Philosophy and nature of science, its role and importance in daily life, Science as interdisciplinary area of learning, development of

science and technology, their interdependence and impact on society, development of scientific attitude and values through science education.

Curriculum Development: need and salient features of curriculum,strategy and principles of curriculum construction, trends in science curriculum, development of science curriculum in India, basic criteria of validity of a science curriculum in the light of NCF – 2005, curriculum for the secondary level. Objectives of teachingscience at Upper Primary level and Secondary level.Analysis of syllabus and textbooks of science at Upper Primary and Secondary level.

Unit II: Approaches and Strategies of Learning Science

Lesson Planning: Instructional objectives, identification of teaching points, organising the content, designing learning experiences, Pedagogical shift from science as fixed body of knowledge to process of constructing knowledge.

Scientific Method: Observation, enquiry, hypothesis, experimentation, data collection, generalization.

Unit and Lesson Planning: Using constructivist approach, taking examples from specific contents of science such as electric circuit, magnetic effects of current, physical and chemical changes, animal and plant kingdom.

Strategies of Learning: Inquiry approach, experimentation, problem solving, concept mapping, collaborating learning and experiential learning in science, facilitating learners for self-study in science.

Learning Resources and strengthening Science

Learning Resources: Identification and use of learning resources in science from immediate environment such as natural pH indicators, common salts, fruits, lenses and mirrors, inter-conversion of one form of energy to other, exploring alternative sources of energy, audio-visual materials; multimedia–selection and designing; use of ICT in learning science.

Instructional resources: Multimedia, computer, charts, models, improvised apparatus and their role and functions.

Strengthening of Learning Science: Organisation of practicals in laboratory, use of science kits, investigatory project, field trips, science clubs, science fairs, use of worksheets.

Unit III: Planning and Pedagogic Aspects in Teaching - Learning of Science

Lesson Planning and learning concepts of science such as Newton's laws of motion, universal law of gravitation, heat as energy, temperature, transfer of heat, reflection, refraction and total internal reflection of light.

Mole concept and Avogadro's number, structure of atom, periodicity of elements, acid, base & salt and pH scale, carbon and its compounds.

Nutrition in amoeba and. hopper, digestive and respiratory system in animals, control and coordination in animals, reproduction in animals.

Photosynthesis, factors affecting the process of photosynthesis, respiration in plants, transportation in plants, asexual and sexual reproduction, pollination, fertilization and partheno-genesis in plants. Heredity and variations, structure of chromosome, RNA & DNA.

Unit IV: Exploring Learning of Science

Exploring learning of science concepts such as electric circuits, series and parallel combination of circuits, electric current, measurement of current and potential difference, ohm's law, resistance, factors effecting resistance, electrical energy, elementary ideas about A.C. and D.C. motors, characteristics of metals, metallurgical operations-dressing of the ore, calcinations, roasting, smelting and refining, concept of electrode potential and electrochemical series, reactivity of metals and non-metals, extraction of metals like iron, copper and aluminium.

Types and structure of cell, brief account of functions of various cell organelles, cell division, elementary idea of mitosis and meiosis. Structure and function of meristems (apical meristems), permanent tissue (complex, secretory) structure and functions of epithelial, connective, muscular and nervous tissues, feeding mechanism, nutrients, balance diet and nutrition deficiency diseases, communicable and non-communicable diseases.

Evaluation in Science

Modes of evaluation: oral, observation and written, objective and essay type questions, Types of objective test items: short answer type, multiple choice type, fill-in-blank type, true-false, matching type, construction of test items: achievement test, diagnostic test and their construction, Preparation of blue print: taking examples of concepts of science mentioned in unit III and IV, continuous and comprehensive evaluation for overall development of child.

Tools and Techniques of Assessment: learning indicators, performance-based assessment, learners' records of observations, field diary, oral presentation of learner's work, portfolio, assessment of project work, assessment of learning based on content mentioned in unit III and IV.

Modes of Learning Engagement:

Constructivist Approach: Activity based learning experimentation, Interactive learning, Group work, demonstration method, Peer learning, Project work, Assignments followed by presentation, Discussion, Inquiry approach, Concept mapping etc.

Practicum:

Activities based on Science syllabus of Classes IX and X:

- Preparation of teaching aids: charts, models, Preparation of one working model.
- Preparation of a model lesson plan followed by seminar/ presentation before the whole group.
- Preparation of kit for teaching learning of a topic along with write up (name of unit, name of the theme/topic, material used, procedure, learning outcomes).

- Preparation of blue print and construction of an achievement test, its administration on one section of a class and analysis of results.

Practicals:

- Study of laws of reflection and refraction.
- Verification of Ohm's law.
- Demonstration of Magnetic effect of current.
- Determination of given resistance and specific resistance of a material using wheat stone bridge and post office box.
- Preparation of crystals of copper sulphate.
- Study of exothermic and endothermic, combination and decomposition reactions.
- Preparations of gases (H_2, O_2& CO_2) and study of their properties.
- Study nature of soft and hard water from a given water sample and its removal.
- Preparation of blood film/blood group testing.
- Study of diffusion and osmosis.
- Study of evolution of CO_2 and heat in respiration.
- Study of evolution of O_2 in photosynthesis.
- Check adulteration in food items.
- Demonstration of interaction between a magnet and current.
- Examine bacteria from curds and milk under microscope.

Suggested Readings:

1. Lewis, J. 1972 Teaching of School Physics, Penguin Book, UNESCO.
2. Anderson, Hans O and Koutnik, Paul G, 1972.Towards More effective science Instruction in secondary education.The MacMillan Co., New York and Courier MacMillan, London,.
3. Das, RC. 1984 Curriculum and Evaluation.National Council of Educational Research and Training, New Delhi,.
4. Driver, R.The pupil as scientist, Open University Press, Buckingham, 1983.
5. Saxena A.B. 1988. Vigyan Shikshan Ka AyonjanHar Prasad Bhargava & Sons, Agra,
6. Science for Class IX and X, NCERT Publication.
7. National Curriculum Framework 2005, NCERT Publication.2006
8. NCERT (2005) National Curriculum Framework. New Delhi. NCERT
9. Science Teachers and Educators 1985. UNESCO Bangkok
10. NCERT: Teacher Education Curriculum Framework 1978NCERT, New Delhi.
11. Teaching Life Sciences, J.K. Sood, Kohli Publication.
12. Science Teaching In Schools by Du RC (1985) Sterling Publication.
13. Science for Class IX and X, NCERT Publication New Delhi
14. R.C.Sharma Modern Science Teaching, Dhanpat Rai& Sons, Delhi.
15. Teaching Technology for College Teachers, Sterling Publishers. New Delhi
16. Food and Nutrition by E.P.G Arya Book Depot. New Delhi.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester V
CPSPM 301: PEDAGOGY OF MATHEMATICS I

Time: 3 Hours | Max. Marks: 100
Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Acquire a clear perspective of the nature of mathematics
- Gain insight on the meaning, nature, scope and objective of mathematics education
- Appreciate the changes in curriculum and evolve new approaches to teaching
- Understand the principles, processes relationships and to design appropriate strategies for teaching.
- Design appropriate activities for developing a concept.
- Design mathematics laboratory.
- Develop competencies in designing appropriate diagnostic and remedial tests.
- Construct appropriate assessment tools for evaluating mathematics learning.
- Appreciate the importance of mathematics lab in learning mathematics.
- Develop the competencies in preparation of appropriate teacher aids unit plan lesson plan and test items.
- Construct appropriate assessment tools for evaluating mathematics learning.
- Understand and develop Technology Integrated Mathematics Module (TIMM) using on different subject specific open source software on various concepts of Geometry at secondary stage and
- Understand and develop dynamical digital applets with emphasis on process involved in teaching and learning of mathematics at secondary stage.

- Explain the meaning of evaluation
- Infer the effect of evaluation on students

Course Contents

Unit I: Nature of Mathematics

- Human Needs as a Basis of Growth in Mathematics
- Mathematical Statements are Unambiguous, Truth Criteria, Use of Symbols
- The role of Intution and Logic in Mathematical Thinking
- Axiomatic Framework of Mathematics: Axioms, Postulates, Undefined Terms, Defined Terms, Reasoning, Type of Reasoning, Proofs - Types of Proofs.
- Language of Mathematics

Unit II: Exploring learners

- Cultivating learner's sensitivity like listening, encouraging learner for probing, raising queries, appreciating dialogue among peer group, promoting the student's confidence.
- Exploring ways of Learning Engagements
- Providing opportunities for group activities, Group/individual presentation, Providing opportunity for sharing ideas, Exposing to exemplar constructivist learning situations in mathematics, Visit to district, state and national level science exhibition/ field visit, Audio visual presentation followed by its analysis and discussion, Reflective written assignments, Case studies.

Unit III: Aims and objectives of Mathematics

- Need and Importance of Mathematics in School Curriculum
- Social Aspects
- Mathematical Aspects
- Applications of Mathematics
- Aims, objectives and scope of mathematics at the secondary stage.
- Writing of objectives for each stage (Primary, Secondary and Sr. Secondary).
- Writing objectives in behavioral terms for each stage. Piaget's operational thinking.
- Emphasis on the use of mathematics in daily life situations
- Role of mathematics in other subject areas – Interdisciplinary approaches.
- Developing Skills in learners - Problem solving, Logical thinking, Drawing inferences, Handling abstraction, Visualising etc. in learner's personality
- History of development of mathematics and contributions of Indian mathematicians.

Unit IV: Integration of mathematical content with activities through Mathematics Laboratory

- Designing and setting up models,
- Teaching aids and activities/ laboratory work -using open source software in Mathematics Lesson (Expressive way- to create their own from scratch, as they

express themselves with contentment by means of a more open application or resource)

- Identifying activity in several content areas at secondary level conducive to the comprehension level of learner, Inculcating skills in Designing, Demonstrating, Interpreting and drawing inference of digital applets/concrete models.

Modes of Learning Engagement:

- Providing opportunities for group activities.
- Hands on experimentation within digital environment.
- Group/ individual presentation.
- Providing opportunity for sharing ideas.
- Exposing to exemplar constructivist learning situations in mathematics.
- Designing and setting up models, teaching aids and activities/ laboratory work.
- Visit to district, state and national level science exhibition.
- Digital presentation followed by its analysis and discussion.
- Reflective written assignments.
- Case studies.
- Audio visual presentation followed by its analysis and discussion.

Practicum:

- Preparation of lesson plans on different approaches on selected content matter.
- Preparation of teaching aid (software based applets and concerte materials based).
- Designing of mathematics kits (software based and concerte materials based) for secondary classes.
- Identification and analysis of common errors.
- Study of learning difficulties at Secondary level.
- Development of a working model on a topic of Mathematics.
- Critical analysis of CBSE/Any Board Secondary School Syllabus in Mathematics. Development of plan of mathematics resource (concrete and digital) room.
- Preparation and analysis of achievement test.
- Action Research on a Mathematical topic.
- Any innovative activity perform during internship in teaching program

Suggested Readings:

1. Teaching of Mathematics (ES-342), Indira Gandhi National Open University, School of Education, New Delhi
2. Roy Dubisch(1963). The Teaching of Mathematics, John Wiley and Sons INC, New York and London
3. Butler and Wren, (1960). Teaching of Mathematics, Mc-Graw Hill Book Company, INC, New York and London
4. Claude H. Brown, (1953). The Teaching of Secondary Mathematics, Harper & Brothers, Publishers, New York

5. George Polya, 1962 (I), 1965 (II). Mathematical Discovery (Volume I and II), John Wiley & Sons, INC, New York and London
6. C. G. Corle, (1964). Teaching Mathematics in Elementary School, The Ronalal Press Company, New York
7. NCTM, USA, (1999) Activity for Junior High School and Middle School Mathematics, Volume – II, NCTM, USA,
8. J.L. Heilborn, (2000). Geometry - History, Culture and Techniques, Oxford University Press,
9. NCERT (2010) A textbook of Content-cum-Methodology of teaching Mathematics, NCERT, New Delhi.
10. NCERT (2005) Position Paper of NFG on Teaching of Mathematics, NCERT, New Delhi.
11. Johnston-Wilder, S. &Pimm, D. (Eds.) (2004). Teaching Secondary Mathematics with·ICT, London: Open Univer- sity Press / McGraw-Hill.
12. Capel, S., Leask, M. & Turner, T. (Eds.) (2009). Learning to Teach Mathematics in Secondary School., NY: Routledge. New York.
13. Law, N., Pelgrum, W.J. &Plomp, J. (Eds.) (2008). Pedagogy And ICT.Use In Schools Around The World Findings From The IEA Sites 2006 Study: Springer. New York
14. Glazer, E. M. (2001). Using Internet Primary Sources to Teach Critical Thinking Skills in Mathematics. Santa Bar- bara, CA: Libraries Unlimited Press
15. Prichard, A. (2007). Effective Teaching with Internet Technologies Pedagogy and Practice. Thousand Oaks, CA: Sage Publications.
16. S. K. Mangal, Teaching of Mathematics, Prakash Brothers, Ludhiana.
17. A. B. Bhatnagar, New dimensions in the teaching of Mathematics, Modern Publishers, Meerut.
18. K. S. Sindhu, Teaching of Mathematics, Sterling Publications, New Delhi.
19. UNESCO: Trends in Mathematics Teaching.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
CPSPBS 302: PEDAGOGY OF BIOLOGICAL SCIENCE

Time: 3 Hours
Credit- 4

Max. Marks: 100
Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Develop insight on the meaning, nature, and effective use of different activities/experiments/demonstrations/ laboratory experiences for determining aims and strategies of teaching-learning of biological science;
- Prepare and use of lesson plans and unit plans required for instructional purposes;
- Integration with other school subjects and to identify and relate everyday experiences with learning of biological science;
- Explore the curricular processes and skills in science at secondary level and laboratory in teaching– learning;
- Formulate meaningful inquiry episodes, problem-solving situations, investigatory and discovery learning projects based on upper primary, stages during teaching-learning of biological science

Course Contents

Unit I: Aims, Objectives, its Nature and Scope

- Developing scientific attitude and scientific temper : Nurture the natural curiosity, aesthetic senses and creativity in biology,
- Acquire the skills to understand morphology, taxonomy, genetics, cell biology, development biology etc.
- Understanding biology in relation to society and human welfare,
- Imbibe the values of honesty, integrity, cooperation, concern for life and preservation of environment;

- Solving problems of everyday life;
- Know the facts and principles of biology and its applications consistent with the stages of cognitive development of learners;
- Specific objective of different content areas in biology.
- Science as a domain of enquiry, dynamic body of knowledge and as a process of constructing knowledge;
- Biological Science for environment and health, History of biological science, its nature and knowledge of biological science independent of human application;
- Origin of life and evolution, biodiversity, observations and experiments in biological sciences;
- Biological sciences and society.

Unit II: Exploring Biology

- Motivating learner to bring his/her previous knowledge in science/biology gained through classroom/environment/parents and peer group;
- Cultivating in teacher-learner the habit of listening to child;
- Generating discussion, involving learners in teaching-learning process;
- Encouraging learners to raise questions,
- Appreciating dialogue amongst peer groups,
- Encouraging learners to collect materials from local resources and to develop/fabricate suitable activities in biological science (individual or group work);
- Understanding the role of learners in negotiating and mediating learning in biology.

Unit III: School Science Curriculum (Biological Science)

- Trends in Science curriculum; Consideration in developing learner- centred curriculum in biology
- Concept of curriculum, historical background of Biology curriculum and its studies. Biological sciences curriculum study project.
- Principles of curriculum construction, curriculum development process, techniques of structuring and restructuring of curriculum, trends in curriculum development in Biology, analysis of existing Biology syllabi and study of recent trends/innovations in biological sciences.
- Pedagogical analysis of – different types of natural resources; food resources and enriched food habits; diversity in plants and animals; hierarchical organization of life.

Unit IV: Approaches and Strategies of Learning Biological Science

- Pedagogical shift from science as fixed body of knowledge to process of constructing knowledge, scientific method - observation, enquiry, hypothesis, experimentation, data collection, generalization (teacher- educator will illustrate taking examples from different stage-specific content areas keeping in mind the

variation, e.g. structure and function, interaction between living and non-living, biodiversity etc.).

- Communication in biological sciences;
- Problem solving, investigatory approach, concept mapping, collaborative learning, and experiential learning in biological science (teacher-learner will design learning experiences using each of these approaches);
- Facilitating learners for self- study
- Lesson plan format for learning objectives, preparation and use of teaching aids, time management, recapitulation and evaluation strategies for learners and presentation of lesson plan in biological sciences in class-room transaction.

Modes of Learning Engagement:

Constructivist approach, Activity based learning experimentation, Interactive learning, Group work, Peer learning, Project work, Assignments followed by presentation, Discussion, Inquiry approach, Concept mapping etc.

Language across the Curriculum Activities: As an integral part of teaching-learning process, relevant activities should be carried out to enhance and promote language skills (LSRW) and proficiency based on the rationale of Language Across Curriculum. The activities in this regard are language centered and, therefore, the focus of learning and teaching activities should be on language skills not necessarily on the content. The activities in this regard may be designed/improvised according to the context. Some of the exemplar activities may include:

- Presentation (Oral and Written) based on themes from the content area
- Debate on themes from the content area
- Panel discussion/Seminar/ discussion etc.
- Group discussion/group work
- Question-answer sessions
- Role play/dramatization
- Extempore speech/Elocution
- Organization of reading/reflection activities beyond the textbooks

Practicum:

Activities based on Science syllabus at secondary level.

- Preparation of teaching aids: charts, models, Preparation of one working model.
- Preparation of a model lesson plan followed by seminar/ presentation before the whole group.
- Preparation of kit for teaching learning of a topic along with write up (name of unit, name of the theme/topic, material used, procedure, learning outcomes)
- Construction of an achievement test, its administration on one section of a class and analysis of results.
- Tools and Technique in Biological Science
- Perform experiments to detect presents of carbohydrates, lipids and proteins in food by qualitative test

- Different types of Microscopes and their principle
- Experiments on Diffusion and osmosis
- Evolution of CO_2 and heat in respiration
- Evolution of O_2 in photosynthesis
- Observation of stages of mitosis and meiosis/animal tissues.

Suggested Readings:

1. NCERT. (2005) National Curriculum Framework. New Delhi. NCERT.
2. NCERT. (2005) Position Paper of NFG on Teaching of Science. New Delhi. NCERT.
3. NCERT. (2005) Position Paper of NFG on Habitat and Learning. New Delhi. NCERT.
4. Vaidya, N. (2004) Science Teaching for 21st Century, Deep & Deep Publications.(1999). Dat Poly, Encyclopedia of Teaching Science.New Delhi. Sarup & Sons.
5. Sutton, CR and Hayson J.H. (1974). The Art of the Science Teacher. McGraw Hill Book Company Ltd.
6. Their, DH. (1973) Teaching Elementary School Science.A Laboratory Approach, Sterling Publication Pvt. Ltd.
7. Science Teacher. (Peer reviewed journal for science teachers).
8. Journal of Research in Science Teaching. (Wiley-Blackwell).
9. Ameeta, P. (2008) Methods of Teaching Biological Science.Neelkamal Publications Pvt. Ltd. Educational Publishers.
10. Sharma, R.C. (1987) Modern Science Teaching. New Delhi. Dhanpatarai& Sons.

Web Sites

1. http:/www.tc.columbia.edu/mst/science.ed/courses.asp.
2. http:/www.edu.uwo.ca

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester V
CPSLA 301: LEARNING ASSESSMENT

Time: 3 Hours | Max. Marks: 100
Credit- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Gain a critical understanding of issues in assessment and evaluation
- Become cognizant of key concepts such as test, measurement, examination, formative and summative assessment, and evaluation
- Understand different kinds and forms of assessment that aid student learning
- Use a wide range of assessment tools, learn to select and construct them appropriately
- Evolve realistic, comprehensive and dynamic assessment procedures that are able to keep the whole student in view
- Understand the use of action research in solving problems

Course Contents

Unit I: Overview of Assessment and Evaluation

- Perspective on assessment and evaluation of learning in a constructivist paradigm
- Distinction between 'assessment of learning' and 'assessment for learning'
- Purposes of assessment in a 'constructivist' paradigm:
  - engage with learners' minds in order to further learning in various dimensions
  - promote development in cognitive, social and emotional aspects
- Meaning and Objectives of :
  - test, measurement, examination, and evaluation

- formative and summative evaluation
- continuous and comprehensive evaluation
- grading and its types

Unit II: School- Based Assessment and Evaluation: Policies, Practices and Possibilities

- Impact of examination-driven schooling
- On Pedagogy: content-confined, information focused testing; memory- and activity centric teaching and testing
- De-linking school-based assessment from examinations: some possibilities and alternative practices

Contexts of assessment: subject- related and person- related

Unit III: Efforts towards Examination Reforms

- Efforts towards examination reforms in India based on: NPE,1986; POA, 1992; NCF, 2000 and 2005 and National Focus Group Position Paper on Examination Reforms (Discussion should cover analysis of recommendations, implementations and the emerging concerns)
- Management of Examination in Schools
- Role of ICT in examination
- Action Research in improving classroom practices, concept, need and steps of action research, action research as an approach to improve class and school practices. Development of an Action Research Plan.

Unit IV: Teacher competencies in evolving appropriate assessment tools, Data Analysis, Feedback and Reporting

- Teacher competencies
- Visualizing appropriate assessment tools for specific contexts, content, and student
- Achievement test: meaning, need, steps and blue print.
- Evolving suitable criteria for assessment
- Organizing and planning for student portfolios and developing rubrics for portfolio assessment
- Statistical tools- percentage, graphical representation, frequency distribution, central tendency, variation, normal distribution
- Feedback as an essential component of formative assessment
  - use of assessment for feedback; for taking pedagogic decisions
  - Types of teacher feedback (written comments, oral); peer feedback
  - Place of marks, grades and qualitative descriptions
- Developing and maintaining a comprehensive learner profile
- Purposes of reporting: to communicate
  - progress and profile of learner
  - basis for further pedagogic decisions
- Reporting a consolidated learner profile

Modes of Learning Engagement: Some suggested modes of learning engagement are:

- Lecture-cum-discussion
- Readings and presentations
- Group discussions
- Analysis of a range of assessment tools
- Developing worksheets and other tasks for learning and assessment in one's specific subject area
- Maintaining a portfolio related to the course-work and devising rubrics for assessment
- Constructing a test or an examination paper in one's subject area; critical review of these
- Observing, interviewing and writing comprehensive profile of a student
- Simulated exercises in 'marking' and giving feedback to fellow student-teachers (on a written task); critical review of feedback
- Simulated exercise in marking an examination paper in one's subject area; critical review of marking

Practicum:

- Compare different forms of assessment.
- Presentation of different kinds of grading with advantages and disadvantages.
- Focus group discussion on examination driven teaching and learning.
- Critical evaluation of examination reforms suggested and implemented based on NPE-1986; POA-1992; NCF-2000; and NCF-2005.
- Developing Action Research proposal following the established steps of Action Research.
- Organizing student Portfolio assessment and developing rubrics for portfolio assessment.
- Developing Achievement Test and practicing method of finalizing the test.

Suggested Readings:

1. Black, P. Harrison. C., Lee, C., Marshall, B, & William, D. (2004). Working inside the black box. Assessment for learning in the classroom. Phi Delta Kappan, 86 (1), 8- 21.
2. Bransford, J. Brown, A.L., & Cocking, R.R. (Eds.). (2000). How people learn: Brain, mind, experience, and school. Washington. DC. National Academy Press.
3. Carr, J.F. & Harris, D.E. (2001). Succeeding with standards. Linking curriculum, assessment, and action planning. Alexandria, VA: Association for Supervision and Curriculum Development.
4. Danielson, C. (2002). Enhancing student achievement: A framework for school improvement. Alexandria, VA: Association for Supervision and Curriculum Development.

5. Gentile, J.R. &Lalley, J.P. (2003). Standards and mastery learning: Aligning teaching and assessment so all children can learn. Thousand Oaks. CA. Corwin.
6. Guskey, T.R., & Bailey, J.M. (2001). Developing grading and reporting systems for student learning. Thousand Oaks. CA. Corwin.
7. NCERT (1985). Curriculum and Evaluation. New Delhi. NCERT.
8. NCERT (2005). National Curriculum Framework. New Delhi. NCERT.
9. NCERT (2005). National Focus Group Position Paper on Examination Reforms. New Delhi. NCERT.
10. Norris N. (1990). Understanding Educational Evaluation. Kogan Page Ltd.
11. Newman, F.M. (1996). Authentic achievement: Restructuring schools for intellectual quality. San Francisco. CA. Jossey-Bass.
12. Nitko, A.J. (2001). Educational assessment of students (3rded.). Upper Saddle River. NJ. Prentice Hall.
13. Singh H.S. (1974) Modern Educational Testing. New Delhi. Sterling Publication.
14 Thorndike R.L. and Hagen. (1977). Measurement and Evaluation in Psychology and Education.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 6th SEMESTER SYLLABI AS PER CBCS PATTERN

Semester VI
B. Sc. B. Ed. (CBCS) Semester- VI
GROUP C: CORE COURSE (CC)
Semester VI

PHY 302: PHYSICS SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Understand the basic concepts of solid state physics and electronics.
- Understand the thermal, electrical and magnetic properties of solids.
- Apply the concepts in understanding the working of some electronics devices.
- Solve the problems related to solid state physics and electronics.
- Establish the link between theory and experiments.

Course Contents

Unit I: SolidState Physics

Overview: Crystalline and glassy forms, liquid crystals, glass transition.
Structure: Crystal structure, periodicity, lattices and bases, fundamental translation vectors, unit cell, Wigner-seitz cell, allowed rotations, lattice types, lattice planes, common crystal structures, Laue's theory of X-ray diffraction, Bragg's law, Laue patterns.
Bonding: Potential between a pair of atoms, Lennard-Jones potential, concept of cohesive energy, covalent, Vander Walls', ionic, and metallic crystals.
Magnetism: Atomic magnetic moment, magnetic susceptibility, Dia-, Para- and Ferro-magnetism, Ferromagnetic domains, hysteresis.

Unit II:Thermal properties and band structure

Thermal properties: lattice vibrations, simple harmonic oscillator, second order expansion of Lennard-Jones potential about the minimum, vibrations of one dimensional monatomic chain under harmonic and nearest neighbor interaction approximation, concept of phonons, Debye model; lattice specific heat, low temperature limit.
Band structure: Electrons in periodic potential, nearly free electron model (qualitative), energy bands, energy gap, metals, insulators, semiconductors.

Motion of electrons: Free electrons, conduction electrons, electron collisions, mean free path, conductivity and Ohm's law, Density of states, Fermi energy, Fermi velocity, Fermi-Dirac distribution.

Unit III: Semiconductors

Intrinsic semiconductors, electrons and holes, Fermi level, Temperature dependence of electron and hole concentrations, Doping, impurity states, n and p type semiconductors, conductivity, mobility, Hall effect, Hall coefficient.

Semiconductor devices: metal-semiconductor junction, p-n junction, majority and minority carriers, diode, Zener and tunnel diodes, light emitting diode, transistor, solar cell.

Unit IV:Electronics

Power supply: Diode as a circuit element, load line concept, rectification, ripple factor, Zener diode, voltage stabilization, IC voltage regulation, characteristics of a transistor in CB, CE and CC mode, graphical analysis of the CE configuration, low frequency equivalent circuits, h-parameters, bias stability, thermal runaway.

Field effect transistors:I-V curves of JFET, biasing of JFET, operation of JFET, source follower, depletion and enhancement mode, MOSFET, biasing of MOSFET, FET as variable voltage resistor, digital MOSFET circuits, Tunnel diode, concept of negative resistance, characteristics and working of tunnel diode, UJT- its construction and working, UJT as relaxation oscillator.

Small signal amplifiers: General principles of operation, classification, distortion, RC coupled amplifier, gain, frequency response, input and output impedance, multistage amplifiers, transformer coupled amplifiers, Equivalent circuits at low, medium and high frequencies, emitter follower, low frequency common-source and common-drain amplifier, Noise in electronic circuits.

Suggested Readings:

1. C.Kittel, Introduction to Solid State Physics, V Edition (John Wiley and Sons, New York, 1976)
2. A.J. Dekker, Solid State Physics, (Macmillan & Co, 1967)
3. S Blackmore, Solid state Physics, II Edition (Cambridge University press, Cambridge)
4. N W Ascroft and N D Mermin, Solid State Physics (Holt, Rinehart and Winston, New York, 1976)
5. R. J. Singh, Solid State Physics (Pearson, 2012)
6. J. P. Srivastava, Elements of Solid State Physics (PHI, 2006)
7. B G Streetman,Solid State Electronic devices, II Edition (Prentice-Hall of India, New Delhi, 1986)
8. W D Stanley,Electronic Devices, Circuits and Applications, (Prentice-Hall, New Jersey, USA, 1988)
9. J D Ryder,Electronics Fundamentals and Applications, II Edition (Prentice-Hall of India, New Delhi, 1986)
10. J Millman and A Grabel; Microelectronics, International Edition (McGraw-Hill Book Company, New York, 1988).
11. B L Theraja, Basic Electronics (S. Chand Publishing, 2005)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To trace an output waveform of RC phase-shift oscillator and determine its frequency for different values of capacitance used.
2. To study the characteristics of field effect transistor (FET) and find out r_p, g_m, and μ.
3. To study diode rectifier and effect of load resistance on ripple factor for L and π filters in full wave rectifier and bridge rectifier.
4. To study the unijuction transistor (UJT) and plot V-I characteristic of a given transistor.
5. To measure the hybrid parameters h_{ie}, h_{re}, h_{fe}, and h_{oe} of a given transistor.
6. To study the performance of an electronically regulated power supply in terms of its regulation characteristics.
7. To study the zener diode in terms of voltage regulation.
8. To study the temperature dependence of resistance of semi-conducting material by four probe method.
9. To study the Hall Effect and calculate Hall coefficient and the carrier concentration.
10. Determine the magnetic susceptibility of a given material and study its field dependence.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 6th SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP C: CORE COURSE (CC)
Semester VI
CHM 302: CHEMISTRY: ORGANIC CHEMISTRY

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- Students will gain an understanding of the fundamental electronic structure and bonding in carbonyl compounds, substituent effects on pKa (in the case of carboxylic acids), the reactivity of carbonyl compounds with both hard and soft nucleophiles (carboxylic acids, aldehydes and ketones), the ability of synthetic organic chemistry to prepare specific molecular targets in a selective manner through a series of simple bond-forming processes.
- To know about important functional group transformations and bond-forming methods in organic synthesis
- To introduce students to the chemistry of carbonyl compounds including structure and reactivity, 1,2- and 1,4-addition and enols and enolates. Chemistry of Nitrogen Compounds, Synthetic transformation of aryl diazonium salts, azo coupling. Chemistry of Heterocyclic compounds.

Course Contents

Unit I: Chemistry of Hydroxy Compounds and ether

Chemistry of hydroxy compounds

- **Alcohols:**classification and nomenclature.Monohydric alcohols-nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols.
  Dihydric alcohols-nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement.
  Trihydric alcohols- nomenclature and methods of formation, chemical reactions of glycerol.
- **Phenols**: Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols-electrophilic aromatic substitution, acylation and carboxylation. Mechanism of Fries rearrangement, Claisen

rearrangement, Gatterman synthesis, Hauben-Hooesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

- **Ethers and Epoxides:** Nomenclature of ethers and methods of their formation, physical properties, Chemical reactions – cleavage and auto oxidation, Ziesel's method.Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and Organolithium reagents with epoxides.

UnitII: Chemistry of Carbonyl Compounds including Enolates

- **Aldehydes and Ketones**: Nomenclature and structure of carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1, 3-dithianes, synthesis of ketones from nitriles and from carboxylic acid. Physical properties,
  Mechanism of nucleophilic additions to carbonyl group with particular emphasis on Benzoin, Aldol, Perkin and Knoevenagel condensations, Condensation with ammonia and its derivatives, Witting reaction, Mannich reaction.
  Use of acetals as protecting group, Oxidation of aldehydes, Baeyer-villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen, Wolff-kishner, $LiAlH_4$ and $NaBH_4$ reductions, Halogenation of enolizable ketones.
- Introduction to α, β unsaturated aldehydes and ketones.
- **Organic Synthesis via Enolates**: Acidity of α-hydrogens. Synthesis of ethyl acetoacetate by Claisen condensation and Synthesis of diethylmalonate. Keto-enoltautomerism in ethyl acetoacetate. Synthetic applications of ethyl acetoacetate and diethylmalonate. Alkylation of 1,3-dithianes.

UnitIII: Chemistry of Nitrogen Compounds

- **Nitroalkanes and Nitroarenes**: Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes.Mechanisms of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media.Picric acid.Halonitroarenes: Reactivity.
- **Amines**: Structure and nomenclature of amines, physical properties. Stereochemistry of amines, Separation of a mixture of primary, secondary and tertiary amines, Structural features effecting basicity of amines, Amines salts as phase-transfer catalysts, Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction, Hofmann bromamide reaction. Reactions of amines: Electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acid. Synthetic transformation of aryl diazonium salts, azo coupling.

Unit IV: Chemistry of Heterocyclic compounds

- **Heterocyclic Chemistry:** Introduction: Molecular orbital picture and aromatic characteristic of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution.Mechanism of nucleophilic substitution reactions in pyridine derivatives.Comparison of basicity of pyridine, piperidine and pyrrole.

Suggested Readings:

1. Bruckner, R. Advanced organic chemistry: Reaction Mechanisms Academic Press
2. Lowry, Thomas H. Mechanism and theory in organic chemistry Addison-Wesley
3. Kalsi P S Reaction Mechanism 6th Edition
4. Singh Mukherjee, Reaction Mechanism
5. Francis A Carey Organic Chemistry fourth edition.

6. Bahl, Arun A textbook of organic chemistry S. Chand and Co. Ltd.
7. Gupta R, Kumar M, Gupta V, Heterocyclic Chemistry, Springer
8. Francis A. Carey, Richard A. Sundberg, Advanced Organic Chemistry
9. David E. Lewis Advance Organic Chemistry Oxford University Press.
10. Bernard Miler Advanced Organic Chemistry: Reactions And Mechanism Prentice Hall College
11. David R. Klein, Organic Chemistry 4th Edition John Wiley & Sons.

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

1. Synthesis of Organic Compounds

a. Acetylating of salicylic acid, aniline, glucose and hydroquinone.
b. Benzoylation of aniline and phenol.
c. Aliphatic electrophilic substitution: Preparation of iodoform from ethanol/ acetone.
d. Aromatic electrophilic substitution:
  i. Nitration: Preparation of m-dinitrobenzene and p-nitroacetanilide
  ii. Halogenation: Preparation of *p*-bromoacetanilide and 2,4,6-tribromophenol
e. Diazotization/coupling: Preparation of methyl orange and methyl red
f. Oxidation: Preparation of benzoic acid from toluene
g. Reduction: Preparation of aniline from nitrobenzene and *m*-nitroaniline from *m*-dinitrobenzene.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 6th SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP C: CORE COURSE (CC)
Semester VI
ZOO 302: ZOOLOGY: ENVIRONMENTAL STUDIES, ETHOLOGY AND ECONOMIC ZOOLOGY

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:
To enable students to understand the energy sources, flow of energy and conservation; to understand the recycling of minerals and nutrients in ecosystem; to understand the dynamics of population; to understand causes of pollution; to comprehend origin of life, animal behaviour and economic importance of animals with wild life protection.

Course Contents

Unit I: Ecosystem

- Environment: - Atmosphere, lithosphere and hydrosphere as habitats and ecological factors.
- Abiotic factors: Light and Temperature as ecological factors, limiting factors, Liebig's law of minimum and Shelford Law of tolerance
- Ecosystem: Dynamics of Ecosystem, Ecological Pyramids, Energy flow, Food chain and Food web,Productivity.
- Biochemical cycle: water, nitrogen and suphur cycles recycling of organic nutrients.
- Population: Definition and attributes-density, natality, vital index, age distribution, growth patterns, migration, dispersal, dispersions, carrying capacity.
- Biotic Community: Definition, Structure, Ecotone, edge effects, habitat and different types of niche, Ecological succession, Infra and Interspecific interaction. All types of animal association.
- Elementary statistics: Central tendency and Correlation Coefficient.

Unit II: pollution and its effect

- Pollution Types and Causes
- Air pollution: sources, acid rain, photochemical smog, prevention and control
- Water pollution, sources, prevention and control, eutrophication.
- Noise pollution: sources, prevention and control.
- Soil pollution: sources, prevention and control
- Thermal pollution.
- Green house effect and global warming

- Depletion of ozone layer.
- Natural Disaster: Earthquake, Tsunami
- Natural Resources and conservation – Non Renewable and Renewable
- Bioaccumulation and Biomagnifications.

Unit III: Ethology

- Introduction and history of Ethology.
- Behaviour: Innate (tropism, Texas, reference instincts) and Acquired (learning and reasoning)
- Motion: Classification of directional movements:- kinesis, tropism & taxes
- Communication: Definition ,types of signal (touch, sound, Chemical, and visual),
- Societies: characteristics and advantage with reference to honey bee, and monkey

Unit IV: Economic Importance and Wild life

- Economic Importance of Invertebrates (Apiculture, Aquaculture, Sericulture).
- Insects as pests and their management
- Economic Importance of vertebrates (Fish culture and Poultry culture.)
- Wild life of India, causes of depletion of wild life, modes of wild life conservation, Red data book. Environmental legislations (Wildlife Protection Act, Environment act. Biodiversity act). Wild life scenario in and around central foot hills of the Aravalli and the Thar desert.

Suggested Readings:

1. Environmental Biology, M Calver, Cambridge Pub 2009.
2. Fundamentals of Ecology of E.P. Odum – W.B. Saunders, Philadelphia)
3. Fundamentals of Ecology of Gene P Odum &Gray W Barrett 5th ed., Cengage Learning 2011
4. Environmental studies by S.V.S Rana – Rastogi Publication, 2008
5. Animal Ecology by S.P. Singh 6th Revised Edition – Rastogi Publications,2008
6. Basic Ecology by E.P. Odum (Holt, Rinehart & Winston , New York)
7. Ecology by S.K. Charles(Prentice Hall of India, New Delhi)
8. Ecology : Principle and Applications by Chapman E (1988) – Cambridge University Press
9. Modern concept of ecology by Kumar HD (1986) Vikas Publication House.
10. Ecology and Environment by Sharma PD (1991) Rastogi Publication
11. Environmental Biology by Trievedi PR &Gurudeep Raj (1992)
12. Animal Ecology and Biostatistics. KC Soni Hindi Edition college book centre, Chaura Rasta, Jaipur
13. Mammalian Endrocrinology and Animal Behavior, VS Pawar, Hindi Edition, College book centre, Chaura Rasta

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents

1. Simulation of an ecosystem in the laboratory.
2. Determination of oxygen content of water sample by Winkler's method.
3. Determination of chloride content of water sample.
4. Determination of dissolved CO_2 content of water.
5. Determination of Alkalinity in the pond water.
6. Determination of total solid content of water.
7. Determination of pH of soil sample.
8. Determination of water content in a given simple of soil.
9. Demonstration of Phototactic responses by *Tribolium* / House fly / *Drosophila*.
10. Demonstration of Geotactic responses by Earthworm.
11. Exercise on mean, median, mode and test of significance- Correlation Coefficient.

GROUP C: CORE COURSE (CC)
Semester VI
BOT 302: BOTANY: PLANT PHYSIOLOGY AND METABOLISM

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to;

- Understandthe sub-cellular physiological phenomena inplants;
- Understand the water relations inplants;
- Understand the functioning of plant from the physiological point ofview;
- Understand about enzymes and their mechanism of action
- Understand various facets of growth, differentiation and physiology of flowering in angiosperms.

Course Contents

Unit I: Movement of water molecules in plants

- Importance of water to plant life, properties ofwater.
- Review of diffusion, osmosis and imbibition – definitions, concept of water potential, osmotic potential, pressure potential, solute potential.
- Absorption of water: Root as an absorbing organ, mechanism and pathways of water movement from root hair to root xylem - symplast, apoplast and trans-membrane pathways.
- Ascent of sap: Vertical pathway of water in plants, structural properties of xylem, root pressure theory, cohesion – tension hypothesis.

Unit II: Respiration in plants

- Transpiration: Definition, types, mechanism of stomatal opening and closing (role of K^+ and Abscisic acid), anti-transpirants, factors and significance of transpiration, guttation.
- Cellular respiration: Introduction, respiratory quotient, aerobic and anaerobic respiration, structure of mitochondrion, glycolysis, synthesis of acetyl CoA, Krebs cycle, oxidative phosphorylation, electron carrier complexes, chemiosmotic hypothesis, proton pump theory, synthesis of ATP, pentose phosphate pathway.

Unit III: Manufacture &transport of organic substances

- Photosynthesis: Introduction, brief history, ultrastructure of chloroplast,

photosynthetic pigments, absorption and action spectra, photochemical (light) reaction, photophosphorylation, Z-scheme, Calvin cycle, C4 pathway, CAM pathway, photorespiration, factors and significance of photosynthesis.

- Transport of Organic Substances: Ultrastructure and functions of phloem, (sieve tube), mechanism of phloem transport, source – sink relationship, theories and factors affecting photosynthesis.
- Mineral Nutrition: Major and micro-nutrients, absorption of mineral salts, mechanism and theories of mineral uptake; passive absorption – mass flow, Donnan equilibrium: active absorption – carrier concept, cytochrome pumphypothesis.Role of N, P, K, Ca, Mg, Fe, N and Zn in plant metabolism, Mineral deficiency symptoms.

Unit IV: Plant Hormones

- Growth and Development: Definitions, phases of growth and development, photomorphogenesis, brief account of phytochromes – discovery, physiological role and mechanism of action.
- Plant growth Regulators: General account, discovery, chemical nature, physiological effects and applications of auxins, cytokinins, gibberellins, ethylene and abscisic acid. Brief account of plantmovements.
- Physiology of flowering: (i) Brief account of photoperiodism, short day, long day and day-neutral plants, night interruption phenomenon, florigen concept, role of phytochromes (ii) Brief account ofvernalization.

Suggested Readings:

1. Taiz, L. and E. Zeiger, 1998, Plant Physiology (2nd Ed.), Sinauer Associates Inc.USA.
2. Salisbury, F.B. and C.W.Ross, 1992, Plant Physiology (4th Ed.) Wadsworth Publishing Co.USA.
3. Leo, P.J. and R.C.Leegood, 1999, Plant Biochemistry and Molecular Biology, John Wiley & Sons,England.
4. Hopkins, W.J.1995, Introduction to Plant Physiology, John Wiley and Sons, Inc., New York.
5. Lehninger A.B.,1982, Principles of Biochemistry, CBS Publishers and Distributors, NewDelhi.
6. John, J.L., 1994, Fundamentals of Biochemistry, Sultanchand& Co., New Delhi.
7. Srivastava, H.S., 2005, Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications,Meerut.
8. Srivastava H.S. and N Shankar, 2006, Plant Physiology and Biochemistry, Rastogi Publications,Meerut.
9. Salisbury F.B. and Ross C.W. 2005. Plant Physiology (4th Ed.) CBS Publishers & Distributors N. Delhi.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- To demonstrate osmosis using egg membrane, onion/tomato peels, potato osmoscope.
- To study the effect of temperature and alcohol on the permeability of membranes.
- To demonstrate plasmolysis.
- To compare the water holding capacity of soils (clay, peat and sand).
- To demonstrate transpiration pull.
- To compare the rates of transpiration in different environmental conditions.
- To demonstrate the evolution of oxygen during photosynthesis.
- To compare the rates of photosynthesis under different environmental conditions.
- To demonstrate the necessity of light, CO_2 and chlorophyll for photosynthesis.
- Separation of photosynthetic pigments by paper chromatography.
- Demonstration of aerobic respiration.
- Demonstration of anaerobic respiration.
- To demonstrate the liberation of CO_2 during aerobic respiration.

GROUP C: CORE COURSE (CC)
Semester VI
MTH 302: MATHEMATICS: COMPLEX ANALYSIS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objective:
To develop the understanding and application of concepts of complex variables in problem solving situations.

Course Contents

Unit I: Complex Function
Complex numbers, function of a complex variable, limits, Cauchy-Riemann equations (Cartesian & polar forms), continuity, differentiability of a function, Analytic functions, Harmonic functions, Construction of an analytic function.

Unit II: Complex integration
Complex integration, Complex line integrals, Cauchy's integral theorem, Morera's theorem, Indefinite integral, Fundamental theorem of Integral calculus, Derivative of an analytic function, Liouville's theorem, Poisson's integral formula.

Unit III: Series And Analytic Functions
Taylor's &Laurents series, Maximum modulus principle, Schwarz's Lemma, Singularities, Zeros of an analytic function, branchpoint, Meromorphic functions and Entire functions, Reimann's theorem, Casorati-Wierstrass theorem.

Unit IV: Theorems
Residue theorem, residue at a pole, residue at infinity, computation of residue, Rouche's theorem, fundamental theorem of algebra, Mittag-leffer expansion theorem, evaluation of real definite integrals by contour integration, Conformal mapping, Bilinear transformation and its properties.

Suggested Readings:
1. Complex Analysis: L. Alhfors (1979) McGraw Hill
2. Functions of One Complex Variable I: J.B. Conway (1978) GTM Springer
3. Complex Analysis (Princeton Lectures in Analysis): E.M. Stein, R. Shakarchi (2003) Princeton University Press
4. Complex Analysis: G. N. Purohit and S. P. Goyal, JPH, 2005.

5. Complex Analysis: A. R. Vasishtha, Krishna Prakashan Media (P) Ltd., Meeruth, 11th ed, 2010.
6. Real and Complex Analysis: Walter Rudin, Mc-Graw Hill, New Delhi, 2006.
7. Functions of a Complex Variable:J.N. Sharma, Krishna Prakashan, Meerut, 1998.
8. Function Theory of One Complex Variable: R.E. Greene and S.G. Krantz (2006) AMS.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester VI
CPSPS 302: PHYSICAL SCIENCE: PEDAGOGY OF PHYSICAL SCIENCE

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Gain insight about the nature of science and its curriculum.
- Comprehend the approaches and strategies of learning physical science at secondary level.
- Apply pedagogic aspects in teaching-learning of physical science effectively by adopting appropriate teaching strategy.
- Discuss a topic in Science, construct test items to measure objectives belonging to various cognitive levels.
- Use teaching aids effectively in teaching science.
- Gain insight the salient features of curriculum,strategy and principles of curriculum and science curriculum for the secondary level.
- Comprehend the objectives of teaching science at secondary level.
- Apply the principles of learning processes in the teaching of science.
- Teach a topic in science effectively by adopting appropriate teaching strategy.
- Construct test items to measure objectives belonging to various cognitive levels.
- Use effectively the teaching aids in teaching science.

Course Contents

Unit I: Nature of science and its Curriculum:

Nature of Science: History, Philosophy and nature of science, its role and importance in daily life, Science as interdisciplinary area of learning, development of science and technology, their interdependence and impact on society.

Curriculum Development: need and salient features of curriculum, strategy and principles of curriculum construction, trends in science curriculum, development of science curriculum in India, basic criteria of validity of a science curriculum in the light of NCF – 2005, curriculum for the secondary level. Objectives of teaching science at upper primary level and secondary level.Analysis of syllabus and textbooks of science at upper primary and secondary level.

Unit II: Approaches and Strategies of Learning Physical Science

Lesson Planning: Pedagogical shift from science as fixed body of knowledge to process of constructing knowledge, scientific method: observation, enquiry, hypothesis, experimentation, data collection, generalization, unit and lesson planning: using constructivist approach taking examples from specific contents of science such as electric circuit, magnetic effects of current, physical and chemical changes.

Strategies of Learning: inquiry approach, experimentation, problem solving, concept mapping, collaborating learning and experiential learning in science, Facilitating learners for self-study in science.

Learning Resources: identification and use of learning resources in science from immediate environment such as natural pH indicators, common salts, fruits, lenses and mirrors, inter-conversion of one form of energy to other, exploring alternative sources of energy, improvisation of apparatus, audio-visual materials; multimedia–selection and designing; use of ICT in learning science.

Strengthening of Learning Science: organisation of practicals in laboratory, use of science kits, investigatory project, field trips, science clubs, science fairs, relationship between science and other subjects, scientific attitude, development of values through science education, concept mapping and its use, co-operative learning.

Unit III: Pedagogic Aspects in Teaching - Learning of Physical Science

Pedagogic aspects in teaching-learning of science concepts such asnature of matter: classification of matter based on chemical constitution elements, compounds and mixtures, types of mixtures- homogenous and heterogeneous solution, atoms and molecules, atomic theory of matter, atomic and molecular masses, concept of mole, chemical reactions, types of chemical reactions: combination, decomposition displacement reactions, electronic concept of oxidation reduction, oxidation number of redox reactions, elementary idea of electro chemical cell and dry cell.

Planning and Pedagogic Aspects for Teaching - Learning of Physical Science

Planning and pedagogic aspects– lesson planning and learning of scienceconcepts such as Charge, electrostatic force, quantization of charge, capacitance, potential and potential difference, Ohm's law, series and parallel connections of resistances and capacitances, electric power, magnetic effect, heating effect of current, Faraday's law of induction, Lenz Law, motor and generators, oscillations and waves, periodic and non-periodic motion, sound as wave motion, longitudinal and transverse waves.

Unit IV: Exploration of learning of Physical Science

Exploration of learning of scienceconcepts such asdisplacement, motion and its types, speed, velocity and acceleration, angular velocity and acceleration, force: magnitude and direction, addition and subtraction, resultant, balanced and unbalanced force, momentum, work: work done by force, dependence of work on relative orientation of force and displacement, energy (kinetic and potential) work - energy equivalence, power, conversion of K.E. into P.E. and vice-versa, law of conservation of energy and momentum, gravitation: Newton's laws of gravitation, acceleration due to gravity, factors affecting 'g'. Chemical reactions, type of chemical reactions-combination, decomposition, displacement reactions, endothermic and exothermic reactions, concept of oxidation, reduction, redox reactions, rate of reaction, factors affecting the rate like concentration, temperature, pressure and catalyst.

Evaluation in Science

Concept of CCE, modes of evaluation: oral, observation and written, objective and essay type questions, types of objective test items: short answer type, multiple choice type, fill-in-blank type, true-false, matching type, making of test items, achievement test, diagnostic test and their construction, preparation of blue print taking examples of concepts of science mentioned in unit III and IV, continuous and comprehensive evaluation for overall development of child.

Tools and Techniques of Assessment: development of learning indicators, Performance-based assessment, learners' records of observations, field diary, oral presentation of learners work, portfolio, assessment of project work, construction of test items and administration of tests, exploring content and assessments of learning based on content mentioned in unit III and IV.

Modes of Learning Engagement:

Constructivist approach: Activity based learning experimentation, Interactive learning, Group work, Peer learning, Project work, Assignments followed by presentation, Discussion, Inquiry approach, Concept mapping etc.

Practicum:

Activities based on Science syllabus of classes IX and X

- Preparation of one working model.
- Preparation of a model lesson plan followed by seminar /presentation before the whole group.
- Preparation of kit for teaching learning of a topic along with write up (name of unit, name of the theme/topic, material used, procedure, learning outcomes).
- Construction of an achievement test, its administration on one section of a class and analysis of results.

Practicals:

- Preparation of designs of ideal Laboratory/Herbarium/Aquarium/terrarium.
- Measuring the rates of water absorption and loss in plants and animals.
- To design and perform experiment to demonstrate that by product of Respiration in plants and animals is heat.
- To demonstrate oxygen consumption during respiration in plants and animals.
- Perform experiments to detect the presence of carbohydrates, lipids and proteins in food by qualitative chemical tests.
- Measurement of length, mass, time, temperature, current, voltage.
- Graphic manipulation like (a) distance-time graph (b) velocity – time graph (c) voltage – current graph (d) temperature – time graph.
- Study of motion under force (design and demonstration).
- Methods of preparation of common laboratory reagents.
- Separation of substances of a given mixture like (i) NaCl, NH_4Cl and sand and (ii) Sulphur, NaCl and Iron scrap.
- Demonstration of laws of electromagnetic induction.
- Study heating effect of current.
- Qualitative chemical test for some common food stuffs.
- Preparation of Chlorine (Cl_2) and Ammonia (NH_3) and Study of their properties.
- Study nature of soft and hard water.

Suggested Readings:

1. P.K.G.Nair, 1985 Principle of Environmental Biology, UNESCO training of science teachers and educators Bangkok UNESCO.
2. NCERT: 1978 Teacher Education curriculum framework, NCERT, New Delhi

3. Science Teaching in Schools by Das. R.C.(1985), Sterling publication.
4. Modern Science teaching by Heiss, E.d. Obourn, E.S. Hoffman, C.W (1961) MacMillian Publication, New York.
5. NCERT (2006) Science for Class IX & X. New Delhi. NCERT.
6. Lewis, 1. 1972 Teaching of school physic, Penguin Book, UNESCO,.
7. Anderson, Hans 0 and Koutnik Paul G. 1912 Towards More effective science instruction in secondary education. The Macmillan Co., New York and Courier Macmillan, London,:
8. Das; 'RC. 1984 Et a. Curriculum and Evaluation National Council of Educational research And Training New Delhi,.
9. Driver, R 1983 The pupil as scientist? Open University Press, Buckingham.
10. Saxena, A.B. 1988 Vigyan Shikshan KaAyonjan Har Prasad Bhargava& Sons, Agra.
11. NCERT (2006) Science for class IX and X, New Delhi. NCERT
12. NCERT (2005) National Curriculum Framework. New Delhi. NCERT.

CHAUDHARY RANBIR SINGH UNIVERSITY , JIND
B.Sc..B.Ed.- 6th SEMESTER SYLLABI AS PER CBCS PATTERN

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester VI
CPSPM 302: PEDAGOGY OF MATHEMATICS II

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Formulate instructional objectives for different topics of mathematics.
- Appreciate mathematics to strengthen the student's resource.
- Design the process of developing a concept.
- Appreciate the role of mathematics in day-to-day life.
- Channelize, explain, reconstruct and evaluate their thinking.
- Pose and solve meaningful problems.
- Appreciate the historical perspective and contribution of Indian mathematicians in development of the subject.
- Appreciate and explore Technology Integrated Mathematics Module (TIMM) based on different subject specific open source software on various concepts of Geometry at secondary stage; and
- Appreciate and develop dynamical digital applets with emphasis on process involved in teaching and learning of mathematics at secondary stage.
- Be conversant with the nature, values, structure and scope of Mathematics.
- Interpret the principles of child development for planning lessons;
- Understand the principles of learning

Course Contents

Unit I: Approaches of Teaching Mathematics

- Basic Principles of Methods of Teaching Mathematics
- Principles of Child Development and Learning
- Problem posing / solving in Mathematics
- Problem posing: Problem posing skill contextualised to recognition of pattern, Extension of pattern, Formulisation of conjecture and generalisation through several illustrations drawn from learners immediate environment, Skill development of Process Questioning can stimulate discussion of an idea, leading to further exploration and use of oral language to explain and justify a thought.

- Problem solving: Understanding of Problem, Splitting the Problem in known and unknown parts, Symbolisation and mathematical formulation, Solving problem with multiplicity of approaches- exploration of alternative methods through Probing questions and concrete analogies, Attitude build up of internal questioning – learn to ask themselves key questions before, during and after the solution process.
- Methods of Teaching Mathematics
- Induction and Deduction
- Analytic and Synthetic Methods
- Heuristic or Discovery Method

Unit II: Assessment and Evaluation

- Exploring ways of Assessment
- Presentation and communication skills in mathematics, Posing conceptual questions from simple situations, interpretation and analysis, Designing innovative learning situations, Performance in group activity, Laboratory/ Technological experiences, Reflective written assignment, Written test on conceptual understanding of specific topics and its pedagogy, A year and summative assessment by the university.
- Informal creative Evaluation
- Encouraging learner to examine a variety of methods of assessment in mathematics so as to assess creativity, problem solving and practical performance. Appreciating evaluation through overall performance of the child. Self and peer evaluation.
- Formal ways of Evaluation
- Variety of assessment techniques and practices. Assessing Product vs. Process, Knowing vs. Doing. In practice midterm / terminal examination, practicing continuous and comprehensive evaluation to test regular programs / achievement of learner.

Unit III: Construction of concepts and Techniques of Teaching Mathematics

- Trends in Organising Content
- Recall and consolidation of various concepts with varied examples and illustrations in teaching of Arithmetic, Algebra, Co-ordinate Geometry, Geometry, Trigonometry, Mensuration, Statistics and Probability using Inductive and Deductive, Analytic and Synthetic, Heuristic,Project and problem solving methods.
- Analysis of concepts coherently in graded way.
- Misconception and common errors
- Developing Blue print for designing question paper
- Identifying and organizing components for developing frame work of question paper at different stages of learning different types of questions and framing questions based on concepts and sub concepts so as to encourage critical thinking, promote logical reasoning and to discourage mechanical manipulation and rote learning. Framing of open ended questions providing the scope to learners to give responses in their own words. Framing of conceptual questions from simple questions.

Unit IV: Planning for Classroom Transaction

- Planning Classroom Strategies:
- Analysis of textual and supplementary print materials, connecting lab/field experiences and suitable planning for classroom interaction.
- Desirable Characteristics of a Good Instructional Programme in Mathematics
- Identifying desired outcome, designing essential questions guiding teaching/ learning.
- Determining acceptable evidences that show students understanding.

- Integrating learning experiences and instructions – sequence of teaching /learning experiences that enable students to develop / demonstrate desired understanding.
- Developing unit plan and lesson plan for teaching of mathematics:
- Learning Objectives
- Introduction of the topic
- Some thought-provoking questions
- Flow of chapter
- Examples
- Hands on activities
- Self exploratory experiments (if any)
- Daily life application
- Application (Problem Solving)
- Interdisciplinary Applications / Problems
- HOTS questions
- Extension activities
- External Web resources for the content
- Suggested Readings
- Thought-provoking questions that lead students to do more exploration
- Planning ICT Based Mathematics Lesson, Disticnt ways of using open source software in Mathematics Lesson (Exploratory way only- by giving already created ready-made document or file and invite them to explore it.), Thinking Geometrically (Dynamics in Mathematics using software) Technological Pedagogical Content Knowledge (TPCK)- Developing competencies required to make appropriate use of technology, learner teachers will be required to make pedagogical choices critically about when and where technology should be used.
- The role of cooperative learning in mathematics.
- Learning Styles, Learning Difficulties and Diagnostic Tests
- What are the learning styles in Mathematics? - Visual Learners, Auditory Learners and Kinesthetic Learners, Identification of learning difficulties, Error Patterns, Diagnostic and Remedial Teaching, Preparation of Diagnostic tests

Modes of Learning Engagement:

- Providing opportunities for group activities.
- Hands on experimentation within digital environment.
- Group/ individual presentation.
- Providing opportunity for sharing ideas.
- Exposing to exemplar constructivist learning situations in mathematics.
- Designing and setting up models, teaching aids and activities/ laboratory work.
- Visit to district, state and national level science exhibition.
- Digital presentation followed by its analysis and discussion.
- Reflective written assignments.
- Case studies.
- Providing opportunities for group activities.
- Group/ individual presentation.
- Providing opportunity for sharing ideas.
- Exposing to exemplar constructivist learning situations in mathematics.
- Designing and setting up models, teaching aids and activities/ laboratory work.

- Visit to district, state and national level science exhibition.
- Audio visual presentation followed by its analysis and discussion.
- Reflective written assignments.
- Case studies.

Practicum:

- Preparation of lesson plans on different approaches on selected content matter.
- Preparation of teaching aid (software based applets and concerte materials based).
- Designing of mathematics kits (software based and concerte materials based) for secondary classes.
- Identification and analysis of common errors.
- Study of learning difficulties at Secondary level.
- Development of a working model on a topic of Mathematics.
- Critical analysis of CBSE/Any Board Secondary School Syllabus in Mathematics.
- Development of plan of mathematics resource (concrete and digital) room.
- Preparation and analysis of achievement test.
- Action Research on a Mathematical topic.
- Any innovative activity perform during internship in teaching program

Suggested Readings:

1. Teaching of Mathematics (ES-342), Indira Gandhi National Open University, School of Education, New Delhi
2. Roy Dubisch (1963). The Teaching of Mathematics, John Wiley and Sons INC, New York and London
3. Butler and Wren, (1960). Teaching of Mathematics, Mc-Graw Hill Book Company, INC, New York and London
4. Claude H. Brown, (1953). The Teaching of Secondary Mathematics, Harper & Brothers, Publishers, New York
5. George Polya, 1962 (I), 1965 (II). Mathematical Discovery (Volume I and II), John Wiley & Sons, INC, New York and London
6. C. G. Corle, (1964). Teaching Mathematics in Elementary School, The Ronalal Press Company, New York
7. NCTM, USA, (1999) Activity for Junior High School and Middle School Mathematics, Volume – II, NCTM, USA,
8. J.L. Heilborn, (2000). Geometry - History, Culture and Techniques, Oxford University Press,
9. NCERT (2010) - A textbook of Content-cum-Methodology of teaching Mathematics, NCERT, New Delhi.
10. NCERT (2005)- Position Paper of NFG on Teaching of Mathematics , NCERT, New Delhi.
11. Johnston-Wilder, S. &Pimm, D. (Eds.) (2004). Teaching Secondary Mathematics with ICT, London: Open Univer- sity Press / McGraw-Hill.
12. Capel, S., Leask, M. & Turner, T. (Eds.) (2009). Learning to Teach Mathematics in Secondary School., NY: Routledge. New York.
13. Law, N., Pelgrum, W.J., &Plomp, J. (Eds.) (2008). Peda- gogy And ICT Use In Schools Around The World Findings From The IEA Sites 2006 Study: Springer. New York
14. Joubert, M. (2012). ICT in mathematics. Mathematical knowledge in teaching: seminar series. Cambridge, UK: University of Cambridge. Available online at www. maths-ed.org.uk/mkit/Joubert_MKiT6.pdf

15. Glazer, E. M. (2001). Using Internet Primary Sources to Teach Critical Thinking Skills in Mathematics. Santa Bar- bara, CA: Libraries Unlimited Press
16. Prichard, A. (2007). Effective Teaching with Internet Technologies Pedagogy and Practice. Thousand Oaks, CA: Sage Publications.
17. S. K. Mangal, Teaching of Mathematics, Prakash Brothers, Ludhiana.
18. A. B. Bhatnagar, New dimensions in the teaching of Mathematics, Modern Publishers, Meerut.
19. K. S. Sindhu, Teaching of Mathematics, Sterling Publications, New Delhi.
20. UNESCO: Trends in Mathematics Teaching.

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GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
III: Curriculum and Pedagogic Studies (CPS)
Semester VI
CPSPBS 302: PEDAGOGY OF BIOLOGICAL SCIENCE

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the students will be able to:

- Identify and relate approaches of teaching-learning of biological science with social relevance;
- Explore the process skill in science and develop competency to organise laboratory facilities and equipment in teaching– learning of biological sciences;
- Use effectively different activities – ICT, excursion, visits, research methodology etc for teaching–learning of biological science;
- Examine different pedagogical issues in learning biological science;
- Construct appropriate assessment tools for evaluating learning of biological science;
- Develop ability to use biological science concepts for life skills; and
- Develop professional competencies for teaching, learning of biological science.
- Appreciate that science is a dynamic and expanding body of knowledge

Course Contents

Unit I: Planning for Teaching-Learning of Biological Science

- Identification and organization of concepts for teaching-learning of biology;
- Determining acceptable evidences that show learners' understanding.
- Understanding Constructivist Approach
- Instructional materials required for planning teaching-learning of biological science and learners' participation in developing them; Identifying and designing teaching-learning experiences;
- Planning field visits, Zoo, Sea shore life, Botanical garden, etc.;
- Organizing activities, laboratory experiences, making groups, planning ICT applications in learning biology.
- Behavioural, physical and mental changes during Adolescence.

Unit II: Learning Resources in Biological Science

- Identification and use of learning resources in biological science from immediate environmental, exploring alternative sources;
- Developing and designing science kit and biological science laboratory; Planning and organizing field observation; Collection of materials, etc.;
- Textbooks, audio-visual materials, multimedia-selection and designing;
- ICT introduction, Use of ICT in teaching and learning, ICT resources to support Biology teaching and learning;
- E- learners introduction, e-learning and changing nature of classroom, challenges and drawbacks of e-learning.
- Using community resources for biology learning; Pooling of learning resources in school complex/block/ district level; Handling hurdles in utilization of resources.

Unit III: Tools and Techniques of Assessment for Learning in Biological Science

- Performance-based assessment; Developing indicators for performance assessment in biological sciences; Learners record of observations;
- Field diary, herbarium;
- Oral presentation of learners work in biological science, Portfolio; Assessment of project work in biology (both in the laboratory and in the field), Assessment of participation in collaborative learning;
- Construction of test items (open-ended and structured) in biological science and administration of tests;
- Developing assessment framework in biological science;
- Assessment of experimental work in biological science- Evidences of evolution, fitness and heredity, role of environment in day to day life.
- Exploring content areas in biological science not assessed in formal examination system and their evaluation through various curricular channels;
- Encouraging teacher-learners to examine a variety of methods of assessments in biological science;
- Continuous and comprehensive evaluation.

Unit IV: Biological Science – Lifelong Learning and Professional Development of Biology Teacher

- Nurturing natural curiosity of observation and drawing conclusion; Facilitating learning progress of learners with various needs in biology;
- Ensuring equal partnership of learners with special needs;
- Stimulating creativity and inventiveness in biology; Organising various curricular activities, such as debate, discussion, drama, poster making on issues related to science/biology;
- Organizing events on specific day, such as Earth Day, Environment Day, AIDS Day, Science Day etc.
- Planning and organizing field experiences, Science club, Science exhibition; Nurturing creative talent at local level and exploring linkage with district/state/central agencies.

Professional development programmes for science/biology teachers:

- Participation in seminar, conferences, online sharing membership of professional organization; Teachers as a community of learners;
- Collaboration of school with colleges, universities and other institutions;
- Journals and other resource materials in biology education;
- Role of reflective practices in professional development of biology teachers;

- Teacher as a researcher: Learning to understand how children learn science – action research in biological science.

Modes of Learning Engagement:

Constructivist approach, Activity based learning experimentation, Interactive learning, Group work, Peer learning, Project work, Assignments followed by presentation, Discussion, Inquiry approach, Concept mapping etc.

Practicum: Activities based on Science syllabus at secondary level.

- Preparation of one working model.
- Preparation of a model lesson plan followed by seminar/presentation before the whole group.
- Preparation of a kit for teaching learning of a topic along with write-up (name of unit, theme/topic, material used, procedure, learning outcomes).
- Construction of an achievement test, its administration on one section of a class and analysis of results.
- Study of heredity and evolution.
- Preparation of Herbarium and Herbarium techniques
- Establishment of Science Laboratory
- Respiration in plants and animals
- Nutrition in plants and animals
- Excretion in plants and animals
- Movements in Plants and animals
- Techniques of formulating science project in laboratories as per curriculum
- Evidences of evolution
- Principle of working of Human eye.

Suggested Readings:

1. NCERT (2005). National Curriculum Framework. New Delhi. NCERT.
2. NCERT (2005). Position Paper of NFG on Teaching of Science. New Delhi. NCERT.
3. NCERT (2005). Position Paper of NFG on Habitat and Learning. New Delhi. NCERT.
4. N. Vaidya, Science Teaching for 21st Century (1999). New Delhi.Deep & Deep Publications.Dat Poly, (2004).Encyclopaedia of Teaching Science. New Delhi. Sarup& Sons.
5. Their, DH, (1973). Teaching Elementary School Science.A Laboratory Approach, Sterling Publication Pvt. Ltd.
6. Science Teacher. (Peer reviewed journal for science teachers).
7. Journal of Research in Science Teaching. (Wiley-Blackwell).
8. Turner Tony and Wendey Di Macro. Learning to Teach School Experience in secondary school teaching.London and New York.Routledge.
9. P. Ameeta, (2008). Methods of Teaching Biological Science. Educational Publishers edition or later ed.
10. Sharma R.C., (1987). Modern Science Teaching or later edition. New Delhi. Dhanpatarai& Sons.
11. Teaching of Science Today and Tomorrow. New Delhi Docba House.

Web Sites

- http:/www.tc.columbia.edu/mst/science.ed/courses.asp.
- http:/www.edu.uwo.ca

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
IV: Engagement with the field (EF)
Semester VI
EFSE 302: SCHOOL EXPOSURE AND RELATED ACTIVITIES

Credits: 4 **Marks: 100**
Contact hours: 04 weeks

Distribution of Marks for the School Exposure and Related activities		
Activity	**Max. Marks**	**Min. Pass Marks**
Content Analysis in each teaching subject	20	10
Preperation and use of learning resources during peer teaching in each teaching subject (two)	10+10 =20	10
Observation record • Five classes of regular classroom teacher • Five classes of peer	10+10=20	10
Actual classroom teaching (Two lesson in each teaching subject)	40	20
Total	**100**	**50**

Objectives of the Course: On completion of the Course, the students will be able to:

- Understand about the activities to be carried out during school internship programme.
- Observe classroom teaching, various school activities and gain a feel of the multiple roles of a teacher.
- Develop skill in content analysis, preparing TLM and observing classroom processes.
- Plan and implement teaching learning activity for peers and actual classroom.

Pre-Internship Tasks:

(The Internship Committee formulated by the Institute will prepare a Schedule for execution of Pre- Internship Tasks)

During the four week duration, the student teachers are oriented to the school internship programme.

For the first two weeks, they will be provided training in core teaching skills, content analysis, preparing Teaching Learning Material (TLM), writing observation records, Reflective Journals, conducting Action Research and Case Study, organizing school activities and their reporting, developing Achievement Tests, administering and analyzing. Student teachers will also write lesson plans and take up peer teaching.

For the next two weeks, student teachers will be placed in the schools. They will observe the classes being handled by the regular teachers as well as their peers. Every student teacher will teach at least one lesson in each teaching subject and reflect on the teaching.

Modes of Learning Engagement:

Pre internship will be carried out both in the Institute and the School.

First two weeks they will be exposed to theoretical knowledge about internship and receive information on various activities that are required to be carried out by the student teachers.

Student teachers will get hands on experience on performing certain tasks which they are expected to perform in the school.

In the beginning they learn to teach in a simulated condition by teaching their peers.

Next two weeks, student teachers are attached to the school on full time basis, observe the teaching by the regular classroom teacher, teach at least one lesson in each teaching subject, involve in all the activities of the school and learn to understand the school.

Student teachers keep a record of all the work carried out by them in the school (Details to be worked out).

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Semester VII

B. Sc. B. Ed. (CBCS) Semester- VII

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)

Semester VII

PHY 401: PHYSICS: QUANTUM MECHANICS AND STATISTICAL PHYSICS

PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Describe the limitation of classical mechanics and requirement of Quantum mechanics.
- Understand the fundamental aspects of Quantum mechanics followed by its application.
- Apply the Statistical principles to various physical phenomena.
- Solve the problems related to Quantum mechanics and Statistical mechanics.
- Establish the link between theory and experiments.

Course Contents

Unit I:

Origin of the quantum theory- Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect, Ritz combination principle in spectra, stability of an atom, Planck's radiation law, Einstein's explanation of photoelectric effect, Bohr's quantization of angular momentum and its application to hydrogen atom, limitations of Bohr's theory.

Unit II:

Wave-particle duality and uncertainty principle, de Broglie's hypothesis for matter waves, the concept of wave and group velocities, evidence for diffraction and interference of 'particles', experimental demonstration of matter waves, Consequence of de Broglie's concepts, quantisation in hydrogen atom, energies of a particle in a

box, wave packets, Heisenberg's uncertainty relation for p and x, its extension to energy and time.

Consequence of the uncertainty relation: gamma ray microscope, diffraction at a slit, particle in a box, position of electron in a Bohr orbit.

Quantum Mechanics: Schrodinger's equation, Postulates of quantum mechanics, operators, expectation values, transition probabilities.

Unit III:

Applications of quantum mechanics to particle in one dimensional and three dimensional box, harmonic oscillator, reflection at a step potential, transmission across a potential barrier.

Hydrogen atom: natural occurrence of n, l and m quantum numbers, the related physical quantities, comparison with Bohr's theory, Wave functions, Probabilistic interpretation.

Unit IV:

Statistical Physics

The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a-priori probabilities, probability distribution and its narrowing with increase in number of particles, The expressions for average properties, Constraints, accessible and inaccessible states, distribution of particles with a given total energy into a discrete set of energy states.

Some universal laws: The mu space representation, division of mu space into energy sheets and into phase cells of arbitrary size, application to one-dimensional harmonic oscillator and free particles, Equilibrium between two systems in thermal contact, bridge with macroscopic physics, Probability and entropy, Boltzmann entropy relation, Statistical interpretation of second law of thermodynamics, Boltzmann canonical distribution law and its applications, rigorous form of equipartition of energy, Partition function and its applications, Saha's ionization formula. Maxwell distribution of speeds in an ideal gas, Distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values, Doppler broadening of spectral lines. Transition to quantum statistics: 'h' as a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator, Indistinguishability of particles and its consequences, Bose-Einstein and Fermi-Dirac conditions, applications to liquid helium, free electrons in a metal and photons in blackbody chamber, Fermi level and Fermi energy.

Suggested Readings:

1. D.J. Griffith, Introduction to Quantum Mechanics (Pearson Education, 2015)
2. A.K. Ghatak and S. Loknathan, Quantum Mechanics- Theory and Application (Macmillan India Ltd. Delhi)
3. H.C. Verma, Quantum Physics (TBS, 2012)
4. H.S. Mani and G.K. Mehta, Introduction to Modern Physics, (Affiliated East West Press Pvt. Ltd. New Delhi, 1998)

5. B. Laud, Introduction of Statistical Mechanics (Macmillan 1981).
6. F. Reif, Statistical Physics (Mcgraw-Hill, 1988).
7. K. Huang, Statistical Physics (Wiley Eastern, 1988).

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To find out the reverse recovery time of given diodes.
2. To study RC transmission line at 50 Hz and to draw curve showing the variation of magnitude and phase of the voltage along the RC ladder network.
3. To study the Gaussian distribution law.
4. To study the Poisson's distribution law.
5. To determine the value of Planck's constant by photo cell. (Photo electric effect).
6. To determine the value of Planck's constant by solar cell.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VII
CHM 401: CHEMISTRY: ADVANCE CHEMISTRY-I
PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: Students Teachers will be able to

- Understand the Spectroscopic methods that are used to study the molecules.
- Predict the appearance of a molecule's vibrational spectra as a function of symmetry and uses in detailed organic structure analysis
- Evaluate the utility of UV/VIS spectroscopy as a qualitative and quantitative method.
- Determine the vibrations for a triatomic molecule and identify whether they are infrared-active.
- Determine whether the molecular vibrations of a tri-atomic molecule are Raman active.
- Explain the difference between Stokes and anti-Stokes lines in a Raman spectrum.

Course Contents

Unit I: Spectroscopy-I (Theoretical Principle)

Introduction: electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

- **Rotational Spectrum:** Diatomic molecules, Energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.
- **Vibrational Spectrum:** Infrared spectrum: energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of

force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

- **Raman Spectrum**: Concept of polarisability, pure rotational and pure vibrationl Raman spectra of diatomic molecules, selection rules,σ,π- and n M.O., their energy levels and the respective transitions.

Unit II: Separation Techniques

Solvent Extraction: distribution Coefficient, distribution ratio, solvent extraction of metals, multiple batch extraction, counters current distribution – Chromatographic Techniques: classification, theory of chromatographic separation, distribution coefficient, retention, sorption, efficiency and resolution - Column, ion exchange, paper, TLC & HPTLC: techniques and application.

Unit III: Electronic Spectrum

Electronic Spectrum: Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Frank-Condon principles.Qualitative description of σ, π- and n M.O., their energy levels and the respective transitions.

Unit IV: Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions – energy transfer processes (simple examples).

Suggested Readings:

1. Mahendra R. Awode, Quantum Chemistry S. Chand Publishing.
2. A. K. Chandra, Introductory Quantum Chemistry, Tata McGraw-Hill Education
3. Peter Atkins Julio de Paula, Atkins' Physical Chemistry Oxford University Press.
4. Robert J. Silbey, Robert A. Alberty , Moungi G. Bawendi, Physical Chemistry 4th Edition, Wiley
5. Colin N. Banwell, Fundamentals of Molecular & Spectroscopy, Tata McGraw-Hill Education
6. Walter S. Struve, Fundamentals of Molecular Spectroscopy, Wiley

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Inorganic Chemistry: Estimations

a. Quantitative estimation of one metal volumetrically from a given mixture.
b. To estimate magnesium volumetrically from a mixture containing Ba^{2+} and Mg^{2+} Ions/ Zn^{2+} and Mg^{2+} ions.
c. To estimate copper iodometrically from a given mixture containing Pb^{2+} and Cu^{2+} ions.
d. Estimation of Glucose with the help of Fehling's solution.
e. Determination of Total hardness of water.

Colorimetry

- To verify Beer-Lambert law for $KMnO_4/K_2Cr_2O_7$ and determine the concentration of the given solution of the substance.

Conductometry

- To determine normality and gms/lit of xN HCl and also determine specific conductance by conductometry.
- To determine normality and gms/lit of the mixture of $HCl+CH_3COOH$ by Conductometry.
- To determine the normality of weak acid by Conductometry.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VII
ZOO 401: ZOOLOGY: EVOLUTION AND PALAEONTOLOGY
PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:
To enable students to understand and comprehend origin of life and theories of evolution; to understand the evolution from the evidences.

Course Contents

Unit I: Origin of Life &its Theories

- Origin of life (Abiogenesis and biogenesis)
  a. Evidence in favour of evolution: from morphology, comparative anatomy, embryology and Paleontology.
- Molecular basis of evolution
- Theories of evolution:
  1. Lamarckism, inheritance of acquired characters and Neo-Lamarckism.
  2. Darwinism, theory of natural selection and Neo Darwinism.
  3. Mutation theory of Hugo de Vries.
  4. Weismann theory of germplasm
  5. Recapitulation theory

Unit II: Evolution

- Variation: Kinds, sources of variation, origin of new mutations.
- Isolation: Definition, mechanism and role of isolation in evolution.
- Adaptation: Introduction, kinds (structural, physiological and protective) of animal associations, divergent evolution, convergent evolution, evolutionary significances of adaption.

Unit III: Evolution Changes

- Origin of species: Concept of species/subspecies/sibling. Specie, Factors causing genetic divergence in the population of species, genetic drifts, Bottle Neck effect founder's effect.
- Mimicry and protective coloration: Definition, kinds, condition necessary for mimicry, significance.
- Zoogeographical distribution of animals, geological time scale, origin and evolution of amphibian, reptiles, birds and mammals.

Unit IV:

- Introduction, formation, kinds, determination of age of fossil and its significance.
- Dinosaurs, fossil evidence & reasons for extinction of dinosaurs.
- Evolution of man: Time of origin, compelling causes, ancestor of man, evolution from apes and evolutionary trends.

Suggested Readings:

1. Evolutionary Biology by B.S. Tomar& S.P. Singh – (Rastogi Publications, 2008)
2. The origin of life by K. John – (Reinhold Publishing Corpn)
3. The evolution of Man by G.W. Lasker – (Holt,Rinehart&Winston)
4. Organic Evolution by R.S. Lull – (MacMillan)
5. Organic evolution – V.B. Rastogi
6. Animal Taxonomy and Evolution, VS Pawar Hindi Edition, College book centre, Chaura Rasta, Jaipur
7. Mammalian Endrocrinology and Animal Behavior, VS Pawar, Hindi Edition, College book centre, Chaura Rasta Jaipur

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Content:

1. Study of vestigial organs, models of dinosaurs, living fossils.
2. Study of teeth and skulls of horse, elephant and man.
3. Study of five animals for mimicry.
4. Study of various types of beaks of local birds.
5. Study of various types of feet of local birds.
6. Evolution of Man (Chart / Model).
7. Evolution of Horse (Chart / Model).
8. Zoogeographical distribution of animals in India and World.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VII
BOT 401: BOTANY: PLANT ANATOMY AND ECOLOGY
PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

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

- Understand the development, organization and functions of tissues in plants;
- Understand the histological complexity in plants;
- Understand the dynamics of environment and its delicate balance;
- Understand the influence of human beings on quality of environment.

Course Content:

Unit I: Tissue & Tissue System : Root & Shoot Organisation

- Types of Tissue and Tissue System, basic body plan of a flowering plant.
- The root system: The root apical meristem and its organisation; differentiation of primary and secondary tissues and their roles; structural modifications for storage, respiration, reproduction and for interaction with microbes.
- The shoot system: The shoot apical meristem and its histological organization; vascularization of primary shoot in monocotyledons and dicotyledons; formation of internodes, branching pattern; monopodial and sympodial growth; canopy architecture.

Unit II: Organization of Xylem & Phloem tissues

- Cambium and its functions; formation of secondary xylem; a general account of wood structure in relation to conduction of water and minerals; characteristics of growth rings, sapwood and heart wood; secondary phloem: structure, function relationships; periderm

- Leaf: Origin, development, arrangement and diversity in size and shape; internal structure in relation to photosynthesis and water loss; adaptations to water stress; stomatal types and trichomes; senescence and abscission.

Unit III: Ecology & Environment

- Ecological Factors: Brief account of edaphic, climatic, physiographic and biotic factors and their ecological importance.
- Ecosystem : Structure, abiotic and biotic components, bio-energetic approach, food chain, food web, ecological pyramids, bio-geo-chemical cycles of carbon, nitrogen and phosphorus.
- Community ecology: Community characteristics, frequency, density, cover, life forms.
- Plant succession: General features, events in succession, brief account of xerarch succession.

Unit IV: Environmental Adaptations

- Morphological, anatomical and physiological adaptations of plants to environment – hydrophytes, xerophytes,halophytes.
- Biodiversity: General account, types and characteristics, biodiversity conservation efforts, WCU, Red databook, brief account of Intellectual Property Rights (IPR) and patentlaws.
- Environmental pollution – a brief account of causes, effects and remedies of air, water, soil, radioactive and noisepollution.

Suggested Readings:

1. Esau, K., 1977, Anatomy of Seed Plants, 2nd Ed., John Wiley & Sons, NewYork.
2. Fahn, A. 1974, Plant Anatomy 2nd Ed., Pergamon Press, Oxford.
3. Mouseth J.D.,1988, Plant Anatomy. The Benjamin/cummings Publishing Co. Inc., California,USA.
4. Singh V., P.C.Pande & D K Jain 2006, Angiosperms, Rastogi Publications,Meerut.
5. Vashishta, P.C. A Text book of Plant Anatomy, Predeep Publications,Jullandar.
6. Gangulee S.C. &Kar.1980, College Botany Vol.I, Central Book Agency,Calcutta.
7. Sharma, P.D., 2006, Environmental biology, Rastogi Publications,Meerut.
8. Mitra, J.N., An Introduction to Systematic Botany and Ecology, World Press,Calcutta.
9. Odum, E.P. 1983, Basic Ecology, Saunders,Philadelphia.
10. Kormondy, E.J. 1996, Concepts of Ecology, Viva Books Pvt. Ltd., NewDelhi.
11. Misra, R. 1968, Ecology Work Book, Oxford &IBH, NewDelhi.
12. Moore P.W. and S.B.Chapman, 1986, Methods in Plant Ecology, Blackwell Scientific Publications.

13. Krebs, C.J. 1989, Ecological Methodology, Harper and Row, NewYork.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- Anatomy of primary and secondary growth in monocots and dicots using hand sections (or prepared slides).
- Anomalous secondary growth in *Boerhaavia, Nyctanthes* and *Dracaena*
- Anatomy of leaf and peel mount for stomatal types/trichomes.
- Anatomy of the root-primary and secondary structure
- To determine the minimum size of quadrate by species area curve method.
- To determine the minimum number of quadrate to be laid down in field under study.
- To study the vegetation structure through profile diagram.
- To determine moisture content and water holding capacity of different types of soil.
- To determine the dust holding capacity of different types to leaves.

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GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)

Semester VII

MTH 401: MATHEMATICS: NUMBER THEORY AND THEORY OF EQUATIONS

Time: 3 Hours | Max. Marks: 100

Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives:

At the end of the semester learners will be able to understand basic principles, formulae and procedures of number theory and theory of equations and apply them in problem solving situations.

Unit I:

Division Algorithm, Prime and Composite numbers, proving the existence and uniqueness of GCD and the Euclidean Algorithm, Fundamental theorem of Arithmetic, the least common multiple, congruences, linear congruences,

Unit II:

Sigma function, Tau function, Phi function, Wilson's theorem, simultaneous congruences, theorem of Euler- Fermat and Lagrange.

Unit III:

Continued fractions, Relation between roots and coefficients, symmetric functions, Transformations, Reciprocal equations, Descarte's rule of signs, Multiple roots

Unit IV:

Solving cubic equation by Cardon's method, Solving quartic Equations by Descarte's method and Ferrari's method.

Suggested Readings:

1. Elementary Number Theory by David M. Burton.
2. Theory of Equations by Uspensky, Mc. Graw Hill Book Co. Ltd.
3. Elementary Number Theorywith Applications by Thomas Koshy.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
IV: Engagement with the field (EF)
Semester VII
EFSI 401: SCHOOL INTERNSHIP

Credits: 14P **Marks: 300**

Contact hours : 14 weeks

Distribution of Marks for the School Internship		
Activity	**Max. Marks**	**Min. Marks**
Classroom Teaching (two Pedagogy courses)	200	100
Critisism Lessons (four lessons in total)	40	20
Reflective Journal (two Pedagogy courses)	10	5
Observation Records • Ten lessons of school teacher • Ten lessons of peer	5+5 =10	5
Achivement test-development, Administration and Analysis	10	5
Case Study / Action Research	10	5
Detailed Record of any two activities organized by the student teacher	10	5
Learning Resource in two teaching subjects	10	5
Total	**300**	**150**

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

- Observe the classes of regular teachers and peers and learn about teaching learning process and classroom management.
- Develop skill in planning and teaching in actual classroom environment.
- Reflect, learn to adapt and modify their teaching for attaining learning outcomes of students.
- Maintain a Reflective Journal.
- Acquire skill in conducting Action Research/ Case Study.
- Inculcate organizational and managerial skills in various school activities.
- Create and maintain resources for teaching and learning in internship schools.
- Work with the community in the interest of the learner and their learning outcomes.

Internship Tasks:

The student teachers will perform the following in the school attached to her/him.

(a) Delivery of lessons

- The student teachers will deliver a minimum of 40 lessons including two criticism lessons (one at the end of 9th week and the other during the last week of the teaching assignment) in each Pedagogy course. In total they will teach 80 lessons in two Pedagogy courses (Preferably 20 lessons for Upper Primary classes and 20 for Secondary classes in each Pedagogy course).
- The student teachers will visualize details of teaching learning sequences, keeping all considerations in view. They will also involve themselves in discussion, reflection, reconsideration and consolidation after each lesson as well as at the end of the unit.

(b) Practicum

- Preparation, administration and analysis of achievement tests in two Pedagogy courses.
- Conducting Action Research / Case Study.
- Observing ten lessons of a regular teacher and ten lessons of peers in each Pedagogy course and preparing an Observation Record.
- Preparing and using teaching aids in each Pedagogy course.
- Writing a Reflective Journal.
- Organising any two co curricular activities and reporting.
- Preparing a suggestive comprehensive plan of action for improvement of some aspects of the school, where they have been teaching during Internship.
- Reporting on activities conducted with the community.

Any other activity given under Suggested School Activities can be studied after consultation with the Faculty, in charge of learning to function as a teacher (School Internship).

Suggested School Activities:

- Organising cultural, literary, sports and games activities
- Framing of time table
- Organising Morning Assembly
- Maintenance of school discipline
- Maintenance of school records, library and laboratories
- Providing Guidance and Counseling services
- Studying the role of community in school improvement
- School Mapping
- Water Resource Management in schools
- Mass awareness of social evils and taboos
- Organising educational fair, exhibition, club activities, nature study and field trip. (Any other activity/ activities decided by the Institute)

Post Internship Tasks:

- Post Internship is organized for a day mainly for reflection and review of internship programme as a whole, to facilitate the understanding of the

effectiveness of various activities undertaken during the internship. The tasks include the following.

- Seeking reactions from students, teachers, Heads and teachers of cooperating schools and supervisors of the Institute.
- Exhibition of the Teaching Learning Material used by the student teachers during the internship.
- Any other activity decided by the Institute.
- Inviting suggestions for improving the programme.

Modes of Learning Engagement:

- Internship tasks will be carried out as a part of the 'in-school' practice. A mentor/cooperating teacher and supervisor of the Institute will guide the student teacher periodically.
- Student teachers will observe at least 10 lessons of regular classroom teacher and 10 lessons of their peers.
- Adequate classroom contact hours - a minimum of 40 lessons including two criticism lessons in each Pedagogy course preferably 20 lessons for Upper Primary classes (VI-VIII and 20 lessons for Secondary classes (IX and X) for subject based teaching – learning will be under taken in consultation with the school authorities.
- A Reflective Journal will be maintained by the student teacher in which she/he records her/his experiences, observations and reflections on classroom experiences.
- A portfolio will be maintained by the student teachers which includes lesson plans, resources used, assessment tools, student observations and other records.
- Student teachers will always work in liaison with the regular teachers in the schools involving themselves in all the school activities and conducting at least two activities.
- The Institute in consultation with the schools will prepare the details of the internship programme for each of the schools.

Semester VIII

B. Sc. B. Ed. (CBCS) Semester- VIII

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)

Semester VIII

PHY 402: PHYSICS: ATOMIC, MOLECULAR AND NUCLEAR PHYSICS

PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours — Max. Marks: 100

Credits- 4 — Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Understand thefundamental concepts of Atomic, Molecular and Nuclear Physics.
- Develop the concepts of transitions between various energy levels.
- Understand the source of energy in nuclear reactors and stars.
- Solve the problems related toAtomic, Molecular and Nuclear Physics.
- Establish the link between theory and experiments.

Course Contents

Unit I: Atomic Physics

Spectra of hydrogen, Frank-Hertz experiment and discrete energy states, Stern Gerlach experiment, deuteron and alkali atoms, spectral terms, doublet fine structure, screening constants for alkali spectra for s,p,d and f states, selection rules, L-S and J-J couplings, Atoms in a magnetic field, Zeeman effect, Zeeman splitting.

Weak spectra: continuous X-ray spectrum and its dependence on voltage, Duane-Hunt law, Characteristics of X-rays, Moseley's law, doublet structure of X-ray spectra, X-ray absorption spectra.

Unit II: Molecular Physics

Discrete set of electronic energies of molecules, quantisation of vibrational and rotational energies, determination of internuclear distance, pure rotational and rotational-vibrational spectra, Dissociation limit for the ground and other electronic states, transition rules for pure vibrational and electronic vibrational spectra.

Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.
Spectroscopic techniques: Sources of excitation, prism and grating spectrographs for visible, UV and IR, absorption spectroscopy, double beam instruments, different recording systems.

Unit III: Accelerators

Ion sources, Cockcroft-Walton high voltage generators, Van deGraaff generators, Drift tube, Linear accelerators, Wave guide accelerators, Magnetic focusing in Cyclotron, Synchrocyclotron, Betatron, The electromagnetic induction Accelerator, Electron synchrotron, Proton Synchrotron.

Detectors: Interaction of charged particles and neutrons with matter, working of nuclear detectors, Geiger-Muller counter, proportional counter and scintillation counter, cloud chambers, spark chamber, emulsions.

Unit IV: Nuclear Fission and Nuclear Fusion

Nuclear Fission: Theory of Nuclear Fission, Liquid Drop Model, Shell Model, Barrier Penetration-Theory of Spontaneous Fission, Nuclear Fission as a source of Energy, The Nuclear Chain reaction, Condition of controlled Chain Reaction, The Principle of Nuclear Reactors, Classification of Reactors, Power of Nuclear Reactors, Critical size of Thermal Reactors, The Breeder Reactors, Reprocessing of spent fuel, Radiation hazards and Fission products poisoning.

Nuclear Fusion: The sources of stellar energy, The Plasma: The fourth state of the matter, Fusion reaction, Energy balance and Lawson Criterion, Magnetic confinement of Plasma, Classical Plasma losses from the Magnetic Container, Anomalous losses, Turbulence and Plasma instabilities, The Laser Fusion Problem, Fusion reactor

Structure of Nuclei: Structure of nuclei, basic properties (angular momentum, magnetic moment, Quadrupole moment and binding energy), deuteron binding energy, p-p and n-p scattering and general concepts of nuclear forces. Beta decay, range of alpha particles, Geiger-Nuttalllaw, Gamow's explanation of alpha decay, gamma decay, continuous and discrete spectra.

Elementary Particles: Classification of Elementary Particles, Fundamental interactions, Unified Approach (basic ideas), The Conservation laws, Quarks (basic ideas), Charmed and Colour Quarks, Higgs Boson, Large Hadron Collider.

Suggested Readings:

1. H.S. Mani and G.K. Mehta, Introduction to Modern Physics, Affiliated East West Press Pvt. Ltd. New Delhi, 1998.
2. A Beiser, Prospective of Modern Physics
3. H E White, Introduction to Atomic Physics
4. Barrow, Introduction to Molecular Physics
5. T A Littlefield and N Thorley, Atomic and Nuclear Physics (Engineering Language Book Society)
6. H A Enge, Introduction to Nuclear Physics (Addision- Wesly)

7. Eisenberg and Resnik, Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles (John Wiley)
8. D P Khandelwal, Optics and Atomic Physics, (Himalaya Publishing, Bombay, 1988)
9. Rajkumar, Atomic and Molecular Physics (Campus Books International, 2003)
10. C Banwell, Fundamentals of Molecular Spectroscopy (McGraw Hill Education, 2017)

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To study the voltage distribution along LC transmission line when its output terminals are open, short and terminated by characteristics impedance. Find attenuation constant, phase constant and propagation constant also for a given line.
2. To study the effect of feedback on transistor amplifier in terms of its frequency response and voltage amplification
3. To determine the value of Rydberg's constant with the help of plane transmission grating.
4. To study the following applications of an operational amplifier (i) Differentiator (ii) Integrator.
5. To study the following applications of an operational amplifier (i) adder (ii) Subtractor.
6. Determine the absorption coefficient of a given solution. Also study the concentration dependence of absorption coefficient.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VIII
CHM 402: CHEMISTRY: ADVANCE CHEMISTRY-II
PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- Evaluate the utility of UV/VIS spectroscopy as a qualitative and quantitative method.
- Understand Chemistry of Biomolecules.
- The knowledge about Spectral & Magnetic properties of Transition Metal complexes.
- Understand the Bioinorganic Chemistry, Geochemical effect on the distribution of metals.
- Learn chemistry of Amino Acids, Peptides, Proteins and Nucleic Acids

Course Contents

Unit I: Spectroscopy-II

Electromagnetic Spectrum: Absorption Spectra

(A) **Ultraviolet (UV) absorption spectroscopy** – absorption laws (Beer-Lambert law), molar absorptivity, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones. Woodward Fieser rules for calculation of absorption maxima in dienesand α, β unsaturated carbonyl compounds.

(B) **Infrared (IR) absorption spectroscopy** – molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, fingerprint region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds.

(C) **Nuclear magnetic resonance (NMR) spectroscopy**: Proton magnetic resonance (^{1}H NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, area of signals and proton counting, splitting of signals,

spin-spin coupling and coupling constant, interpretation of NMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1, 1, 2-tribromoethane, ethyl acetate, toluene and acetophenone.

(D) Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and NMR spectroscopic techniques.

Unit II: Chemistry of Biomolecules

(A)Classification and nomenclature. Monosaccharide, Configuration of monosaccharides.Mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses.Erythro and threodiastereomers.Structure of glucose including ring size determination and cyclic structure.Conversion of glucose into mannose.Formation of glycosides, ethers and esters.Mechanism of mutarotation.

(B) Structure of ribose and deoxyribose.Introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

Unit III: Spectral & Magnetic properties of Transition Metal complexes

(A) **Electronic spectra of Transition Metal Complexes:** Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series, Orgel-energy level diagram for d^1 to d^9states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

(B) **Magnetic Properties of Transition Metal Complexes:** Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula, L-S coupling, correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Unit IV: Bioinorganic Chemistry

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals. Sodium / Potassium pump,

carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine,Cisplatin as an anti-cancer drug. Iron and its application in bio-systems, Haemoglobin, Myoglobin; Storage and transfer of iron.

Amino Acids, Peptides, Proteins and Nucleic Acids: Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis.Preparation and reactions of α-amino acids.

Structure and nomenclature of peptides and proteins.Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides and proteins. Primary and secondary structures of proteins.Protein denaturation/renaturation.

Nucleic acids: introduction, Constitution of nucleic acids, Ribonucleosides and ribonucleotides. The double helical structure of DNA.

Suggested Readings:

1. Sharma Y. R. elementary organic spectroscopy: principles and chemical applications paperback.

2. Mehta and Mehta, Organic chemistry, PHI
3. Donald L. Pavia Gary M. Lampman George S. Kriz James A. Vyvyan, Introduction to Spectroscopy, 5th Edition.
4. Bahl B. S.&BahlArun 5000 Solved Problems In Organic Chemistry, S. Chand Publishing.
5. Madan R. L., Chemistry for Degree Students B.Sc. 3rd Year S. Chand Publishing.
6. NafisHaider S, Fundamental of Organic Chemistry, S. Chand Publishing.
7. Pradeep. T. Nano: The Essentials; Understanding Nanoscience and Nanotechnology. Tata McGraw-Hill Education Pvt. Ltd., New Delhi.
8. Kenneth J. Klabunde and Gleb B. Sergeev Nanochemistry (Second Edition)
9. Bandyopadhyay, A. K. Nano Materials. New Age International Publishers, New Delhi
10. P.T. Anastas and J.C. Warner, Green Chemistry: Theory and Practice. Oxford University Press.
11. Lancaster M. Green Chemistry: Introductory Text. Royal Society of Chemistry (London).
12. Ryan M.A. and Tinnesand M. Introduction to Green Chemistry. American Chemical Society (Washington).
13. Cann M. C. and Connelly M. E. Real world cases in Green Chemistry, American Chemical Society (Washington).
14. Cann M. C. and Umile T. P. Real world cases in Green Chemistry (Vol 2) American Chemical Society (Washington)
15. Ahluwalia, V.K., Kidwai, M. New Trends in Green Chemistry, 2004
16. Inorganic Polymers by Stone and Graham.

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Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Note: The students should be given exposure of any research labs and instrumentation center/ reputed university lab/industry/ government labs of northern region.

1. **Organic Chemistry**
   a. Two stage preparation: *p*-nitroacetanilide from Aniline and *p*-Bromoacetanilide from Aniline.
   b. Determination of Iodine value of an oil/fat.
   c. Separation of two component mixture using water or $NaHCO_3$ solution & identification of the two components. Preparation of one derivative.
   d. Green synthesis:
2. **Physical Chemistry**
   a. **Colorimetry**
      i. Determination of formula of complex by Job's method.
      ii. Verification of Beer – Lambert law for $KMnO_4/K_2Cr_2O_7$ and determine the concentration of the given solution of the substance.
   b. **Polarimetry**
      i. Determination of the specific rotation of a given optically active compound and determination of the concentration of given solution of an optically active substance
   c. **Solvent Extraction**
      i. Separation and estimation of Mg (II) and Zn (II)
   d. **Ion Exchange Method**
      i. Separation and estimation of Mg (II) and Zn (II)
   e. **Chromatography**
      i. To determine R_f value of individual and mixture of amino acid by thin layer chromatography (TLC).
      ii. Separation, Isolation and Analysis of the Different Components in a Mixture.
      iii. Method of separation of green leaf pigment, mixture of inorganic, vitamins, colors of flowers etc. separation of α, β, γ carotene from carrot.
   f. **Refractometry and Polarimetry**
      i. To verify law of refraction of mixture (e.g of glycerol and water) using Abbe's refractrometer.
      ii. To determine the specific rotation of a given optically active compound.
   g. **UV spectrophotometer**

i. Record the UV spectrum of p-nitrophenol (in 1:4 ethanol:water mixture). Repeat after adding a small crystal of NaOH. Comment on the difference, if any.
ii. Record the U.V. spectrum of a given compound (acetone) in cyclohexane (a) Plot transmittance versus wavelength. (b) Plot absorbance versus wavelength.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VIII
ZOO 402: ZOOLOGY: MOLECULAR GENETICS, BIOTECHNOLOGY AND INSTRUMENTATION
PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours
Max. Marks: 100
Credits- 4
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:
To enable students to comprehend the modern concepts and applied aspects of Molecular Genetics, Biotechnology and instrumentation.

Course Contents

Unit I: Nucleic Acids: RNA & DNA

- Nucleic acids: DNA- Structure, forms, chemical composition functions and units of DNA, Genetic Code
- RNA: Genetic RNA, non–genetic RNAs (mRNA, tRNA, and rRNA) – Structure and functions.
- Replication of DNA
- Gene mutation : nature of mutation, types of mutation and causes of mutation
- DNA repair: mismatch repair, direct repair, base-excision, nucleotide-excision rep ir and other types of DNA repair. Genetic diseases and faulty DNA repair.

Unit II: Genetic Engineering

- Gene expression: Transcription and translation of prokaryotes and eukaryotes.
- Regulation of gene expression in prokaryotes (Lac and tryptophan operon)
- Genetic engineering : Gene cloning
  i. Cloning vectors
  ii. Restriction endonucleases, staggered and blunt ended cuts, ligation and example.
  iii. Recombinant DNA technology

- Gene amplification
  i. cDNA library
  ii. Genomic library and
  iii. Polymerase chain reaction
- Applications of recombinant DNA technology – DNA finger printing, human gene therapy, ethical concerns and cloning. Human Genome Project.

Unit III: Tissue Culture

- Animal Cell, Tissue and organ culture. History of animal Cell & organ culture requirements. Characteristics of animal cell culture. Culture media (Natural & Synthetic).
- Sterilization of glassware, equipment isolation of animal tissue; sometic cell fusion, hybridoma technology.
- Elementary idea of bio informatics, genomics, proteomics

Unit IV: Microscopy

- Microscopy : Principle structure and function of simple and compound microscope
- Spectrophotometry: Principle of spectrophotometer, structure of simple & UV visible spectrophotometer. Principles of Chromatography.
- Principles of electrophoresis, separation technique of proteins and DNA.
- Principles of Centrifugation, simple, Gradient &Ultracentrifuge.
- General Principle & functions of instrument related to ECG, EEG, CT scanning and Sonography.

Suggested Readings:

1. Molecular Biology of the Cell, Alberts al, 5thed, Garland Science 2008
2. Molecular Biology of the Gene Watson Baker et al, 7thed, Pearson 2014.
3. Biochemistry , Molecular Biology and Genetics 5thed, Lippincott Williams and Wilkinson, 2013
4. Biochemistry D Voet & JG Voet, Wiley 2011.
5. Immunology , Kuby 7thed, Owen Punt Stenford McMillan, 2013
6. Fundamentals of Biochemistry , JL Jain , S Chand Pub 2014
7. Essentials of Molecular Biology 2ed, David Freifileder, Panima Publishing N Delhi 1996.
8. Genetics and Biotechnology, Dr KC Soni Hindi Edition, College book centre Chaura Rasta Jaipur.
9. Microbiology and biotechnology, Dr KC Soni Hindi Edition, College book centre Chaura Rasta Jaipur.
10. Biochemistry and Molecular Biology, K Wilson & J Walker, 7th Cambridge 2010.
11. Animal Cell Culture – A practical approach, Ed, John, R.W. Masters IRL Press
12. Gunther S. Stent, Molecular Genetics, MacMillian Publishing Co Inc.
13. R.W. Old and S.B. Primorse: Principle of gene manipulation: An introduction to genetic engineering.

14.R.A. Meyers (Ed) : Molecular Biology and Biotechnology .(VCH Publishers)
15.Genetics – Analysis and Principles- Robert J. Brooker , McGraw Hill
16.Principles of Cell and Molecular Biology –L.J Kleinsmith& V.M Kish, Harper Collins College Publisher.
17.Molecular Cell Biology 7th Ed, 2013- Lodish,Berk, Matsludaira, Kaiser Kriegar, Scott, Zipursky, Darnell,W.H Freeman And Co.
18.Bioinformatics, Sharma Munjal and Shankar, 2012 Rastogi Publications , Gangotri , Shivaji Road, Meerut-25002
19.Biotechnology – BD Singh (Hindi Ed) , Kalyani Publisher B1/292, Ludhiana, -141008 Punjab

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents:

1. Study of DNA in the *Drosophila*'ssalivary gland chromosomes.
2. Isolation of genomic DNA
3. Molecular separations by chromatography, electrophoresis, precipitation etc.
4. Isolation of milk protein from the milk sample.
5. Separation of serum from blood by using centrifuge
6. Separation of plasma from blood by centrifugation.
7. Separation of biomolecules by paper and gel chromatography.
8. Preparation and use of culture media for microbes.
9. Preparation and use of culture media for animal tissues.
10. Media preparation media sterilization and inoculation.
11. Cell culture techniques- Design and functioning of tissue culture laboratory, cell proliferation measurements, culture media preparation and cell harvesting methods.
12. Isolation and staining of bacteria.
13. Determination of pH value of different water samples, blood urine and saliva.
14. Qualitative tests for carbohydrates.
15. Qualitative test for proteins.
16. Qualitative test for lipids.
17. Effects of temperature on the activity of enzyme.
18. Chart, model, Power point/multimedia presentation preparation related to evidence of evolution Human /Horse evolution, Geographical time scale etc.
19. Students are expected to visit different laboratories (RRL, CSIR, ICMR, Science centers etc).

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VIII
BOT 402: BOTANY: MOLECULAR BIOLOGY, BIOCHEMISTRY AND BIOTECHNOLOGY
PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

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

- Understand the structure and functions of biological macromolecules;
- Understand and appreciate the importance of nucleic acid and gene research in modern times;
- Understand the tools and techniques of biotechnology, the processes involving gene manipulation and their applications.
- Understand the tools, techniques and applications of plant tissue culture.

Course Contents

Unit I: Genetics

- Discovery, brief history of DNA and RNA. (i) DNA: types, molecular structure, characteristics, structural properties and functions. Satellite and repetitive DNA, mitochondrial and plastid DNA, plasmid, DNA damage and repair, replication of DNA in prokaryotes and eukaryotes. (ii) RNA: Types, structure, characteristics, structural properties and functions, Role of RNAs in proteinsynthesis.
- Gene expression: Structure of gene, transfer of genetic information, genetic code,
- Gene structure and regulation in prokaryotes, operon concept – lac and tryptophan operon.

Unit II: Nitrogen & Protein Metabolism

- Nitrogen Metabolism: Forms of nitrogen, cellular conversion of nitrates to ammonium ions, assimilation of NH^+_4 ions physiology and biochemistry of biological nitrogen fixation, amino acids – nature, classification, structures, synthesis of amino acids – reduction amination and

transamination.

- Proteins – classification, structure – primary, secondary, tertiary and quaternary.
- Protein synthesis, transcription, translation, regulation of gene expression in prokaryotes and eukaryotes
- Enzymes: Nomenclature, types and mechanism of action

Unit III: Complex Molecules: Carbohydrates & Lipids

- Carbohydrates: Introduction, classification, chemical structures of mono, oligo and polysaccharides, synthesis and breakdown of sucrose and starch.
- Lipids: Introduction, classification, chemical structures, saturated and unsaturated fatty acids, synthesis and breakdown of fatty acids, β-oxidation.

Unit IV: Biotechnology and Bioinformatics

- Tools and techniques for DNA recombinant technology, cloning vectors, brief account of genomics and c-DNA library, interferons, transposable elements, PCR.
- Applications of Biotechnology – function, definition and applications, brief account of DNA finger printing, *Agrobacterium* – mediated gene transfer, achievements in crop improvement, transgenicplants.
- Brief account of recent advances in Plant bio-technology; products of biotechnology
- Brief account of Bioinformatics – genomics,proteomics.

Suggested Readings:

1. Lea, P.J. and R.C.Leegood, 1999, Plant Biochemistry and Molecular Biology, John Wiley & Sons,England.
2. Lehninger, A.B., Principles of Biochemistry, CBS Publishers and Distributors, New Delhi.
3. Srivastava, H.S.2005, Plant Physiology, Biochemistry and Biotechnology, Rastogi Publications,Meerut.
4. Jain.J.L. 1994, Fundamentals of Biochemistry, Sultanchand & Co., NewDelhi.
5. Old, R.W. and S.B.Primrose, 1989, Principles of Gene Manipulation, Blackwell Scientific Publication, Oxford,UK.
6. Lodish, H., A.Berk, S.L.Zipursky, P.Matsudaiva, D. Baltimore, and J.Darnell, 2000. Molecular Cell biology, W.H. Freeman & Co., NewYork.
7. Alberts, B., D.Bray, J.Lewis, M.Raff, K.Roberts and I.O.Watson, 1999, Molecular Biology of Cell, Garland Publishing Co., Inc., NewYork.
8. Malacinski, G.M., 2005, Essentials of Microbiology (4th Ed.). Narosa Publishing House, NewDelhi.
9. Cell and Molecular Biology (8th Ed.) E.D.P. De Robertis and EMF De Robertis Lippencott Williams & Wilkins

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Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	20
Viva Voce	5
Record	5
Total Marks	**30**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

- Basic requirements of a tissue culture laboratory: (a) Common Glassware, (b) test tubes, culture tubes and screw-capped tubes, (c) Petridish (d) Pipette (e) Pasteur pipette (f) Erlenmeyer flask (g) Volumetric flask (h) Cleaning glassware (i) Inoculation needle and inoculation loop (j) Bunsen burner (Spirit-lamp)(k) Water baths (l). Autoclaves (m) Laminar air flow (n) Incubator (o) Hot air oven (p) Colony counter (q) pH meter (r) Electric balance (s) Spectrophotometer (t) Centrifuge (u) Binocular Microscope.
- Method of using balance
- Preparation of temporary cotton plugs.
- Preparation of permanent cotton plugs.
- Preparation of culture media
- Preparation of liquid medium (broth)
- Preparation of solid media (PDA medium and plates)
- Preparation of agar slants.
- Methods of sterilization
- To test for the presence of carbohydrates, proteins andlipids.

GROUP D: DISCIPLINE SPECIFIC ELECTIVE (DSE)
Semester VIII
MTH 402: MATHEMATICS: NUMERICAL ANALYSIS
PHY 202: PHYSICS: OPTICS AND LASER

Time: 3 Hours
Credits- 4

Max. Marks: 100
Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:
At the end of course, learner will be able to apply concepts of Numerical methods in solving problems related to real life situation.

Unit I:
Error - its sources, propagation and analysis, Root finding for nonlinear equations (Transcendental and Algebraic equations): Bisection method, Regula-Falsi method, Newton Raphson's method order of convergence, Iterative method.

Unit II:
Numerical solution of system of linear equations, direct methods- Gauss elimination method, Gauss-Jordan method, the matrix inversion method, Iterative methods: Gauss-Jacobi Method, Gauss Siedel method.

Unit III:
Differences: forward, backward, central, Relation betweendifference and derivatives, Differences of polynomials, Newton's formula for forward and backward interpolation.Divided differences and simple differences, Newton's general interpolation formula, Lagrange's interpolation formula, Error in interpolation.

Unit IV:
Numerical differentiation and numerical integration- Newton's Cotes Quadrature formula, Gauss Quadrature formula,Trapezoidal, Simpson's& Weddle's rules, Numerical solution of first and second order differential equations, Taylor's series approximation, Euler's Method, Picard's Method, Runge-Kutta Method.

Suggested Readings:

1. An Introductory Methods in Numerical Analysis: S.S. Sastri, P.H.I, New Delhi, 4th edition2005.

2. Numerical Analysis: J.L. Bansal, J.P.N. Ojha, JPH, Jaipur, 1991.
3. An Introduction to Numerical Analysis: Kendall E. Atkinson, John Wiley, New York, 2nd edition 2001.
4. Computer Based Numerical Methods and Statistical Techniques: P.K. De, CBS Publication, New Delhi, 1st edition 2006.

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Group D: Discipline Specific Elective (DSE)
Semester VIII
DSE 402: ONE PROJECT IN PHYSICS / CHEMISTRY / MATHEMATICS / BOTANY / ZOOLOGY

Credits: 6 **Marks: 100**

Students will select the topics of Project in consultation with concerned subject teacher in Semester VI and they will work for the Project from Semester VI to VIII. Final Project Report will be submitted by the student-teacher in the Semester VIII for its evaluation. Evaluation of the Project will be done out of the 100 marks as per the distribution given below:

Distribution of Marks for the Project Evaluation		
Activity	**Max. Marks**	**Min. Marks**
Project Report	70	28
Viva Voce	15	6
Presentation	15	6
Total Marks	**100**	**40**

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester VIII
PEVE 402: VISION OF EDUCATION IN INDIA-ISSUES AND CONCERNS

Time: 3 Hours | Max. Marks: 100
Credits- 4 | Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

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

- Understand determinants of the purposes and processes of education.
- Understand the role of education as an agency of social transformation.
- Reflect critically on concerns and issues of contemporary Indian schooling.
- Develop their insight as future concerns of education.
- Analyze development of education in light of socio, economic, political and cultural development.

Course Contents

Unit I: Vision of Indian Education and Indian Thinkers

- Aims and purposes of education drawn from the ancient intellectual tradition of India
- Communities, Religion, State and Market as the determinants of purpose and process of Education
- An overview of salient features of the philosophy and practice of education by
    - Swami Vivekanand: Humanistic Approach
    - Rabindranath Tagore: Liberationist pedagogy
    - M. K. Gandhi: Basic education or Education for self sufficiency
    - Aurobindo Ghosh: Integral Education
    - J. Krishnamurthi: Education for individual and social transformation

Unit II: Contemporary Indian Schooling: Concerns and Issues

- Constitutional interventions for universalization of education and RTE Act 2009

- Constitutional provisions on education that reflect National ideals (Democracy, Equality, Liberty, Secularism and Social justice)
- Equality of Educational Opportunity:
  - Meaning of equality of educational opportunity and constitutional provisions
  - Prevailing nature and forms of inequality, including dominant and minor groups and related issues
  - Inequality in schooling: Public and private schools, rural-urban Schools, single teachers' schools and many other forms of inequalities in school systems and the processes leading to disparities
- Issues of Quality and Equity in schooling (with specific reference to girl child, weaker section and differently abled children), Variations in school quality
- Idea of 'common school' system

Unit III: Future Concerns and changing scenario in Education

- Impact of globalization, liberalization and privatization on Indian society and education
- Rights and Scheme for education of Girl Child
- Education for National Integration and International Understanding
- Citizenship education, Education for Sustainable Development of society
- ICT In School Education- National Repository of Open Educational Resources (NROER)

Unit IV: Education and Development- An Interface

- Emerging trends in the interface between:
  - political process and education
  - economic developments and education
  - Socio- cultural changes and education
  - Skill development with reference to vocational education
  - Educational development through community participation (Govt. and Non- Govt. Agencies)

Modes of Learning Engagement:

- Sourcing and studying relevant portions of documents relevant to the themes.
- Presentations based on readings (including original writing of at least one educational thinker).
- Conduct surveys of various educational contexts (e.g. Schools of different kinds) and make interpretative presentations based on these.
- Study writings on analysis of education-development interface and make presentations.
- Group discussions, debates and dialogue on the themes.

Practicum:

- Preparing an assignment on Constitutional Provisions on Education.
- Preparing a brief summary of Educational writers/books contributed by any of the Indian Thinkers.
- Reporting on Practice of Rights of the Child with special reference to Girl Child.

- Comparative analysis of different types of schools.
- Conducting surveys and presentations based on aforesaid units.
- Interpretation of field studies and experiences in terms of the course themes
- Comprehension of ideas of thinkers and presenting them in groups.
- Extent of innovative ideas and sensitivity in visualizing project on 'peace' or 'environmental concerns'

Suggested Readings:

1. Agrawal, J.C. & Agrawal S.P. (1992). Role of UNESCO in Educational. New Delhi. Vikas Publishing House.
2. Anand, C.L. et.al. (1983). Teacher and Education in Emerging in Indian Society. New Delhi. NCERT.
3. Govt. of India (1986). National Policy on Education. New Delhi. MHRD.
4. Govt. of India (1992). Programme of Action (NPE). New Delhi. MHRD.
5. Mani, R.S. (1964). Educational Ideas and Ideals of Gandhi and Tagore. New Delhi. New Book Society.
6. Manoj Das (1999). Sri Aurobindo on Education. New Delhi. National Council for Teacher Education.
7. Mistry, S.P. (1986). Non-formal Education-An Approach to Education for All. New Delhi. Publication.
8. Mohanty, J. (1986). School Education in Emerging Society. sterling Publishers.
9. Mukherji, S.M. (1966). History of Education in India. Baroda. Acharya Book Depot.
10. Naik, J.P. & Syed, N. (1974). A Student's History of Education in India. New Delhi. MacMillan.
11. NCERT (1986). School Education in India – Present Status and Future Needs. New Delhi. NCERT.
12. Ozial, A.O. 'Hand Book of School Administration and Management'. London. Macmillan.
13. Radha Kumud Mookerji (1999). Ancient Indian Education (Brahmanical and Buddhist). New Delhi . Cosmo Publications.
14. Sainath P. (1996). Everybody loves a good drought. New Delhi. Penguin Books.
15. Salamatullah. (1979). Education in Social context. New Delhi. NCERT.
16. Sykes, Marjorie (1988). The Story of Nai Talim. Wardha. Naitalim Samiti.
17. UNESCO (1997). Learning the Treasure Within.
18. Vada Mitra. (1967). Education in Ancient India. New Delhi. Arya book Depot.
19. National Policy on Education (1986). Ministry of HRD. New Delhi. Department of Education.
20. NCERT (2002). Seventh All India School Education Survey. New Delhi. NCERT.
21. UNESCO. (2004). Education for All. The Quality Imperative. EFA Global Monitoring Report. Paris.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester VIII
EPCPE 402: PEACE ORIENTED VALUE EDUCATION

Time: 1.5 Hours | Max. Marks: 50
Credits- 2 | Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 08 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

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

- Understand the importance of peace education.
- Analyse the factors responsible for disturbing peace.
- Appreciate the role of peace in life.
- Develop insight of understanding of concept of Indian values according to time, space and situation.
- Scientifically analyse values in Indian culture and tradition.
- Develop positive attitude about Indian human values
- Understand the Indian values according to Shradhhaand logic.
- Understand the co-ordination withIndian values and life style.
- Analyse the ethical, artistic and pleasant values.
- Analyse absolute evalues in globalization and universlization.
- Develop the teaching learning method for adoptation and assimilation in life value.
- Explain fundamental aims and values that provide the intellectual basis of contemporary education policy and practice.
- Engage with issues in a manner that makes them sensitive to promote certain educational values while marginalizing others.
- Explore the meaning of Ethics and values.
- Understand the process of value education.

Unit I: Importance of Peace

- Aims, objectives and importance of Peace Education.
- Barriers- Psychological, Cultural, Political
- Factors responsible for disturbing Peace: Unemployment, terrorism, Exploitation, Suppression of individuality, complexes.

- Characteristics of good textbook, evaluation of textbook, analysis of text book from peace education perspective.

Unit II: Nature and sources of values, Classification of values

- Meaning, concept need and importance of values and ethics.
- Personal and Social values
- Intrinsic and extrinsic values on the basis of personal interest and social good.
- Social, moral, spiritual and democratic values on the basis of expectation of society and one's self inspiration.
- Identification of Analysis of emerging issues involving value conflicts
- Design and development of instructional material for nurturing values.

UNIT III: Values in religious scriptures

- Bhagwad gita-Nishkam Karma, Swadharma, Laksagrah and Stithpragya.
- Bible – Concept of truth, compassion, forgiveness
- Dhamnipada- Astangmarg, Aryastyaand Madhyamarg
- Gurugranth Sahib- Concept of Kirath, Sungat, Pangat & Jivanmukti
- Quran–Concept of spiritual and moral values (adah, raham & theory of justice) & social responsibilities.

UNIT IV: Methods and Evaluation of Value Education

- Traditional Methods: Story Telling, Ramleela, Tamasha, street play and folk songs.
- Practical Methods: Survey, role play, value clarification, Intellectual discussions.
- Causes of value crisis: material, social, economic, religious evils and their peaceful solution.
- Role of school- Every teacheras teacher of values, School curriculum as value laden.
- Moral Dilemma (Dharmsankat) and one's duty to wards self and society

Practicum/Field Work (Any two of the following):

- Preparation of a report on school programmes for promotion of peace.
- Observation of classroom situation and identification of factors promoting peace.
- Analyse morning assembly programme of a schoolfrom the point of view of value education.
- Analysis of a text book of a school subject from the point of view of values hidden.
- Preactice of role- play in two situations and preparation of report.
- Report on value conflict resolution in a situation.

Suggested Readings:

1. अवस्थी शशि–प्राचीन भारतीय समाज, हिन्दी माध्यम कार्यान्वयन निदेशालय,दिल्ली विश्वविद्यालय, दिल्ली 1993
2. उर्वशी, शरती –नैतिक शिक्षा एवं बालविकास, प्रभात प्रकाशन, चावडीबाजार, दिल्ली , 1979
3. काणेपी.वी. – धर्मशास्त्री काइतिहास, उ.प्र. हिन्दीसंस्थान, हिन्दी भवन,महात्मा गांधीमार्ग, लखनऊ।
4. गुप्तानत्थूलाल–मूल्यपरकशिक्षा पद्धति, जयकृष्ण अग्रवाल, महात्मागांधीमार्ग, अजमेर 1989

5. गोयनकाजयदयाल–महत्वपूर्णशिक्षा, गीताप्रेस गोरखपुर।
6. पाण्डेय गोविन्दचन्द–मूल्य मीमांसा–राजस्थानहिन्दीग्रन्थअकादमी, तिलकनगर, जयपुर, 1973।
7. प्रसहस्रबुद्धे: जीवन मूल्य, सुरुचि साहित्य, केशवकुंज, झण्डेवालान, नईदिल्ली,
8. भारती धर्मवीर–मानवमूल्य औरसाहित्य, भारतीय ज्ञानपीठ, काशी, 1972
9. मानवसेवासंघ, वृंदावन–मानवता के मूलसिद्धान्त 1981
10. मिश्रणविष्णिवास– अध्यापन, भारतीय दृष्टि, एनसीटीई, नईदिल्ली 1988
11. विमलकुमार–मूल्य मीमांसा, राजकमलप्रकाशन, दिल्ली
12. AcharyaMahaprija : TowardsInnerHarmony, NewDelhi,B. Jain Publishers, 1999
13. Dutt,N.K.andRuhelaS.P.:HumanValuesandEducation,SterlingPublishersPvt.Ltd ., NewDelhi,
14. Gandhi K.L.: Value Education, GyanPublishingHouse, NewDelhi, 1993
15. Gupta,NathuLal:ValueEducation:TheoryandPractice:JaikrishanAgarwal,Mahat maGandhi Road,Ajmer – 2000
16. I.A.Lolla:ValueCertification:AnadvancedHandbookfortrainersandTeachers,Calif, UniversityAssociatePress, KrischanBoum, Howard 1977
17. PremKripal: Value in Education, NCERT, NewDelhi 1981
18. Rajput, J.S. (2001).Values in Education, NewDelhi, SterlingPublishers, 2005
19. RokeachM.: The Nature ofHumanValues, The FreePress , NewYork 1973
20. SharmaR.S.: The Monk who sold his Ferrari, Mumbai, JaicoPublishingHouse, 2003
21. Swami RagunathAnand: Eternal ValuesforaChangingSociety, BVB Bombay1971.
22. Gupta, K. M. (1989). Moral Development of School Children Gurgaon: Academic Press.
23. Krishnamurthy, J. (2000). Education and the Significance of Life. Pune: KFI.
24. Dhokalia, R. P. (2001). External Human Values and World Religious. New Delhi: NCERT.
25. Sheshadri, C., Khadere, M. A., &Adhya, G. L. (ed.) (1992). Education in Value. New Delhi: NCERT, London, Allen and Unwin.
26. Singh, R. N. (ed.) (2003). Analytical study of Sikh Philosophy, Commonwealth Publishers: New Delhi- 02.
27. Khan Masood Alia (ed.) (2006). Islamic Thought and its Philosophy. Commonwealth Publishers: New Delhi- 02.
28. Khan, IntakhabAlam (2007). Peace, Philosophy and Islam, Academic Excellence.Delhi- 31.

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GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester VIII
EPCGI 402: GENDER ISSUES IN EDUCATION

Time: 1.5 Hours | Max. Marks: 50
Credits- 2 | Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 08 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 8 marks each.

iv) All questions will carry equal marks.

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

- develop basic understanding and familiarity with key concepts - gender, gender perspective, gender bias, gender stereotype, empowerment, gender parity, equity and equality, patriarchy and feminism
- understand the gradual paradigm shift from women studies to gender studies and some important landmarks in connection with gender and education in the historical and contemporary period
- learn about gender issues in school, curriculum, textual materials across disciplines, pedagogical processes and its intersection with class, caste, culture, religion and region
- understand how Gender, Power and Sexuality relate to education (in terms of access, curriculum and pedagogy)

Course Contents

Unit I: Gender Issues: Key Concepts

- Gender, Social construction of Gender.
- Gender Socialization, Gender Roles.
- Gender discrimination.

Unit II: Structures of Gender Inequality

- Patterns of Gender inequality in terms of caste, class and Culture.
- Patterns of violence against women: Female foeticide, Female Infanticide.
- Child marriage. Dowry, Widowhood, Female commercial sex workers, Domestic violence.
- Gender Identities and Socialization Practices in: Family, Schools, Other formal and Informal Organization.

Unit III: Gender and Education, issues related to marginalized women

- Gender bias in curriculum, drop out, Sex Ratio, Literacy and Recent trends in Women's education.
- Issues related to marginalized Women: ST/SC/Minorities.

Unit IV: Gender Jurisprudences

- The Pre-natal diagnostic Techniques Act, 1994.
- The Draft sexual Assault Law Reforms, India, 2000.
- Domestic violence Act 2005.
- Reservation for Women.
- Child marriage Act.

Modes of Learning Engagement:

Classroom will be interactive by sharing experiences, discussing day today happenings in the society, visiting centres and offices, showing films followed by discussions and priority will be given to student teachers throughout the transaction of the course.

Practicum/ Tutorials:

- Write a paper on efforts of the Central and State governments for Gender Jurisprudences.
- Prepare on any one topic from any one unit with the support of Teacher Educator and present in the classroom.
- Review one recent article on Gender Issues in Education.
- Prepare a report on recent trends in Educational development of girl child in India.
- Conduct an opinion survey for Gender Issues in Education.

Suggested Readings:

1. Radha Kumar (1993). The History of Doing. Zubaan.
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