Curriculum Framework
B.Sc. – B.Ed. (4 Year)
Academic Year 2023-24

Based on NEP 2020

॥ न हि ज्ञानेन सदृशं पवित्रमिह विद्यते ॥

भारतीय शिक्षक प्रशिक्षण संस्थान, गांधीनगर

Indian Institute of Teacher Education, Gandhinagar

(A State Public University Established by Government of Gujarat)

Curriculum Framework B.Sc.-B.Ed. 2023

Published by

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Registrar

Indian Institute of Teacher Education

Ramkrushna Paramhans Vidya Sankul, Near KH-5, Sector - 15, Gandhinagar - 382016

From the Desk of Vice-Chancellor….

Dear All,

National Education Policy-2020 (NEP-2020) has been a policy to place Indian Education System on the global platform. It has been guiding us to reframe educational ethos in global context intervening Indian Knowledge System. India has been regarded as one of the ancient educational system and world was attracted towards the system our forefathers invaded for centuries. It has been our hard luck that the Centres of Knowledge, and Teaching and Learning like; Takshshila, Nalanda, Vallabhi, etc. were attacked and vanished the places were the Knowledge was practiced. But the spirit and zeal, which we have inherited still exists in hearts of Indians from ages. It is the right time to explore our culture, traditions, ethos, values, rituals to the world and it will bring solace to millions and millions of individuals all over the Globe; because we believe in **"वसुधैव कुटुम्बकम्"** and it can be proved with how Indus Valley Culture has possessed the real essence of these words. Indian Subcontinent has been found under tremendous disturbance and so is the world. If we wish, as Global Citizen, peace and harmony among all, we need to have paradigm shift in Educational System. This shift will place India as "विश्वगुरु" and that is the mission envisaged in NEP-2020.

Indian Institute of Teacher Education, Gandhinagar is an institute with difference because it has been instituted for the noble cause of uplifting the standards of School Education through Teacher Education, because the Teacher can reestablish the Indian Ethos in global context. The teacher is pivot in bringing out dynamism into young learners and there may be different society in future. This global community has power to establish peace and harmony into the world.

So, looking at need of futuristic societies and recommendations of NEP-2020, IITE has revised its curriculum on guiding principles of NCFTE-2009 and NEP-2020. The revised curricula is within recommendation of NEP-2020 of Integrated Teacher Education Programme (ITEP) and all guiding principles and recommendations of NCTE's Curriculum Committee have been incorporated. It is certain that these curricula will help prospective teachers and prospective teacher educators to develop holistically.

On publishing the curriculum framework for all courses offered by IITE, I thank faculties and Members of BoS and Academic Council for wholehearted efforts in bringing out these curricula in very short notice. It is also a request to all stakeholders to review and let us know what the best can be added to these curricula for making it more comprehensive and updated.

Wishing all of you all the best.

5th September, 2023

Gandhinagar

Dr. Harshad A. Patel

Contents:

Curriculum Framework B.Sc.-B.Ed. (4-Year) in force from Academic Year 2023-24

Four Year Integrated Teacher Education Programme Curriculum Framework														
Sr	Area	No.	Courses	Credit Per Sem								Total Cr	Total per Area
				S - 1	S - 2	S - 3	S - 4	S - 5	S - 6	S - 7	S - 8		
1	Ability Enhancement and Value added Courses		2 - Week Induction Programme									0	30
		1	Language I: Gujarati Language	2								2	
		2	Language I :Hindi Language	2								2	
		3	Language II :Sanskrit Language		2							2	
		4	Language II:English Language		2							2	
		5	Performing Art & Creative Expressions	2								2	
		6	Visual Art & Creative Expressions		2							2	
		7	ICT in Education							2		2	
		8	Perspectives on School Leadership and Management							2		2	
		9	Mathematics and Quantitative Reasoning						2			2	
		10	Sports, Nutritions and Fitness							2		2	
		11	Understanding self								2	2	
		12	Understanding Indian Ethos	2								2	
		13	Understanding Indian Knowledge System		2							2	
		14	Citizenship Education, Sustainability and Environment Education								2	2	
		15	Teacher and Society							2		2	
	Total			**8**	**8**	**0**	**0**	**0**	**2**	**8**	**4**	**30**	
2	Foundations of Education	1	Evolution of Indian Education	4								4	28
		2	Philosophical Perspectives of Education (Indian and Global)			4						4	
		3	Child Development and Educational Psychology			4						4	
		4	Sociological Perspectives of Education								4	4	
		5	Curriculum Development Principles							2		2	
		6	Assessment and Evaluation						2			2	
		7	Inclusive Education						2			2	
		8	Education Policy Analysis								2	2	
		9	One Optional from the offered courses (Adolescence Education/Language Across Curriculum/ Eduction for Mental Health/ Emerging Technologies in Education/ Gender Education/ Guidance and Counselling/ Human Rights Education/ Peace Education/ Health and Yoga Education/ Tribal Education/ Economics of Education/ School Leadership and Management)								4	4	
				4	**0**	**8**	**0**	**0**	**4**	**2**	**10**	**28**	
3	Pedagogy Courses	1	Stage specific Content cum Pedagogy Courses				4	8	4			16	16
			Total	**0**	**0**	**0**	**4**	**8**	**4**	**0**	**0**	**16**	
4	School Internship	1	Pre-internship Practice				2					2	22
		2	School Observations (Field Practice)				2					2	
		3	School based Research Project							2		2	
		4	Internship in Teaching I						2			2	
		5	Internship in Teaching II							8		8	
		6	Internship in Teaching III								2	2	
		7	Community Engagement and Service								2	2	
		8	Creating Teaching Learning Material								2	2	
			Total	**0**	**0**	**0**	**4**	**0**	**2**	**10**	**6**	**22**	
5	Disciplinary Courses	1	Any two of the disciplines 1. Language & Literature 2. Natural Sciences 3. Mathematics 4. Biological Sciences 5. Chemical Science 6. Physical Science 7. Social Sciences 8. Business Studies & Accountancy 9. Arts 10. Physical Education 11. Vocational Education	8	12	12	12	12	8			64	64
			Total	**8**	**12**	**12**	**12**	**12**	**8**	**0**	**0**	**64**	
			Grand Total	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**160**	**160**

CURRICULUM FRAMEWORK: ABILITY ENHANCEMENT AND VALUE ADDED COURSES						
Sr. No.	**Sem**	**Title**	**Nature of Paper**	**Type**	**Credit**	**Hours**
1	1	Language I Gujarati Language	Compulsory	Practical	2	60
2	1	Language I Hindi Language	Compulsory	Practical	2	60
3	1	Performing Art & Creative Expressions	Compulsory	Practical	2	60
4	1	Understanding Indian Ethos	Compulsory	Theory	2	30
5	2	Language II Sanskrit Language	Compulsory	Practical	2	60
6	2	Language II English Language	Compulsory	Practical	2	60
7	2	Visual Art & Creative Expressions	Compulsory	Practical	2	60
8	2	Understanding Indian Knowledge System	Compulsory	Theory	2	30
9	6	Mathematics and Quantitative Reasoning	Compulsory	Theory	2	30
10	7	ICT in Education	Compulsory	Theory	2	30
11	7	Perspectives on School Leadership and Management	Compulsory	Theory	2	30
12	7	Sports, Nutritions and Fitness	Compulsory	Practical	2	60
13	7	Teacher and Society	Compulsory	Theory	2	30
14	8	Understanding Self	Compulsory	Theory	2	30
15	8	Citizenship Education, Sustainability and Environment Education	Compulsory	Theory	2	30

CURRICULUM FRAMEWORK: EDUCATION						
Sr. No.	**Sem**	**Title**	**Nature of Paper**	**Type**	**Credit**	**Hours**
1	1	Evolution of Indian Education	Compulsory	Theory	4	60
2	3	Philosophical Perspectives of Education	Compulsory	Theory	4	60
3	3	Child Development and Educational Psychology	Compulsory	Theory	4	60
4	4	General Pedagogy of Mathematics and Science	Compulsory	Theory	4	60
5	4	Pre-Internship Practice	Compulsory	Practical	2	60
6	4	School Observations (Field Practice)	Compulsory	Practical	2	60
7	5	Pedagogy of Science	Compulsory	Theory	4	60
8	5	Pedagogy of Mathematics	Compulsory	Theory	4	60
9	6	Assessment and Evaluation	Compulsory	Theory	2	30
10	6	Inclusive Education	Compulsory	Theory	2	30
11	6	Advance Pedagogy	Compulsory	Theory	4	60
12	6	Internship in Teaching I	Compulsory	Practical	2	60
13	7	Curriculum Development Principles	Compulsory	Theory	2	30
14	7	School Based Research Project	Compulsory	Practical	2	60
15	7	Internship in Teaching II	Compulsory	Practical	8	240
16	8	Sociological Perspectives of Education	Compulsory	Theory	4	60
17	8	Education Policy Analysis	Compulsory	Theory	2	30
18	8	One Optional from the offered courses (Adolescence Education/Language Across Curriculum/ Eduction for Mental Health/ Emerging Technologies in Education/ Gender Education/ Guidance and Counselling/ Human Rights Education/ Peace Education/ Health and Yoga Education/ Tribal Education/ Economics of Education/ School Leadership and Management)	Optional	Theory + Practical	4	90
19	8	Internship in Teaching III	Compulsory	Practical	2	60
20	8	Community Engagement and Services	Compulsory	Practical	2	60
21	8	Creating Teaching Learning Material	Compulsory	Practical	2	60

CURRICULUM FRAMEWORK: CHEMISTRY						
Sr. No.	**Sem**	**Title**	**Nature of Paper**	**Type**	**Credit**	**Hours**
1	1	General Chemistry I	Compulsory	Theory	4	60
2	2	General Chemistry II	Compulsory	Theory	4	60
3	2	Chemistry Practical I	Compulsory	Practical	2	60
4	3	Environmental Chemistry	Compulsory	Theory	4	60
5	3	Chemistry Practical II	Compulsory	Practical	2	60
6	4	Organic Chemistry I	Compulsory	Theory	4	60
7	4	Chemistry Practical III	Compulsory	Practical	2	60
8	4	Inorganic Chemistry/Physical Chemistry	Optional	Theory	4	60
9	4	Chemistry Practical IV	Compulsory	Practical	2	60
10	5	Organic Chemistry II	Compulsory	Theory	4	60
11	5	Chemistry Practical V	Compulsory	Practical	2	60
12	5	Polymer Chemistry/Analytical Chemistry	Optional	Theory	4	60
13	5	Chemistry Practical VI	Compulsory	Practical	2	60
14	6	Advanced Organic Chemistry	Compulsory	Theory	4	60
15	6	Chemistry Practical VII	Compulsory	Practical	2	60
16	6	Chemistry Project	Compulsory	Practical	2	60

CURRICULUM FRAMEWORK:BOTANY						
Sr. No.	**Sem**	**Title**	**Nature of Paper**	**Type**	**Credit**	**Hours**
1	1	Cryptogams & Gymnosperms	Compulsory	Theory	4	60
2	2	Cell Biology & Biochemistry	Compulsory	Theory	4	60
3	2	Laboratory Experiments in Botany I	Compulsory	Practical	2	60
4	3	Plant Taxonomy & Morphology	Compulsory	Theory	4	60
5	3	Laboratory Experiments in Botany II	Compulsory	Practical	2	60
6	4	Plant Embryology & Plant Anatomy	Compulsory	Theory	4	60
7	4	Laboratory Experiments in Botany III	Compulsory	Practical	2	60
8	4	Microbiology & Phytopathology/Plant Breeding & Horticulture	Optional	Theory	4	60
9	4	Laboratory Experiments in Botany IV	Compulsory	Practical	2	60
10	5	Plant Physiology & Metabolism	Compulsory	Theory	4	60
11	5	Laboratory Experiments in Botany V	Compulsory	Practical	2	60
12	5	Plant Tissue Culture & Plant Biotechnology/ Environmental Science & Climate Change	Optional	Theory	4	60
13	5	Laboratory Experiments in Botany VI	Compulsory	Practical	2	60
14	6	Genetics & Molecular Biology	Compulsory	Theory	4	60
15	6	Laboratory Experiments in Botany VII	Compulsory	Practical	2	60
16	6	Life Science Project	Compulsory	Practical	2	60

CURRICULUM FRAMEWORK: ZOOLOGY						
Sr. No.	**Sem**	**Title**	**Nature of Paper**	**Type**	**Credit**	**Hours**
1	1	Invertebrate Zoology	Compulsory	Theory	4	60
2	2	Immunology and Haematology	Compulsory	Theory	4	60
3	2	Laboratory Experiments in Zoology I	Compulsory	Practical	2	60
4	3	Vertebrate Zoology	Compulsory	Theory	4	60
5	3	Laboratory Experiments in Zoology II	Compulsory	Practical	2	60

CURRICULUM FRAMEWORK: PHYSICS						
Sr. No.	**Sem**	**Title**	**Nature of Paper**	**Type**	**Credit**	**Hours**
1	1	Mechanics and Semiconductor Physics	Compulsory	Theory	4	60
2	2	Wave and Optics	Compulsory	Theory	4	60
3	2	Physics Practical I	Compulsory	Practical	2	60
4	3	Electricity, Magnetism and Electromagnetic Theory	Compulsory	Theory	4	60
5	3	Physics Practical II	Compulsory	Practical	2	60
6	4	Classical and Nuclear Physics	Compulsory	Theory	4	60
7	4	Physics Practical III	Compulsory	Practical	2	60
8	4	Thermodynamics and Statistical Physics/Electronics	Optional	Theory	4	60
9	4	Physics Practical IV	Compulsory	Practical	2	60
10	5	Solid State Physics	Compulsory	Theory	4	60
11	5	Physics Practical V	Compulsory	Practical	2	60
12	5	Introduction to Nanoscience and Nanotechnology/Atomic and Molecular Physics	Optional	Theory	4	60
13	5	Physics Practical VI	Compulsory	Practical	2	60
14	6	Mathematical and Quantum Physics	Compulsory	Theory	4	60
15	6	Physics Practical VII	Compulsory	Practical	2	60
16	6	Physics Project	Compulsory	Practical	2	60

CURRICULUM FRAMEWORK: MATHEMATICS						
Sr.No.	**Sem**	**Title**	**Nature of Paper**	**Type**	**Credit**	**Hours**
1	1	Calculus I	Compulsory	Theory	4	60
2	2	Linear Algebra	Compulsory	Theory	4	60
3	2	Vedic Mathematics	Compulsory	Practical	2	60
4	3	Calculus II	Compulsory	Theory	4	60
5	3	Computational Statistics	Compulsory	Practical	2	60
6	4	Differential Equations	Compulsory	Theory	4	60
7	4	Applications of Differential Equations	Compulsory	Practical	2	60
8	4	Group Theory/Real Analysis	Optional	Theory	4	60
9	4	Applications of Integral Transform	Compulsory	Practical	2	60
10	5	Elemantary Number Theory	Compulsory	Theory	4	60
11	5	Numerical Analysis	Compulsory	Practical	2	60
12	5	Metric Space/Operations Research	Optional	Theory	4	60
13	5	LaTeX Programming	Compulsory	Practical	2	60
14	6	Complex Analysis	Compulsory	Theory	4	60
15	6	Geometrical Approach in Mathematics	Compulsory	Practical	2	60
16	6	Mathematics Project	Compulsory	Practical	2	60

SEMESTER I

Semester - I

		Total papers	Hours	Credit	Internal	External	Total
Ability Enhancement and Value added Courses	**Theory**	1	30	2	15	35	50
	Practical	**3**	180	6	90	60	150
Education	**Theory**	1	60	4	30	70	100
Science **Principal**	**Theory**	1	60	4	30	70	100
Science **Subsidiary**	**Theory**	1	60	4	30	70	100
	Total	**7**	**390**	**20**	**195**	**305**	**500**

Sr. No.	Subject	Title	Type	Nature of Paper	Hours	Credit	Internal	External	Total
1	Ability Enhancement and Value added Courses	Language I: Gujarati Language	Practical	Compulsory	60	2	30	20	50
2	Ability Enhancement and Value added Courses	Language I: Hindi Language	Practical	Compulsory	60	2	30	20	50
3	Ability Enhancement and Value added Courses	Performing Art & Creative Expressions	Practical	Compulsory	60	2	30	20	50
4	Ability Enhancement and Value added Courses	Understanding Indian Ethos	Theory	Compulsory	30	2	15	35	50
5	Education	Evolution of Indian Education	Theory	Compulsory	60	4	30	70	100
6	Chemistry	General Chemistry I	Theory	Compulsory	60	4	30	70	100
7	Botany	Cryptogams & Gymnosperms	Theory	Compulsory	60	4	30	70	100
8	Zoology	Invertebrate Zoology	Theory	Compulsory	60	4	30	70	100
9	Physics	Mechanics and Semiconductor Physics	Theory	Compulsory	60	4	30	70	100
10	Mathematics	Calculus I	Theory	Compulsory	60	4	30	70	100

EDUCATION

Semester-1

Language I: Gujarati Language

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

પ્રશિક્ષણાર્થીઓ ...

- વિવિધ પ્રવૃત્તિઓ દ્વારા ગુજરાતી ભાષામાં શ્રવણ, લેખન, કથન અને વાંચન કૌશલ્યનો ઉચિત ઉપયોગ કરે છે.
- અર્થગ્રહણ સાથે ધ્યાનપૂર્વક સાંભળતા શીખે તથા પોતાના વિચારો શુદ્ધભાષામાં વિનય અને વિવેકપૂર્વક અભિવ્યક્ત કરે છે.
- ધ્યાનપૂર્વક,સ્પષ્ટ,શુદ્ધ અને યોગ્ય ગતિથી અર્થઘટન સાથે વાંચન કરે છે.
- પોતાના વિચારો ક્ષોભ,શરમ,સંકોચ વિના અને યોગ્ય પ્રવાહી શૈલીમાં અભિવ્યક્ત કરે છે.

Course Content:

વિભાગ:A - શ્રવણ અને લેખન કૌશલ્ય આધારિત પ્રવૃત્તિઓ.

1. https://www.youtube.com/watch?v=h9OM--rX0Jc - youtube પરથી મનુભાઈ પંચોળી 'દર્શક' લિખિત દીપનિર્વાણ પુસ્તકનો આસ્વાદ સાંભળો અને ચિંતન કરો.
2. https://www.youtube.com/watch?v=iKaIzzuDp0o - youtube પરથી અશોક વ્યાસની મુલાકાત સાંભળો અને ચિંતન કરો.
3. ગુજરાતી ભાષાના કોઈ એક નામાંકિત વક્તાના વક્તવ્યની વિડીયો/ઓડિયો કલીપ સાંભળો અને ચિંતન કરો.
4. ગુજરાતી ભાષાની કોઈ એક કાવ્ય રચના અને તેના આસ્વાદની વિડીયો/ઓડિયો કલીપ સાંભળો અને ચિંતન કરો.
5. https://www.youtube.com/watch?v=7H58DXWLe8E - આ youtube પરથી હાસ્ય લેખક રતિલાલ બોરીસાગરની મુલાકાત સાંભળો અને ચિંતન કરો.

(પ્રશિક્ષણાર્થીઓએ ક્રમ 1 થી 5 ની પ્રવૃત્તિ જાતે પસંદ કરવાની અને કોઈપણ લેખિત સ્વરૂપે રજૂ કરવી. જેમા શ્રવણ કૌશલ્ય પ્રવૃતિની લિંકની નોંધ કરવાની રહેશે.)

વિભાગ:B - વાચન અને કથન કૌશલ્ય આધારિત પ્રવૃત્તિઓ.

1. કોઈપણ બે કાવ્યોનું આદર્શ કાવ્યપઠન કરવું અને તેનો કેન્દ્રવર્તી વિચાર કથનાત્મક રીતે અભિવ્યક્ત કરવો.
2. ગુજરાતી સમાચાર-પત્ર અથવા સામાયિકમાંથી કોઈપણ બે લેખકોની કટાર (કોલમ)નું વાંચન કરવું અને કથનાત્મક અભિવ્યક્તિ કરવી.
3. ગુજરાતી ભાષા સાહિત્યના કોઈ એક સાહિત્ય સ્વરૂપની વિશેષતા વાંચો અને કથનાત્મક અભિવ્યક્તિ કરો.
4. કોઈ પણ એક મહાપુરુષના જીવન-ચિત્રનું આદર્શ વાંચન કરવું અને કથનાત્મક અભિવ્યક્તિ કરવી.
5. તોતોચાન અથવા દીવાસપ્નનું વાંચન કરવું અને કથનાત્મક અભિવ્યક્તિ કરવી.

Mode of Transaction:

- વિભાગ અ અને વિભાગ બ આધારે કાર્યશાળા કે પ્રવૃત્તિનું આયોજન કરવું. (Any one from section A and B respectively)

Note:

- સુપરત કાર્ય માટે પ્રશિક્ષણાર્થીઓ અ વિભાગમાંથી કોઈ એક પ્રવૃત્તિ પસંદ કરીને તેનું ઓછામાં ઓછા 250 શબ્દોમાં લેખનકાર્ય જમા કરાવશે.
- બ વિભાગમાંથી કોઈ એક પ્રવૃત્તિ પસંદ કરીને વર્ગમાં ઓછામાં ઓછી ૫ થી ૧૦ મિનિટ મૌખિક અભિવ્યક્તિ કરવાની રહેશે.
- વૈવિધ્યતા જળવાઈ રહે તે માટે આ બન્ને વિભાગમાંથી ઓછામાં ઓછી ત્રણ પ્રવૃત્તિ દરેક સંસ્થાએ કરવી જરૂરી છે.
- પ્રશિક્ષણાર્થીએ આપેલ અહેવાલને આધારિત તેનું પ્રાયોગિક કાર્ય પૂર્ણ ગણવામાં આવશે.

Semester-1

Language I: Hindi Language

Compulsory
Credit: 02
Marks:50

उद्देश्य :
प्रशिक्षणार्थी...

- प्रवृत्ति के माध्यम से श्रवण, कथन, पठन और लेखन कौशल का उचित प्रयोग करते हैं।
- हिन्दी भाषा का व्यवहारिक जीवन एवं प्रत्यायन में उचित रूप से प्रयोग करते हैं।
- हिन्दी भाषा पर प्रभुत्व प्राप्त करते हैं।
- हिन्दी भाषा कौशल की अभिवृद्धि के हेतु विभिन्न युक्ति-प्रयुक्ति का प्रयोग करते हैं।

विभाग : अ: श्रवण और लेखन कौशल आधारित प्रवृतियाँ।

१. https://youtu.be/JJKpjtr15wk विडियो क्लिप सुनकर काव्य में प्रस्तुत विचारों पर चिंतन कीजिए।

२. https://youtu.be/pCRkOG1LH-I विडियो क्लिप सुनकर कहानी के केन्द्र विचार, पात्र, घटना एवं उद्देश्य पर चिंतन कीजिए।

३. https://youtu.be/4nvEfSMvQGE विडियो क्लिप सुनकर हिन्दी भाषा के महत्त्व के संदर्भ में आपकी प्रतिक्रिया प्रस्तुत करें।

४. https://youtu.be/GW5GKaGLxBU, विडिओ क्लिप सुनकर मुलाकात में प्रस्तुत महानुभव के विचार के संदर्भ में आपकी प्रतिक्रिया दर्शाएं।

५. https://youtu.be/LrdrcP2oiyU विडिओ क्लिप सुनकर आत्मकथा के बारे में चिंतन कीजिए।

❖ १ से ५ प्रवृत्तिओ पर आपके चिंतन और मनन के आधार पर लिखित रूप में प्रस्तुत करें। (क्रमश: काव्य लेखन, कहानी लेखन, हिन्दी दिवस एवं हिन्दी भाषा का महत्त्व, अहेवाल लेखन, आत्मकथा सुनकर उसके अंतर्गत अपने विचार प्रस्तुत करें। (१ से ५ प्रवृतिओ के आधार पर आप पॉडकास्ट, पावर पॉइंट प्रेजेंटेशन,ब्लॉग स्पॉट के रूपमे प्रस्तुत कर सकते है।

विभाग : ब: पठन और कथन कौशल आधारित प्रवृतियाँ।

१. हिन्दी साहित्य की किसी दो उत्तम काव्य का पठन करें और कथनात्मक अभिव्यक्ति करें।

२. हिन्दी समाचार-पत्र में प्रस्तुत कोई एक लेखक का साहित्यिक लेख पढ़ें और कथनात्मक अभिव्यक्ति करें।

३. उत्तम कहानियों में से किसी एक कहानी का आदर्श पठन करें और कथनात्मक अभिव्यक्ति करें।

४. हिन्दी साहित्य की कोई एक उत्तम पुस्तक पढ़े जैसे कि मुंशी प्रेमचंद रचित उपन्यास 'रंगभूमि' का पठन करें और कथनात्मक अभिव्यक्ति।

५. कोई एक संशोधनात्मक लेख का पठन करें और मनन एवं चिंतन के आधार पर कथनात्मक रूप में प्रस्तुत करें।

❖ क्रमश: साहित्य की किसी दो उत्तम काव्य के संदर्भ में कथनात्मक अभिव्यक्ति, हिन्दी समाचार-पत्र में प्रस्तुत कोई एक लेखक का साहिक्र त्यिक लेख की पत्रकारों के अंदाज में कथनात्मक अभिव्यक्ति, उत्तम कहानियों में से किसी एक कहानी की विशिष्ट रूप से कथनात्मक अभिव्यक्ति, कोई एक उत्तम पुस्तक पढ़े जैसे कि मुंशी प्रेमचंद रचित उपन्यास 'रंगभूमि' का पुस्तक परिचय, कोई एक संशोधनात्मक लेख की कथनात्मक अभिव्यक्ति करें। १ से ५ प्रवृतिओ के आधार पर आप पॉडकास्ट, यू ट्यूब , विडिओ, ऑडियो, ब्लॉग स्पॉट के रूपमे प्रस्तुत कर सकते है।

आयोजन का माध्यम:

❖ प्रवृत्ति आधारित कार्यशालाका आयोजन होगा।

सूचना:

❖ प्रशिक्षणार्थी विभाग - अ एवं विभाग - ब प्रवृत्तियों में से कोई एक एक प्रवृत्ति के आधारित कार्य प्रस्तुत करें। अर्थपूर्ण अभ्यास के हेतु संस्था के स्तर पर तीन प्रवृत्ति पर कार्य प्रस्तुत करना उचित रहेगा।

❖ प्रयोगात्मक कार्य प्रशिक्षणार्थियों की प्रस्तुत प्रवृत्तियों के आधारित होगा।

Semester-1

Performing Art and Creative Expressions

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands the significance of art and creative expressions in fostering holistic development.
- Analyses the historical and cultural context of various Performing Art forms with reference to the content that is to be taught.
- Develops ability to identify context of the content with reference to the aims of the objectives of the course curriculum.
- Demonstrates proficiency in planning and implementing different Performing Art forms, such as music, dance, drama and theatre, to enrich classroom teaching.

Section A: Introduction to Performing Art in Education

1.1 Concept of Art Integrated Learning, Art Education and Art as pedagogical Tools
1.2 Concept of Performing Art (Dance, Drama and Music)
1.3 Music, Theatre and Drama in Education with focus on folk dance, folk music, theatre, puppetry, sculpture etc. wr.t content creation and lesson planning
1.4 Developing Academic Planning and Art Integrated Plans in pedagogy subjects w.r.t performing Art

Section B: **Performing Art in Education and planning for creative expressions**

2.1 Tools and Techniques for Art Integrated Learning and Assessment w.r.t Performing Art
2.2 Designing activities for Art integrated learning with focus on pedagogy subjects w.r.t Performing Art
2.3 Performing Art and Creative Expressions for inclusion in Education
2.4 Significance of Performing Art to foster holistic development of the learners

Instructions for the Course:

- The paper is a practical paper with focus on workshop, discussion and activities. Section A & B comprises of theoretical base for developing the skills related to ideation and conceptualisation of Art Education and Art Integrated Learning w.r.t. Performing Art. The student should be able to develop and implement lesson plans based on Art Integrated Learning and Planning for pedagogical content, annual calendar like morning assembly, zero period, special events and celebrations etc. The theoretical consideration mentioned in the paper are to support development of activities listed in section A & B.

Activity of Section A

Prepare an Art Integrated Lesson Plan with details of Execution on any one of the textbook content topic related to your pedagogy subject. The below listed topics are some of the suggestions

- Select a concept or topic from school textbooks and prepare your own fusion dance (Fusion of at least two or more classical/traditional/folk dance form) entitled as **"Express concept or topic with various forms of dance fusion".** Perform it and prepare a report with detailed planning for execution of the concept through lesson.
- Select any one silent short educational video clip/ film clip w.r.t the text book content (without dialogues) and prepare review on the basis of facial expressions and situations. Submit a report with detailed planning for execution of the concept through lesson.
- Select a story from English/Hindi/Gujarati textbook and prepare yourself to tell story in creative way using puppetry/sculptor. Perform it and prepare a report with detailed planning for execution.
- Select a poem/text from English/Hindi/Gujarati textbook and prepare yourself for poem recitation/presentation. Perform it and prepare a report with detailed planning for execution.
- Workshop to describe the idea, concepts listed, selecting and planning the activities one each from Section A and B respectively and field work to complete the activity.

Activity of Section B

Prepare a Performing Art based short event (folk dance/music/ puppet show/theatre/dance/drama) based on the textbook content topic related to your pedagogy subject.

The below listed topics are some of the suggestions

- Select a concept or topic from school textbooks and prepare or develop a performing art sequence for explanation of the topic. Perform it and prepare a report with detailed planning for execution.
- Select a concept or topic from school textbooks related to social awareness and prepare short drama. Perform it and prepare a report.
- Prepare Dance Drama sequence entitled as **"Make your dance steps speak with the navrasa"**(Nine Emotions) for narration of event or depiction of concept for a cultural event of college.
- Prepare "cultural performance" on the basis of fusion of the performing art (Dance/Drama/ Music) for celebration of days or festival during assembly.
- The student/student group is required to submit a detailed report may be in form of document /pod-cast, YouTube video, blog post, or any other suitable method.

Mode of Transaction:

- Workshop to describe the idea, concepts listed, selecting and planning the activities one each from Section A and B respectively and field work to complete the activity

Note: 1.

- Trainees will select one activity from each section for submission but for the better exposure for conceptual understanding maximum activities from each section must be carried out at institutional level
- The practicum will be considered as completed on the basis of the submission document of the activities.The Prospective Teachers will have to submit two Assignments (one from Section A and one from Section B)

Semester-1

Understanding Indian Ethos

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Develops an understanding of basics of Indian Ethos.
- Appreciates the contributions of personalities and texts in developing Indian Ethos.
- Develops an understanding of Philosophical and Spiritual basis of Indian Ethos.
- Critically appraises Indian philosophical systems and its relevance in contemporary India.

Unit-1: Introduction to Indian Ethos

1.1 Concept, Principles and Importance of Indian ethos
1.2 Major contribution to Indian Ethos (Personalities): Acharya Kautilya, Aadi Shankaracharya
1.3 Major contribution to Indian Ethos (Text): Ramayan (Aadikavi Valmiki), Bhagwadgeeta (Maharishi Ved Vyasa)
1.4 Implications of Indian Ethos in education and society

Unit-2: Philosophical and Spiritual basis of Indian Ethos

2.1 Indian Philosophical Systems (Orthodox) : Sankhya, Yoga, Nyaya, Vedanta
2.2 Indian philosophical systems (Heterodox) : Charvakas, Jains & Buddha
2.3 Upanishads: Basic Teaching and Spiritual & Moral Values
2.4 Relevance of Indian philosophy and spirituality in the modern world

Mode of Transaction:

- Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:-

- Community Engagement Project with a local community to learn prevalent ethos.
- Study of Indian Scriptures like Vedas, Upanishads, Bhagavad Gita, Ramayana, and Mahabharata for reflection on teachings and principles found in these texts.
- Field Trip to Historical Sites of cultural and historical significance w.r.t Indian Ethos.
- Documentary Screening and Discussion, Folk Tales narrations for value enculturation.
- Debates on contemporary concerns w.r.t values and ethos

Semester-1

Evolution of Indian Education

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Familiarises with the important aspects of Ancient Indian Education System.
- Develops an understanding of Medieval and Colonial Education System.
- Critically appraises the development of education after Independence in India
- Analyses and deliberates on the focus areas & trends of Indian education system.

Unit-1: Ancient Indian Education System

1.1 Education during Vedic & Later Vedic Period: Aims, Characteristics and Curriculum
1.2 Education during Buddhist Period: Aims, Characteristics and Curriculum
1.3 Education during Mauryan and Gupta Period: Aims, Characteristics and Curriculum
1.4 Introduction to Ancient Indian Universities : Takshashila, Nalanda, Valabhi

Unit-2: Medieval and Colonial Education System

2.1 Medieval Education System: Characteristic features and Educational Institutions during medieval period
2.2 Colonial Education System: Characteristic features and Educational Institutions during modern period.
2.3 Educational Policies: Macaulay Minutes and Wood's Dispatch, and their impact on the Indian Education System.
2.4 Rise of Sanskrit Pathshala, Gamthi Shala, Buniyadi Schools, and their role in Education

Unit-3: Education in Independent India

3.1 Progress of Education after Independence w.r.t recommendations of Kothari Commission-1964-66, NEP 1986
3.2 Progress of Education after Independence w.r.t Open Distance learning, Vocational Education, Professional Education,
3.3 Contribution of Educational Thinkers: Savitribai Phule, Sri Aurobindo, Gijubhai Badheka, Pt. Madanmohan Malviya,
3.4 Contribution of Organisations: Vidyabharti, Ramkrishna Mission, Arya Samaj

Unit 4: Focus Areas and Future Trends in Education

4.1 Current challenges in Indian education including access, quality, and equity
4.2 Online and Digital Education w.r.t Content creation, digital repository, equitable use of technology and technology integration
4.3 The fundamental principles guiding education systems as envisioned in NEP-2020
4.4 Discussion on Progression from Education 1.0 to Education 4.0

Mode of Transaction:

- Lecture cum Discussion,
- Field trip
- Assignment
- Project

Suggested Activities:-

- Visit to Historical Educational Sites & Oral History Interviews.
- Comparative Analysis of Education Policies & Analysis of Educational Documents
- Timeline of Educational Reforms.
- Role Play of Key Educational Reformers & Reflective Journals:
- Panel Discussion on Contemporary Educational Challenges & Educational Reforms Debate.
- Educational Museum/ Exhibit/ Documents..Visits and Readings.

CHEMISTRY

Semester-1

General Chemistry I

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands the atomic and molecular basis of organic chemistry, the fundamental principles of molecular structure, and their relation to organic molecules and their properties.
- Identifies organic molecules by functional group, including alkanes, alkenes, alkynes, haloalkanes, alcohols, thiols, ethers, sulfides, amines, aldehydes, ketones, carboxylic acids, and carboxylic acid derivatives.
- Understands the hybridization and shape of inorganic molecules.
- Explains the VB (Valence Bond) theory and MO (Molecular Orbital) theory effectively.
- Grasps the concepts related to boron and its compounds, including their structures and types.

Course Content:

Unit 1: Organic Molecules: Structure, Bonding and Properties

1.1 Classical concepts of binding, Valence of Carbon, Bond length, Bond Energy
1.2 Modern concept of bonding
1.3 Hybridization of Carbon, Nitrogen, and Oxygen
1.4 Electronegativity and Resonance concept
1.5 Hydrogen Bonding in organic molecules and their effect on Boiling Point and Solubility
1.6 Representation of organic molecule on paper with pen
1.7 Arrows & their role in organic chemistry

Unit 2: Nomenclature of Organic Compounds

2.1 Classification of organic compound
2.2 Functional Groups and Homologous Series
2.3 IUPAC System of Nomenclature, Rules for naming organic compounds
2.4 Selected examples of mono and Polyfunctional organic compounds

Unit 3: Chemical Bonding and Complex Compounds

3.1 Covalent bond-Sidgwick Powel theory
3.2 Molecular orbital approach of bonding (LCAO method) symmetry and overlap symmetry of molecular orbital
3.3 bonding in homonuclear molecules for e.g. H_2, Be_2, N_2, N_2^+, O_2, O_2^-,$O_2^+$and Ne_2
3.4 Valence Shell Electron Pair Repulsion(VSEPR) theory
3.5 Hybridization, Rules of Hybridization, Types of hybridization and shape of some molecules
3.6 Werner's Theory
3.7 Labile and Inert Complexes, Stability of Complex Compounds, Factor affecting Stability of Complexes
3.8 Spectrochemical Series
3.9 V. B. Theory of Complexes-Examples of ML_4 and ML_6

Unit 4: Boron Chemistry

4.1 Structure, bonding, preparation, properties and uses of boron compounds
4.2 Boric acid and borates
4.3 Boron nitrides
4.4 Borohydrides, Carboranes
4.5 Structures of Boranes: Classification, wade rule, styx code, fram electrons
4.6 Three centered bonds in B2H6 and structures of Boranes

Mode of Transaction:

- Chat and Talk, Projector presentation and online videos to understand procedures

Suggested Activities:

- Group discussion, activities include structure to name and name to structure conversion practice

BOTANY

Semester-1

Cryptogams and Gymnosperms

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Comprehends general properties and area of usages of algae, fungi, Bryophyte, Pteridophyte and Gymnosperm
- Knows morphological features of Algae, Fungi, Bryophyte, Pteridophyte and Gymnosperm
- Classifies algae, fungi, Bryophyte, Pteridophyte and Gymnosperm according to their morphological structure.
- Can name reproduction types in Algae, Fungi, Bryophyte, Pteridophyte and Gymnosperm

Course Content:

Unit 1: ALGAE

1.1 General characters of Algae
1.2 Classification of Algae by Smith
1.3 Life cycle, Distribution, Occurrence, Morphology and Reproduction of *Nostoc*
1.4 Life cycle, Distribution, Occurrence, Morphology and Reproduction of *Spirogyra*

Unit 2: FUNGI

2.1 General characters of Fungi
2.2 Classification of Algae by Ainsworth
2.3 Life cycle, Distribution, Occurrence, Morphology and Reproduction of *Mucor.*
2.4 Life cycle, Distribution, Occurrence, Morphology and Reproduction of *Saccharomyces*

Unit 3: BRYOPHYTES AND PTERIDOPHYTES

3.1 General characters of Bryophyte and Pteridophyte
3.2 Classification of Bryophyte and Pteridophyte
3.3 Life cycle, Distribution, Occurrence, Morphology and Reproduction of *Anthoceros*
3.4 Life cycle, Distribution, Occurrence, Morphology and Reproduction of *Nephrolepis*

Unit 4: GYMNOSPERMS

4.1 General characters of Gymnosperms
4.2 Classification of gymnosperm
4.3 Life cycle, Distribution, Occurrence, Morphology and Reproduction of *Pinus*
4.4 Life cycle, Distribution, Occurrence, Morphology and Reproduction of *Ephedra*

Mode of Transaction:

- Lectures; Demonstration and Microscopic Analysis in Life Science Laboratory; Educational Videos

Suggested Activities:

- Collection of Plant Samples Belonging to Different Division for Morphology and Anatomy Experiments

ZOOLOGY

Semester-1

Invertebrate Zoology

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands about the classification of invertebrate phyla
- Describes the general characteristics of various phyla
- Describes the general features of various class of invertebrate phyla
- Explains various internal characteristics and systems of various phyla
- Learns important differentiating features of various phyla/class
- Learns in detail various systems of representative animals of various phyla

Course Content:

Unit 1: INTRODUCTION TO PROTISTA, PARAZOA AND METAZOA

1.1 Branches of Biology and areas of Zoological Studies
1.2 General characteristics and classification up to classes
1.3 Study of Euglena, Amoeba and Paramecium
1.4 Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica*
1.5 Locomotion an Reproduction in Protista

Unit 2: PORIFERA, CNIDARIA AND CTENOPHORA

2.1 Porifera- General characteristics and classification up to classes
2.2 Cnidaria- General Characteristic and classification up to classes
2.3 Metagenesis in Obelia, Polymorphism in Cnidaria, Corals and coral reefs
2.4 Ctenophora- genral characteristics and evolutionary significance

Unit 3: PLATYHELMINTHES AND NEMATHELMINTHES

3.1 Platyhelminthes- General characteristics and classification up to classes
3.2 Life cycle and Pathogenicity of *Fasciola hepatica* and *Taenia solium*
3.3 Nemathelminthes- General Characterisitics and classification up to classes
3.4 Life cycle and pathogenecity of *Ascaris lumbricoides* and *Wuchereria bancrofti*

Unit 4: INTRODUCTION TO COELOMATES

4.1 Annelida- General Characterisitics and Classification up to classes, Excretion in Annelida
4.2 Arthropoda- General Characteristics and Classification up to classes, Vision and Respiration in Arthropoda
4.3 Mollusca- General Characteristics and Classification up to classes
4.4 Respiration in Mollusca, Torsion and Detorsion in Gastropoda, Pearl formation in bivalves and evolutionary significance of trocophore larva

Mode of Transaction: Lectures; Demonstration and Microscopic Analysis in Life Science Laboratory; Educational Videos

Suggested Activities: Collection of Insect Samples Belonging to Different Division for Morphology and Anatomy Experiments.

PHYSICS

Semester-1

Mechanics and Semiconductor Physics

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- understands the concept of momentum, impulse, and the conservation of momentum in both one-dimensional and two-dimensional collisions.
- understands the law of universal gravitation, the motion of celestial bodies, and the concept of gravitational potential energy.
- develops the ability to solve a wide range of problems related to modules of elasticity and twisting forces.
- understands the properties of semiconductors, including their electrical conductivity, energy band structure, and charge carriers (electrons and holes).
- understands how diodes work, including the forward and reverse biasing of diodes and their voltage-current characteristics.

Course Content:

Unit 1: Moment of Inertia and Gravitation

1.1 Moment of Inertia and its Physical Significance, Expression for Moment of Inertia, Torque, Calculation of the Moment of Inertia of a Body

1.2 Newton`s second law for rotation, rotational kinetic energy and expression for power during rotation, Acceleration of a body rolling down an Inclined Plane

1.3 Newton`s Law of gravitation, Kepler's law of Planetary Motion, Gravitation Field, Gravitational Intensity

1.4 Gravitational Potential, Gravitational Potential Energy, Motions of planets and satellites, geo-stationary satellites.

Unit 2: Fluid Mechanics

2.1 Surface Tension, Synclastic and anticlastic surfaces, Excess of pressure.

2.2 Application to spherical and cylindrical drops and bubbles, Related Numerical

2.3 Viscosity, Coefficient of Viscosity, Streamline flow, Critical velocity, Reynolds number & its significance.

2.4 Bernoulli's Theorem, Experimental determination of coefficient viscosity by Poiseuille`s method.

Unit 3: Elasticity and Pendulum

3.1 Stress and Strain, Hooke's law. Relation between Longitudinal Stress and Strain (stress-strain diagram), :(i) Young's modulus (ii) Bulk Modulus and (iii) Modulus of Rigidity

3.2 Poisson's Ratio, Determination of Young modulus by Searle's method and Related Numerical

3.3 Twisting couple on a cylinder, Work done in twisting a wire, Torsional pendulum, Statistical method (Horizontal twisting apparatus for a rod).

3.4 Dynamical method (Maxwell's vibrating needle method), Bending of beam, Bending moment.

Unit 4: Semiconductor Physics

4.1 Theory of semiconductors: Intrinsic and Extrinsic Semiconductors, Band structure of semiconductors, N-type & P-type Semiconductor

4.2 Carrier concentration in Intrinsic and Extrinsic Semiconductors, Electrical Conductivity and Conduction Mechanism in Semiconductors

4.3 The ideal diode, Static and Dynamics Resistance of a diode

4.4 Zener Diode, Zener Breakdown, V-I Characteristic of a Zener diode

Mode of Transaction:

- To Create a comprehensive and effective learning experience for students pursuing mechanics and semiconductor physics. ICT based learning, Using Laboratory work, Presentation, Assignment and Access to online resources.

Suggested Activities:

- Topic related live demonstration in the classroom, ICT based Teaching – learning, Experiment work in Physics Lab, Outreach program

MATHEMATICS

Semester-1

Calculus I

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Finds limit, continuity and derivative of the function
- Applies reduction formula to find integrals
- Checks the convergence of sequence and series
- Applies Mean value theorems to differentiable function

Course Content:

Unit 1: Limit and Continuity of a Function

1.1 Concept of Limit, Examples of limit based on $\epsilon-\delta$ definition
1.2 Properties of limit of a function
1.3 Bounded and monotonic function
1.4 Concept of continuous function, Properties of continuous function

Unit 2: Differentiability and Differentiable Functions

2.1 Definition of differentiable function
2.2 Properties of differentiable function, Inverse function theorem
2.3 Mean Value theorems: Rolle's mean value theorem, Lagrange's mean value theorem, Different forms of LMVT, Cauchy's mean value theorem
2.4 Applications of MVT's

Unit 3: Sequence and Series of Real Numbers

3.1 Basic concept of sequence and series of real numbers
3.2 Limit of a sequence, convergent sequence, bounded sequence, monotonic sequence
3.3 Concept of convergence of series
3.4 Various tests for convergence of series- comparison test, practical comparison test, D'Alem bert ratio test, Cauchy's root test, Alternating series (Leibnitz test)

Unit 4: Improper Integral

4.1 Definite Integral
4.2 Fundamental theorem of calculus
4.3 Reduction Formula
4.4 Improper Integral: Improper integrals of the first and second kind

Mode of Transaction: Lectures,Discussion,Presentations,Assisgnments,Projects

Suggested Activities:

- Application of Sequence & Series and Mean Value theorem to Differentiable Functions.

SEMESTER II

Semester - II

			Total papers	Hours	Credit	Internal	External	Total
Ability Enhancement and Value added Courses		Theory	1	30	2	15	35	50
		Practical	3	180	6	90	60	150
Science	Principal	Theory	1	60	4	30	70	100
		Practical	1	60	2	15	35	50
	Subsidiary	Theory	1	60	4	30	70	100
		Practical	1	60	2	15	35	50
		Total	**8**	**450**	**20**	**195**	**305**	**500**

Sr. No.	Subject	Title	Type	Nature of Paper	Hours	Credit	Internal	External	Total
1	Ability Enhancement and Value added Courses	Language II Sanskrit Language	Practical	Compulsory	60	2	30	20	50
2	Ability Enhancement and Value added Courses	Language II English Language	Practical	Compulsory	60	2	30	20	50
3	Ability Enhancement and Value added Courses	Visual Art & Creative Expressions	Practical	Compulsory	60	2	30	20	50
4	Ability Enhancement and Value added Courses	Understanding Indian Knowledge System	Theory	Compulsory	30	2	15	35	50
5	Chemistry	General Chemistry II	Theory	Compulsory	60	4	30	70	100
6	Chemistry	Chemistry Practical I	Practical	Compulsory	60	2	15	35	50
7	Botany	Cell Biology & Bio-chemistry	Theory	Compulsory	60	4	30	70	100
8	Botany	Laboratory Experi-ments in Botany I	Practical	Compulsory	60	2	15	35	50
9	Zoology	Immunology and Haematology	Theory	Compulsory	60	4	30	70	100
10	Zoology	Laboratory Experi-ments in Zoology I	Practical	Compulsory	60	2	15	35	50
11	Physics	Wave and Optics	Theory	Compulsory	60	4	30	70	100
12	Physics	Physics Practical I	Practical	Compulsory	60	2	15	35	50
13	Mathematics	Linear Algebra	Theory	Compulsory	60	4	30	70	100
14	Mathematics	Vedic Mathematics	Practical	Compulsory	60	2	15	35	50

Semester-2

Language II Sanskrit Language

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

- विविधप्रवृत्तीनां माध्यमेन संस्कृतभाषायां श्रवणं भाषणं पठनं लेखनं च इति चतुर्षु कौशलेषु सामर्थ्यं प्राप्नुवन्ति।
- दैनिकजीवने स्वव्यवहारे संस्कृतभाषाया: उपयोगं कर्तुं सामर्थ्यं प्राप्नुवन्ति।
- संस्कृतभाषायां नैपुण्यं प्राप्तुं सक्षमा: भवन्ति।
- संस्कृतभाषाया: प्रभावपूर्णप्रयोगार्थं विविधयुक्तिप्रयुक्तीनां प्रयोगं कुर्वन्ति।
- विविधगीतानां माध्यमेन संस्कृतभाषाया: रसास्वादनं कुर्वन्ति।
- शिशुगीतानां माध्यमेन संस्कृताध्ययनाय रुचिम् उत्पादयितुं समर्था: भवन्ति।

Unit 1: श्रवणभाषणकौशलाधारिता: प्रवृत्तय:

1.1 (1) https://youtu.be/9AK-VLzJL4Y (2) https://youtu.be/4KR1CHGUQJs
प्रदत्त लिंकमाध्यमेन शिशुगीतद्वयं सावधानेन श्रुण्वन्तु।

1.2 (1) https://youtu.be/sGc3SnmArh4 (2) https://youtu.be/t1ZPvFsvS-A
प्रदत्तलिंकमाध्यमेन संस्कृतमहत्वं दर्शयत् गीतद्वयं सावधानेन श्रुण्वन्तु।

1.3 अष्टमकक्षायां नवमकक्षायां च अभ्यासक्रमे विद्यमानानि सुभाषितानि ध्यानपूर्वकं शृण्वन्तु।

1.4 स्वपरिचय: स्वदिनचरी संख्या समय: च ध्यानपूर्वकं शृण्वन्तु वदन्तु च।

1.5 वर्तमान-भूत-भविष्यत्काल:-एकवचनम्,बहुवचनम्,सम्बन्धक-हेत्वर्थककृदन्तं ज्ञात्वा संस्कृतसम्भाषणं कुर्वन्तु।

Unit 2: पठनलेखनकौशलाधारिता: प्रवृत्तय:

2.1 प्राथमिकविद्यालयस्य अष्टमकक्षाया: पुस्तकस्य पठनं कुर्वन्तु।

2.2 संस्कृते लघुकथानां पठनं कुर्वन्तु। ('सुगन्ध:', 'पञ्चतन्त्रकथा:', 'बोधकथा:'- संस्कृतभारती, नवदेहली)

2.3 वर्णमालालेखनं कुर्वन्तु, वर्णानाम् उच्चारणस्थानानि पठन्तु।

2.4 वर्तमान-भूत-भविष्यत्कालवाक्यानां लेखनं कुर्वन्तु।

2.5 संख्यालेखनं कुर्वन्तु।

Mode of Transaction:प्रत्यक्षपद्धति:, पाठ्योपकरणद्वारा प्रस्तुति:, प्रकाशप्रक्षेपणीद्वारा पाठनम्, चर्चा, संवाद:, प्रश्नोत्तरम्

Suggested Activities: क्रीडा:,गीतगानम्,अभिनयेन शिशुगीतानि

Internal Assessment: Marks:

1. संस्कृतभारती (2007),भाषाप्रवेश:,नई दिल्ली:,संस्कृतभारती।

Semester-2

Language II English Language

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Listens, speaks, reads and writes in the in language
- Uses language in daily life/communication.
- Gains proficiency over the language.
- Develops his/her own tools/contents and strategies to apply language

Section A: Activities related to Listening & Writing skills

1. https://www.youtube.com/watch?v=M8JdkfZdhe8 Listen this video and reflect upon it.
2. https://youtu.be/NLyGQeqrKOM Listen this video and reflect upon it.
3. https://youtu.be/hN7j7Ey-cM0 Listen this video and reflect upon it.
4. https://youtu.be/SDNK8lT0lxs Listen this video and reflect upon it.
5. On the basis of the above activities carried out in the sr. no.1 to 4, prepare written report in written form (may be in form of PPT, blog post, etc.)
6. Email writing/Letter writing/Report writing/Prepare your resume with application for the post of a teacher.

Section B: Activities related to Reading and Speaking skills

1. Recitation of any two poems.
2. Read the editorial/speaking from Newspaper.
3. Ideal Reading of any one short stories.
4. Read any one book you like such as “Wings of Fire”
5. Read any one research article from the magazine.

On the basis of the above activities carried out in the sr. no.1 to 5, prepare report (may be in form of podcast, YouTube video, blog post, etc.)

Mode of Transaction: Workshop to describe the idea and the activity. Activities to be conducted (Any one from section A and B respectively)

Note:

1. Trainees will select one activity from each section for submission BUT for the better exposure
2. minimum three activities from each section must be carried out at institutional level)
3. The practicum will be considered as completed on the basis of the submission.

Semester-2

Visual Art and Creative Expressions

Compulsory
Credit: 02
Marks:50

Learning Outcomes:
Prospective teacher...

- Understands the significance of art and creative expressions in fostering holistic development.
- Analyses the historical and cultural context of various Visual Art forms with reference to the content that is to be taught.
- Develops ability to identify context of the content with reference to the aims of the objectives of the course curriculum.
- Demonstrates proficiency in planning and implementing different Visual Art forms, such as drawing, painting, sculpture, crafts etc., to enrich classroom teaching.

Section A: **Introduction to Visual Art in Education**

1.1 Concept of Art Integrated Learning and Art as pedagogical Tool.
1.2 Concept of Visual Art (Painting, Fine Art, Crafts, Sculpture) and Principle & elements of Design
1.3 Painting, fine Art, crafts, sculpture in Education with focus on aesthetics of textual images, expressions, balance, creativity etc. wr.t content creation and lesson planning
1.4 Developing Academic Planning and Art Integrated Plans in pedagogy subjects w.r.t visual Art

Section B: **Performing Art in Education and planning for creative expressions Hours: 15**

2.1 Tools and Techniques for Art Integrated Learning and Assessment w.r.t Visual Art
2.2 Designing activities for Art integrated learning with focus on pedagogy subjects w.r.t Visual Art
2.3 Visual Art and Creative Expressions for inclusion in Education
2.4 Significance of Visual Art to foster holistic development of the learners

Instructions for the Course:

- The paper is a practical paper with focus on workshop, discussion and activities. Section A & B comprises of theoretical base for developing the skills related to ideation and conceptualisation of Art Education and Art Integrated Learning w.r.t Visual Art. The student should be able to develop and implement lesson plans based on Art Integrated Learning and Planning for pedagogical content, annual calendar like morning assembly, zero period, special events and celebrations etc. The theoretical consideration mentioned in the paper are to support development of activities listed in section A & B.

Activity of Section A

Prepare an Art Integrated Lesson Plan with details of Execution on any one of the textbook content topic related to your pedagogy subject. The below listed topics are some of the suggestions

- Select a concept or topic from school textbooks and prepare your own media of visual expression using drawing/painting/craft/sculpture/model etc. The work should have the ability to express and explain the concept through visual means. Prepare a report with detailed planning for execution of the concept through lesson.
- Select a chapter from the text analyse the components of the text with reference to the elements of visual expressions relating to relevance and appropriateness to depict the concept, balance, space, texture etc. Develop your own creative expressions based on the analysis. Submit a report with detailed plan for execution.
- Select a story from English/Hindi/Gujarati textbook or a concept from the science textbooks. Develop a visual and creative art form using technology/animation/posters/ drawings etc. to tell story in creative way. Submit a report with detailed plan for execution.
- Identify creative visual art forms available on various media including print and online. Use those artefacts to make the students think creatively and draw the concepts posters/ drawings/street art forms/ cartoon strips etc. Prepare a report with detailed planning for execution.

Activity of Section B

Prepare a Visual Art based short event (exhibition/ poster making competition/ drawing competition/ photography competition/ sculpture making/craft making/best out of waste/ improvised learning aids etc.) based on the textbook content topic related to your pedagogy subject. The below listed topics are some of the suggestions

- Select a concept or topic from school textbooks and prepare an improvised teaching learning aid from the material available in your surroundings. Prepare a report with details of the process.
- Select a concept or topic from school textbooks related to social awareness/community outreach/sustainability etc. and prepare poster/painting/or any other visual form. Arrange an exhibition and prepare a report.
- Prepare exhibition on the basis of visual art forms/sculptors/aids. prepared by the students that can be used to teach text book concepts to the students
- The student/student group is required to submit a detailed report may be in form of document /podcast, YouTube video, blog post, or any other suitable method.

Mode of Transaction:

- Workshop to describe the idea, concepts listed, selecting and planning the activities one each from Section A and B respectively and field work to complete the activity

Note:

1. Trainees will select one activity from each section for submission but for the better exposure for conceptual understanding and maximum activities from each section must be carried out at institutional level
2. The practicum will be considered as completed on the basis of the submission document of the activities.

Semester-2

Understanding Indian Knowledge System

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Acquaints with basic concepts of Indian Knowledge System.
- Familiarises with the classification and uniqueness of various aspects of Indian Knowledge System.
- Familiarises with the concepts of Arts, Science and Technology in Historical Perspective
- Critically appraises foundational concepts related to Arts, Science and Technology in reference to contemporary applications and use.

Unit-1: Introduction to Indian Knowledge System

1.1 Definition, Concept, Scope and significance of IKS
1.2 Classification of IKS Corpus: Literary and Non-Literary
Historicity of IKS: Before 3,000 BCE, 3,000 to 500 CE, 500 to 1,800 CE
1.3 Unique Aspects of Indian IKS: Nuances of Oral Traditions, Religious Vs Material Dimensions, Spiritual vs. Material Dimensions
1.4 Documentation and preservation of IKS

Unit - 2: Foundational Concepts relevant for Applications in Science, Arts & Technology and their significance in modern education system

2.1 Bharatiya Civilization and IKS: Genesis of Land and discovery of Saraswati River and Saraswati- Sindhu Civilization
2.2 Art, Literature and Scholars: Life and work of Agastya, Lopamudra, Patanjali, Yajnavalkya, Gargi, Maitreyee
2.3 IKS in Science, Astronomy, and Mathematics Some major concepts like matter, life and universe, gravity, zero, pi, number system, cosmology and astronomy, Indigenous Practices for land, water, soil and bio resource conservation
2.4 IKS in Engineering, Technology, and Architecture: Pre-Harappan and Sindhu Valley Civilization, Dyes, Paints and Metallurgy, Iron Pillar of Delhi,, Marine Technology, and Bet–Dwārkā.

Mode of Transaction:

- Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:-

- Community Engagement Project to engage with a local community and learn about its cultural practices,rituals, and traditions. They can document their experiences and share their learnings with the class.
- Study of Indian Scriptures: group work for Indian Scriptures for discussion and reflection.
- Field Trip to Historical Sites with cultural and historical significance for project based learning.
- Study of Indian Science, Art and Architecture with research and present on a specific forms and artefacts.
- Folk Tales and Storytelling from different regions of India with reflections on present day significance.
- Documentary Screening and Discussion on Indian Knowledge System

CHEMISTRY

Semester-2

General Chemistry II

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands the equilibrium phenomena involving ion generation during dissolution, the pH scale, and the effects of salt hydrolysis on pH.
- Comprehends reaction kinetics and can determine the order of reactions based on molecular species.
- Can prepare samples for compound analysis, gaining practical expertise.

Course Content:

Unit 1: Ionic Equilibrium

1.1 Introduction
1.2 Dynamic equilibrium between the ions and unionised molecules
1.3 Ostwald's dilution law and its limitations
1.4 Ionic product of the water and pH scale
1.5 Hydrolysis of salts- salts of weak acids and strong bases
1.6 Salts of weak bases and strong acids
1.7 Salts of weak acids and weak bases
1.8 Buffer solutions
1.9 Acid-Base indicators
1.10 Theory of acid-base indicators
1.11 Action of Phenolphthalein and methyl orange indicator

Unit 2: Chemical Kinetics

2.1 The concept of reaction rate
2.2 Rate Laws and Rate constants
2.3 Molecularity and order of reaction
2.4 Zero order reactions
2.5 First order rate equation
2.6 Second order rate equation
2.7 Arrhenius equation and significance of activation energy
2.8 Catalysis: Introduction
2.9 Types of catalysis, Characteristics of catalysis

Unit 3: Introduction to analytical chemistry

3.1 What is analytical chemistry?
3.2 Qualitative analysis and Quantitative analysis
3.3 Sample and Sampling of Solid, Liquid and Gas
3.4 Accuracy and Precision
3.5 Sensitivity and selectivity
3.6 Determinate errors and indeterminate errors
3.7 Significant figures
3.8 Rounding off

Unit 4: Classical methods of analysis

4.1 standard solutions: primary and secondary standards
4.2 Titrimetric analysis: Types of titrations
4.3 Equivalence point and End point
4.4 end point detections
4.5 Indicators, theory of indicators and their selection for volumetric analysis
4.6 Theory of volumetric and gravimetric analysis
4.7 Important organic precipitants

Mode of Transaction:

- Chalk and Talk, Power Point Presentation and online videos to understand procedures

Suggested Activities:

- Group discussion, Practical activities

Semester-2

Chemistry Practical I

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands safety norms and hazards.
- Develops analytical skills.
- Learns to handle various glassware and chemicals.
- Performs qualitative analysis of inorganic substances.
- Can apply theoretical knowledge in practical experiments.
- Develops precision in titration experiments and understand the reactivity of strong and weak acids and bases.
- Accurately detects equivalence points in titration experiments.
- Calculates the concentration of an unknown solution from titration results.

Course Content:

Practical 1: Inorganic qualitative analysis (minimum 6)

1.1 Semi micro qualitative analysis of Inorganic compound:
$Pb(NO_3)_2$, $CdCl_2$, $Cu_3(PO_4)_2$, $CaCO_3$, $Al_2(SO_4)_3$, $MnSO_4$, $NiCO_3$, CuS, ZnS, $BaCl_2$,$Sr(NO_3)_2$, $ZnCO_3$, $MgSO_4$, $Al_3(PO_4)_2$, K2Cr_2O_7, KBr, KCl/NH_4Cl, KI, $(NH_4)_3PO_4$, ZnO,MnO_2

Practical 2: Volumetric analysis

2.1 Acid-Base titrations
2.2 Strong acid-strong base (HCl against NaOH)
2.3 Strong acid-weak base (HCl against Na_2CO_3)
2.4 Weak acid-strong base (Succinic acid against NaOH)
(Oxalic acid against NaOH)

Mode of Transaction:

- Chalk and Talk, Projector presentation

Suggested Activities:

- Group discussion, Practical activities

BOTANY

Semester-2

Cell Biology and Biochemistry

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Defines terminologies related to cell biology.
- Learns process of membrane transport and membrane models
- Learns structure, function and organization of cell organelles
- Knows the chemical nature and interaction of biomolecules

Course Content:

Unit 1: CELL AS A UNIT OF LIFE

1.1 The Cell Theory
1.2 Prokaryotic and eukaryotic cells
1.3 Cell wall and Plasma membrane: Ultra structure and functions
1.4 Cell Organelles: structure and functions

Unit 2: CELL CYCLE AND DIVISION

2.1 Cell cycle
2.2 Mitosis
2.3 Meiosis
2.4 Chromosome Structure

Unit 3: CARBOHYDRATES AND LIPIDS

3.1 Definition and Importance of Carbohydrates
3.2 Monosaccharides, Oligosaccharides, Polysaccharides
3.3 Fatty acids: Structure and Types
3.4 Biological role of Lipids

Unit 4: PROTEIN AND NUCLEIC ACID

4.1 Amino acids
4.2 Classification and importance of proteins
4.3 Nucleosides and nucleotides
4.4 Structure of nucleic acids (DNA and RNA)

Mode of Transaction:

- Lectures; Demonstration of Experiments in Life Science Laboratory; Educational Videos, Charts

Suggested Activities

- Analysis of Electron Micrographs, Prepare the Chart and Model of cell organelles

Semester-2

Laboratory Experiments in Botany I

Compulsory
Credit: 02
Marks:50

SUGGESTED EXPERIMENTS

- To understand the working of compound light microscope.
- To study the cell wall through chart
- To study various shape of chloroplast.
- To study various stages of mitosis in onion root tip.
- To study various stages of meiosis in onion bud
- To study mitosis through permanent slides
- To study meiosis through permanent slides
- To study electron micrograph of various cell organelles
- Measurement of pH of different samples using pH paper, pH meter and universal indicator
- Qualitative determination of carbohydrates from plant material
- Estimation of glucose by Benedict's quantitative reagent.
- Qualitative determination of proteins from plant material
- Separation of amino acids in a mixture by paper chromatography & their identification by comparison with standard Rf value
- Test for the presence of fats from oil seeds.

ZOOLOGY

Semester-2

Immunology and Haematology

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands about the types of immunity and their functions in human body.
- Describes the Antigens and Antibodies and their responses in immune system.
- Explains the effects occur after the dysfunction of immunity in individual.
- Understands the disease related to immune system after mutations.
- Provides the detailed study of blood composition.
- Describes the types of blood cells, their functions and various factors involved in blood coagulation.

Course Content:

Unit 1: IMMUNITY AND IMMUNOGEN

1.1 Types of immunity : Natural, Acquired, herd, Innate, specific
1.2 Cells and organs of immune system : An overview
1.3 Primary response and generation of memory
1.4 Antigen Immunogenicity versus antigenicity Factors influencing Immunogenicity Adjuvant, Epitopes and Haptens Antigen processing and presentation

Unit 2: ANTIBODY

2.1 Basic structure of Antibody
2.2 Immunoglobulin classes and their Biological activities.
2.3 Epitopes and Receptors on immunoglobulin molecule
2.4 Antibody Diversity and Clonal Selection Theory
2.5 Overview of Monoclonal Antibody

Unit 3: DYSFUNCTIONAL IMMUNITY

3.1 Immunodeficiency Diseases
3.2 Hypersensitivity
3.3 Autoimmune diseases
3.4 Overview of Tumor immunity
3.5 Overview of Transplantation immunity

Unit 4: HAEMATOLOGY

4.1 Composition of Blood
4.2 Blood Cells : Types and Functions
4.3 Discovery of human blood group systems
4.4 Blood coagulation

Mode of Transaction:

- Lectures; Demonstration and Microscopic Analysis in Life Science Laboratory; Educational Videos

Suggested Activities:

- Preparation of various charts for the types of immunity and related diseases and study of blood samples in laboratory.

Semester-2

Laboratory Experiments in Zoology I

Compulsory
Credit: 02
Marks:50

SUGGESTED EXPERIMENTS

- Study of Human Blood Groups using Agglutination Test.
- To perform Widal Test for Serological diagnosis of Enteric Fever.
- To carry out total count of RBC and WBC using Haemocytometer.
- To carry out Differential Count of WBC.
- Estimation of Haemoglobin by Sahli's method.
- Determination of Bleeding Time by Filter Paper technique and Clotting Time by Capillary method.
- Estimation of Blood Sugar by GOD/POD method to understand biochemistry of blood.

PHYSICS

Semester-2

Wave and Optics

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- understands the fundamental properties of waves, including amplitude, frequency, wavelength, and wave speed.
- differentiates between various types of waves, such as mechanical waves (e.g., sound waves) and electromagnetic waves (e.g., light waves) and is familiar with the wave equation, which describes how waves propagate through a medium.
- understands wave behaviour, including reflection, refraction, diffraction, interference, and superposition.
- understands the principles of geometric optics, including ray tracing, image formation by mirrors and lenses, and the various types of lenses (convex and concave).
- learns about dispersion of light, including how different wavelengths of light are separated and create phenomena like rainbows.

Course Content:

Unit 1: Geometric Physics

1.1 Basic concepts of Light Waves

1.2 Fermat's principle: Fermat's principle and its application in establishing laws of reflection and refraction at spherical and plane boundaries

1.3 Defects of image: Spherical aberration, Qualitative idea about coma, astigmatism and distortion,

1.4 Chromatic aberration, circle of least confusion, achromatism of two thin lenses separated by a distance.

Unit 2: Interference

2.1 The superposition principle. Condition for Interference

2.2 Classification of Interferences Methods-Young's double slit experiment Theory, Intensity in interference pattern Phase change on reflection

2.3 Lloyd's single mirror: Interference due to plane parallel wedge-shaped films Colours in thin films

2.4 Newton rings, Determination of wavelength of light using Newton's rings, Michelson interferometer and its application for finding difference in wavelengths

Unit 3: Diffraction and Polarization

3.1 Fresnel and Fraunhoffer diffraction phenomena, Differences between interference and diffraction,

3.2 Fraunhoffer diffraction of single Slit; Diffraction grating- Determination of wavelength of light using diffraction grating (Normal incidence and Minimum deviation);

3.3 Resolving power; Zone plate-construction and its comparison with convex lens.

3.4 Polarized light: Production of plane polarized light by reflection, Double refraction. Brewster's law; Malus law; Nicol prism; Nicol prism as polarizer and analyzer Quarter wave plate, Half wave plate

3.4 Polarized light: Production of plane polarized light by reflection, Double refraction. Brewster's law; Malus law; Nicol prism; Nicol prism as polarizer and analyzer Quarter wave plate, Half wave plate

Unit 4: LASER and Fibre Optics

4.1 Lasers-characteristics; Stimulated and Spontaneous emission.
4.2 Population inversion, Laser principle
4.3 Ruby laser, He-Ne laser Applications of lasers
4.4 Introduction to fibres. Different types of fibres. Principles of fiber communication (qualitative treatment only), Advantages of optical fibre communication

Mode of Transaction:

- Classroom teaching with ICT tools. Use visual aids and demonstrations to help students grasp the concepts effectively.
- E resources of books and Videos etc. These resources provide a comprehensive explanation of the theory along with relevant examples and applications
- Conduct hands-on experiments with lasers, diffraction, interference, and polarization to observe wave optics phenomena first hand. This will deepen their understanding of theoretical concepts and improve their practical skills.

Suggested Activities:

- Organize optics demonstrations and workshops to showcase optical illusions, holography, and other fascinating optical phenomena. This will make the subject more intriguing and memorable.
- Host competitions for students to design and build simple optical devices, such as lenses, mirrors, and prisms, and demonstrate their functionality.
- Combine art with physics by asking students to create optical art pieces that illustrate wave optics principles like refraction, diffraction, or interference.
- Organize visits to research or industrial laboratories specializing in optics and wave optics to expose students to cutting-edge research and applications.

Semester-2

Physics Practical I

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Learns about the usage of electrical systems, including various electrical measurements like current, resistance, voltage, capacitance, etc.
- Knows the working of wave optics instruments, such as wavelength of LASER Beam, interference and diffraction, and their application to understand the behaviour of light.
- Uses the analytical techniques effectively and perform graphical analysis to the experimental data.
- Gains practical knowledge by applying the experimental methods to correlate with the theories of Physics.

Course Content:

Find out the acceleration due to gravity by simple pendulum

- To determine moment of Inertia and modulus of rigidity using Torsional pendulum
- To determine the surface tension of the given liquid
- To determine 'g' and radius of gyration using Bar Pendulum
- To determine the modulus of rigidity of material of given wire by Maxwell needle
- To determine the modulus of rigidity of material by using Torsional Pendulum
- Young's modulus by Searle's method
- To determine the wavelength of sodium light using Newton's ring.
- To find out the prism angle and dispersive power by spectrometer
- To find out the wavelength of sodium light using diffraction grating

Mode of Transaction:

- To Create a comprehensive and effective learning experience for students pursuing mechanics and semiconductor physics. ICT based learning, Using Laboratory work, Presentation, Assignment and Access to online resources.

Suggested Activities:

- Group discussion, Seminar and Practical Viva based Quiz

MATHEMATICS

Semester-2

Linear Algebra

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands different types of matrices
- Finds eigen value and eigen vector of the matrices
- Checks vector space and subspace of a set
- Finds quadratic forms

Course Content:

Unit 1: Vector Space

1.1 Vector spaces, Subspaces
1.2 Span of a set
1.3 More about subspaces, Linear dependence and Independence
1.4 Dimension and Basis of a vector space

Unit 2: Linear Transformation

2.1 Definition and examples of linear transformation
2.2 Range and kernel of a linear map, Rank and nullity of a linear map
2.3 Inverse of a linear transformation, Rank-nullity theorem and its properties
2.4 The space L(U, V), Composition of linear maps

Unit 3: Matrices

3.1 Matrix associated with a linear map, Linear map associated with a matrix
3.2 Linear operator in M_(m×n), Matrix multiplication
3.3 Rank and Nullity of a matrix, Transpose of a matrix and special types of matrices
3.4 Row Echelon Form (REF) & Reduced Row Echelon Form (RREF) of matrices, system of linear equations, Matrix Inversion

Unit 4: Determinants

4.1 Definition, Fundamental properties of determinants, Cofactors
4.2 Determinant minors & rank of a matrix, Product of determinants
4.3 Eigenvalues, Eigenvectors, Wronskian, Caley Hamilton theorem
4.4 Quadratic forms and its applications

Mode of Transaction: Lectures,Discussion,Presentations,Assisgnments,Projects

Suggested Activities: Application of Matrices to Various topics.

Semester-2

Vedic Mathematics

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Develops the skills of Vedic Sutras
- Acquires knowledge of Indian ancient knowledge
- Understands various Vedic techniques to find solutions
- Can apply Vedic methods to solve other mathematics problems

Course Content:

Unit 1: Vedic mathematics: Introduction

1.1 Vedic mathematics- Introduction
1.2 Historical background
1.3 Sixteen Vedic sutras & its thirteen sub sutras – interpretation & its uses

Unit 2: Utility of Vedic Mathematics' Techniques

2.1 Simplify arithmetic computation – addition, multiplication, division, percentage, HCF
2.2 Simplify algebraic techniques, – factorization
2.3 Roots of simple equations

Mode of Transaction: Lectures,Discussion,Assisgnments,Projects

Suggested Activities:

- Application of Vedic Mathematics to simplify/fast arithmetic computation.

SEMESTER-III

Semester - III

			Total papers	Hours	Credit	Internal	External	Total
Education		Theory	2	120	8	60	140	200
Science	Principal	Theory	1	60	4	30	70	100
		Practical	1	60	2	15	35	50
	Subsidiary	Theory	1	60	4	30	70	100
		Practical	1	60	2	15	35	50
		Total	**6**	**360**	**20**	**150**	**350**	**500**

Sr. No.	Subject	Title	Type	Nature of Paper	Hours	Credit	Internal	External	Total
1	Education	Philosophical Perspectives of Education	Theory	Compulsory	60	4	30	70	100
2	Education	Child Development and Educational Psychology	Theory	Compulsory	60	4	30	70	100
3	Chemistry	Environmental Chemistry	Theory	Compulsory	60	4	30	70	100
4	Chemistry	Chemistry Practical II	Practical	Compulsory	60	2	15	35	50
5	Botany	Plant Taxonomy & Morphology	Theory	Compulsory	60	4	30	70	100
6	Botany	Laboratory Experiments in Botany II	Practical	Compulsory	60	2	15	35	50
7	Zoology	Vertebrate Zoology	Theory	Compulsory	60	4	30	70	100
8	Zoology	Laboratory Experiments in Zoology II	Practical	Compulsory	60	2	15	35	50
9	Physics	Electricity, Magnetism and Electromagnetic Theory	Theory	Compulsory	60	4	30	70	100
10	Physics	Physics Practical II	Practical	Compulsory	60	2	15	35	50
11	Mathematics	Calculus II	Theory	Compulsory	60	4	30	70	100
12	Mathematics	Computational Statistics	Practical	Compulsory	60	2	15	35	50

Semester-3

Philosophical Perspectives of Education

Compulsory
Credit: 04
Marks:100

Learning Outcomes:
Prospective teacher...

- Acquaints with the concepts related to Philosophy of Education
- Associates with various educational perspectives related to Indian Philosophy.
- Compares and Analyses various Global Philosophical Perspectives of Education
- Critically understands the Philosophical Perspectives on Social and Ethical Issues in Education

Unit 1: **Introduction to Philosophy of Education**

1.1 Understanding philosophy and its relevance to education
- Definition and nature of philosophy of education
- Relationship between philosophy and educational theories

1.2 Indian philosophical perspectives of education
- Overview of major Indian philosophical systems
- Influence of Indian philosophy on educational practices

1.3 Global philosophical perspectives of education
- Overview of major global philosophical traditions
- Comparison of different cultural and philosophical approaches to education

1.4 Comparison between Indian and Global Philosophies
- Role and significance of Ancient Philosophical Systems in education ethos.

Unit-2: Indian Philosophical Perspectives of Education

2.1 Vedanta philosophy and education
- Concept of Reality and its implications for education
- Educational implications of Vedantic principles such as Atman, Maya, and Karma

2.2 Jain philosophy and education
- Principles of Jain philosophy related to education
- Jain perspectives on moral and ethical development in education

2.3 Buddhist philosophy and education
- Buddhist concepts of compassion, mindfulness, and non-attachment in education
- Incorporating Buddhist principles in creating a peaceful learning environment

2.4 Gandhian philosophy and education
- Principles of non-violence, truth, and self-discipline in education
- Applying Gandhian principles to curriculum and pedagogy

Unit-3: Global Philosophical Perspectives of Education

3.1 Idealism and education
- Overview of idealism as a philosophical perspective
- Implications of idealism for educational theories and practices

3.2 Pragmatism and education
- Pragmatic principles and their educational applications
- Real-world problem-solving and experiential learning in pragmatist education

3.3 Existentialism and education
- Existentialist views on freedom, choice, and authenticity in education
- Fostering personal meaning and self-discovery in existentialist education

3.4 Postmodernism and education
- Critiques of traditional educational systems from a postmodern perspective
- Postmodern approaches to curriculum, pedagogy, and assessment

Unit 4: Philosophical Perspectives on Social and Ethical Issues in Education

4.1 Philosophy of social justice in education-Examining different philosophical perspectives on social justice issues in education
- Implications for creating inclusive and equitable learning environments

4.2 Ethics in education
- Ethical theories and principles relevant to educational practices
- Ethical considerations for teachers, students, and educational institutions

4.3 Philosophy of education and gender
- Exploring philosophical perspectives on gender and education
- Addressing gender biases and promoting gender equality in educational settings

4.4 Philosophy of education and environmental sustainability
- Environmental ethics and their implications for education
- Incorporating sustainability principles in curriculum and practices.

Mode of Transaction:
- Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:-
- Comparative analysis of educational philosophies of different cultures
- Philosophy café, Debates and case studies on philosophical perspectives
- Institutional Visits to observe how philosophy in practice are implemented in educational setting.
- Field trips to philosophical schools, ashrams, or libraries,Research projects on the influence of different philosophical perspectives on educational policies, curric ulum development, or methods of instruction.

Semester-3

Child Development and Educational Psychology

Compulsory
Credit: 04
Marks:100

Learning Outcomes:
Prospective teacher...

- Develops insight about Child Development & Educational Psychology and the stages of human growth and development.
- Understands different theories of Development and its implication in real classroom scenario.
- Understands and imply theories of Intelligence, Personality Creativity and Motivation.
- Understands different theories of Learning and its implication in real classroom scenario.
- Understands Mental Health and Adjustment.

Unit 1: Educational Psychology & Growth and Development

1.1 Psychology: Concept; Educational Psychology: Concept, Scope and Significance
1.2 Growth, Development & Maturity: Concept, Principles and Factors affecting Growth and Development
1.3 Stages of Human Development: Characteristics and Educational Implications
1.4 Adolescence: Concept, Characteristics, Challenges and Educational Implications

Unit 2: Developmental Theories: Concept, Stages and Characteristics, Educational Implications

2.1 Piaget's Cognitive Development Theory
2.2 Vygotsky's Theory of Cognitive Development
2.3 Kohlberg's Moral Development Theory
2.4 Dollard Miller's Theory

Unit 3: Individual Differences, Intelligence, Personality, Creativity and Motivation

3.1 Individual Difference: Concept, areas, Educational Implication;
Intelligence: Concept and Guilford's SOI Theory, Measurement of Intelligence and its Educational implications
3.2 Personality: Concept, Factors affecting Personality, Vedic Theory of Personality
3.3 Creativity: Concept, Steps of developing creativity
3.4 Motivation: Concept, Need, Theory of Abraham Maslow and McClelland

Unit 4: Learning and Learning Theories, Mental Health and Adjustment

4.1 Learning: Concept and Nature of Learning, Factors affecting Learning,
Transfer of Learning: Concept and Types
4.2 Classical Conditioning theory
4.3 Operant Conditioning theory , Learning by trial and error
4.4 Mental Health, Mental Hygiene, Adjustment: Concept, Characteristics, Educational Implications, adjustment,Defense Mechanism: Concept, Types.

Mode of Transaction:

- Lecture, Discussion, Experiential learning, Assignment, Project

Suggested Activities:-

- Observe and List out Developmental characteristics of 5 students at Secondary level
- Compare the Educational implications of various Developmental theories and determine its uniqueness.
- View any two movies like Slumdog Millionaire, Smile Pinky, Salam Bombay and discuss in context of its issues and concerns of childhood/adolescents.

CHEMISTRY

Semester-3

Environmental Chemistry

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Gains knowledge about the environment and its segments.
- Learns about the types of pollutants, their analysis, and methods of control.
- Acquires knowledge of analytical methods for monitoring pollutants.
- Understands the importance of the ozone layer and the mechanisms of ozone formation and depletion.

Course Content:

Unit 1: Environment

1.1 Scope of environmental Chemistry
1.2 Need for public awareness
1.3 Environmental Segments
1.4 Different atmospheric regions with temperature and pressure profile ,Composition of atmosphere
1.5 Biogeochemical Cycles in the environment: oxygen cycle, carbon cycle, nitrogen cycle,phosphorus cycle, sulphur cycle

Unit 2: Environmental Pollution

2.1 Environmental pollution and pollutants
2.2 Air pollution : Major sources and Classification of air pollutants , Methods to control air pollution
2.3 Water pollution : Major sources and Classification of water pollutants , Methods to control water pollution, characteristic of potable water
2.4 Soil pollution : Sources, effects and control of soil pollution

Unit 3: Analytical Methods for Monitoring Pollutants

3.1 Sampling, Sampling of Gas and Vapors, Sampling of Particulates, Stack sampling
3.2 Instrumental techniques for Monitoring Air Pollutants, Monitoring of NO_x, Monitoring of Hydrogen supplied, Monitoring of Oxidants and Ozone
3.3 Analytical methods of measuring Dissolve oxygen, Biochemical oxygen demand (BOD), Chemical oxygen demand (COD)
3.4 Analytical examination of sewage and sewage purification

Unit 4: Ozone layer

4.1 The earth's protective umbrella, creation of ozone layer
4.2 Mechanism of ozone formation and depletion
4.3 CFC, Harmful effect of CFC
4.4 Green house effect, green house gases, sources and sinks of green house gases

Mode of Transaction: PPT, Video lectures, Chalk & talk

Suggested Activities: Group discussion, Hands on training

Semester-3

Chemistry Practical II

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Can apply theory in practical applications.
- Understands safety norms and hazards.
- Develops analytical skills.
- Handles various glass wares effectively.
- Handles chemicals and other utilities with skill.
- Conduct qualitative analysis of organic substances.
- Enhances accuracy and precision in titration experiments.
- Carefully determines the equivalence point in titrations.
- Calculates unknown solution concentrations based on titration results.

Course Content

Practical 1: Organic qualitative analysis of solid substances: (Minimum 6)

1.1 Identification of Unknown organic solid substance is carried out through systematic process having different stages and determination of melting point of solid substances of following type:
Oxalic acid, Benzoic acid, Succinic acid, Cinnamic Acid, α-Naphthol, β-Naphthol, catechol, Resorcinol, o-Nitro aniline, m-Nitro aniline, p-Nitro aniline, Naphthalene, Urea, Thiourea, m-dinitrobenzene etc.

Practical 2: Water analysis (Minimum 3)

2.1 Total hardness of water (Ca^{2+} and Mg^{2+}) by complexometric titration
2.2 Chemical oxygen demand (COD) of given water sample
2.3 Biological oxygen demand (BOD) of given water sample
2.4 To determine the amount of sulphate
2.5 To determine the amount of Total alkalinity

Mode of Transaction: Chalk and Talk, Power Point Presentation
Suggested Activities: Group discussion, Practical exercise

BOTANY

Semester-3

Plant Taxonomy and Morphology

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Identifies morphological characters of plants
- Demonstrates families according Bentham and Hooker's system
- Illustrates floral formula, floral diagram and identification key.
- Identifies plant families on the basis of morphological characteristic.

Course Content:

Unit 1: MORPHOLOGY

1.1 Types of Leaves
1.2 Types of Phyllotaxy
1.3 Types of Venation
1.4 Types of Flowers

Unit 2: INFLORESCENCE

2.1 Inflorescence Types: Racemose, Cymose, Special
2.2 Types of Racemose Inflorescence
2.3 Types of Cymose Inflorescence
2.4 Types of Special Inflorescence

UNIT 3: SYSTEMATIC BOTANY

3.1 Outline Classification of Bentham and Hooker's System of Classification. And its meris and Demerits
3.2 Types of Aestivations
3.3 Types of Placentation
3.4 Monocotyledons Families 3.4.1 Amaryllidaceae, 3.4.2 Gramineae

UNIT 4: SYSTEMATIC BOTANY 2

4.1 Dicotyledons- Polypetalae 4.1.1 Malvaceae, 4.1.2 Leguminosae
4.2 Dicotyledons-Gamopetalae 4.2.1 Solanaceae, 4.2.2 Rubiaceae
4.3 Dicotyledons- Apetalae 4.3.1 Nyctaginaceae, 4.3.2 Euphorbiaceae
4.4 Floral Formula and Floral Diagram

Mode of Transaction: Lectures; Demonstration of Experiments in Life Science Laboratory; Educational Videos

Suggested Activities: Field Study, Collection of Plant Samples for Morphological and Anatomical Experiments, Draw the floral Formula of different families.

Semester-3

Laboratory Experiments in Botany II

Compulsory
Credit: 02
Marks:50

SUGGESTED EXPERIMENTS

- To study types of Phyllotaxy
- To study types of Venation
- To study types of Flower
- To study types of Inflorescence
- To study types of Aestivation
- To study types of Placentation
- To study outline of the system of classification proposed by Bentham and Hooker
- To study the family Malvaceae
- To study the family Leguminosae
- To study the family Solanaceae
- To study the family Rubiaceae
- To study the family Nyctaginaceae
- To study the family Euphorbiaceae
- To study the family Amaryllidaceae
- To study the family Gramineae

ZOOLOGY

Semester-3

Vertebrate Zoology

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands about the classification of vertebrata/chordate.
- Describes the general characteristics of various phyla.
- Describes the general features of various class of vertebrata.
- Explains various internal characteristics and systems of various phyla
- Learns important differentiating features of various phyla/class
- Learns in detail various systems of representative animals of various phyla

Course Content:

Unit 1: INTRODUCTION TO CHORDATA

1.1 General characteristics and outline classification
1.2 Protochordata- General characteristics of Hemichordata, Urochordata and Cephalochordata
1.3 Advanced features of vertebrates over protochordata
1.4 Agnatha- General characteristics and classification of cyclostomes up to class

Unit 2: PISCES, AMPHIBIA AND REPTILIA

2.1 Pisces- General characteristics of Chondrichthyes and Osteichthyes, classification up to order
2.2 Migration, Osmoregulation and parental care in fishes
2.3 Amphibia- General characteristics and classification up to order, Parental care in Amphibians
2.4 Reptilia- General characteristics and classification up to order, Affinities of *Sphendon*, Poison apparatus and biting mechanism

Unit 3: AVES AND MAMMALS

3.1 Aves- General characteristics and classification, *Archeopteryx*-a connecting link
3.2 Principles and aerodynamics of flight, Flight adaptation and migration in birds
3.3 Mammals- General characteristics up to order
3.4 Affinities of Prototheria, Adaptive radiation with reference to locomotory appendages

Unit 4: ZOOGEOGRAPHY

4.1 Zoogeological realms
4.2 Theories pertaining to distribution of animals
4.3 Plate tectonic and Continental Drift Theory
4.4 Distribution of Vertebrates in different realms

Mode of Transaction: Lectures; Demonstration and Microscopic Analysis in Life Science Laboratory; Educational Videos

Suggested Activities: Field study to observe various organisms in different ecosystems and the study of their behaviour for better understanding.

Semester-3

Practicals in Zoology II

Compulsory
Credit: 02
Marks:50

SUGGESTED EXPERIMENTS

- Study of museum specimen and permanent slides relevant to the theory from Cyclostomes to Reptilia.
- Comparative study of Integument, Digestive Tract and Blood Cells of Vertebrates through observation of permanent slides.
- Comparative study of Brain of different Vertebrates through demonstration of charts and models.
- Comparative study of Vertebrate Osteology amongFrog, Fowl and Rabbit (Pecimen: Skull, Limb Bones, Girdles, Special Bones, Vertebrae)
- Comparative study of Heart and Aortic Arches, Respiratory System and Urogenital System of different Vertebrates through demonstration of charts and models.
- Field visit to Zoological Park for study of Aquatic Vertebrate/Terrestrial Vertebrates.
- To confirm thalassemia by Necked Eye Single Tube RBCs Osmotic Fragility Test (NESTROFT).
- To solve problems based on Mendelian Inheritance Patterns.
- To study Karyotype of Human Chromosomes.
- Identification of Normal Male and Female Karyotype.
- Identification of Turner Syndrome using Karyotype.
- Identification of Klinefelter Syndrome using Karyotype.
- Identification of Down Syndrome using Karyotype.
- To perform Pedigree analysis and predict probabilities with suitable examples.

PHYSICS

Semester-3

Electricity, Magnetism and Electromagnetic Theory (EMT)

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- understands the concept of electric charge, electric field and their mathematical description.
- learns how to analyse electric circuits, including series and parallel circuits, using techniques like Kirchhoff's laws and circuit simplification by studying the behaviour of electric fields in different materials, including conductors and insulators.
- explores the behaviour of magnetic materials, including ferromagnetic, paramagnetic, and diamagnetic substances, thereby understanding the concept of magnetic fields and their properties, including the direction of magnetic field lines.

Course Content:

Unit 1: Vector Analysis and Electrostatics

1.1 Vector Calculus: Differentiation of vectors, scalar and vector fields, conservative fields and potentials, line integrals, gradient of a scalar field

1.2 Divergence of a vector field and divergence theorem, curl of a vector field and its physical significance, Stokes' theorem, combination of grad, div and curl.

1.3 Field lines, Flux, Gauss's law and its applications, Electric potential, Laplace and Poisson equations, boundary value problems.

1.4 The work done to move a charge, The energy of a point charge distribution

Unit 2: Magnetostatics

2.1 The Lorentz Force law: magnetic fields, forces, current, The Biot-Savart Law and its simple applications: straight wire and circular loop

2.2 Straight line currents, The Divergence and Curl of B,

2.3 Application of Ampere`s Law, Comparison of Magnetostatics and Electrostatics

2.4 Magnetic vector Potential, Magnetostatic Boundary Conditions

Unit 3: Magnetism

3.1 Diamagnets, Paramagnets, Ferromagnets, Torques and forces on magnetic dipoles and Magnetization

3.2 Ampere`s Law in Magnetized Materials and Boundary Conditions

3.3 Magnetic Susceptibility and Permeability

3.4 Ferromagnetism, Magnetic Hysteresis including B–H curve

Unit 4: Electromagnetic induction and Network Transformations

4.1 Faraday's laws of electromagnetic induction, Lenz's law.

4.2 Self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field.

4.3 Types of networks, Superposition Theorem, the Reciprocity Theorem, Thevenin's Theorem,

4.4 Norton Theorem, Maximum Power Transfer Theorem, Compensation Theorem.

Mode of Transaction: To Create a comprehensive and effective learning experience for students pursuing electricity and magnetism. ICT based learning, Using Laboratory work, Presentation, Assignment and Access to online resources.

Suggested Activities: Topic related live demonstration in the classroom, ICT based Teaching – learning, Experiment work in Physics Lab, Outreach program

Semester-3

Physics Practical II

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Learns about the usage of electrical systems, including various electrical measurements like current, resistance, voltage, capacitance, etc.
- Uses the analytical techniques effectively and perform graphical analysis to the experimental data.
- Gains practical knowledge by applying the experimental methods to correlate with the theories of Physics.

Course Content:

- To determine an unknown Low Resistance using Potentiometer.
- To determine an unknown Low Resistance using Carey Foster's Bridge.
- To verify the Thevenin theorem.
- To verify Norton theorem.
- To verify the Superposition theorem.
- To verify the Maximum power transfer theorem.
- Characteristics of p n junction diode
- Simulation of Nuclear Radioactive decay using Calculator
- Characteristics of Zener diode as a voltage regulator
- To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.

Mode of Transaction: Physical experiments in the lab, Board work, Demonstration, Virtual Lab, ICT based learning

Suggested Activities: Group discussion and Quiz

MATHEMATICS

Semester-3

Calculus II

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands concept of vector valued function
- Evaluates the double integral and change the order of it.
- Analyse the geometrical interpretation of double and triple integral
- Can verify Green, Stoke's and Gauss divergence theorem

Course Content:

Unit 1: Functions of Several Variables

1.1 Introduction to functions of several variables, Limits and continuity
1.2 Partial derivatives, Chain rules for functions of several variables, Directional derivatives and gradient
1.3 Tangent planes and normal lines
1.4 Extrema of functions of two variables, Applications of extrema

Unit 2: Double Integral

2.1 Introduction to coordinate systems, Definition of gradient, divergence and curl, properties of these operators
2.2 Introduction to double integral, repeated or iterated integral
2.3 Double integral over a closed region, evaluation of double integral
2.4 Changing the order of double integral

Unit 3: Triple Integral

3.1 Triple integrals, Iterated triple integrals
3.2 Geometrical interpretation of double and triple integrals and problems based on it
3.3 Introduction to Jacobian (only definition)
3.4 Transformation of double and triple integrals

Unit 4: Integrals and Vector Fields

4.1 Definition of line integral, Green's theorem, Surface and volume integral
4.2 Gauss's divergence theorem (statement only), Examples based on it
4.3 Stoke's theorem (Only examples based on it)
4.4 Verification of the three theorems and problems based on the theorems

Mode of Transaction: Lectures,Discussion,Presentations,Assisgnments,Projects

Suggested Activities: Application of multiple integrals to find the volume and surface.

Semester-3

Computational Statistics

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Develops the skills to understand the concepts of mean, media & mode.
- Acquires knowledge relationship between difference measures of central tendency
- Understands various trend analysis
- Can apply trend analysis methods to solve measurement of seasonal variations

Course Content:

Unit 1: Statistical Methods

1.1 Measures of central tendency
1.2 Standard deviation, Moments, Kurtosis
1.3 Discrete probability distribution
1.4 Measures of central tendency for a discrete probability distribution

Unit 2: Trend Analysis

2.1 Objective of time series, Components of time series
2.2 Measurement of trend, Freehand or graphic method
2.3 Method of semi averages, Method of moving averages
2.4 Method of least squares, Measurements of seasonal variations

Mode of Transaction: Presentation,Project, Lecture cum Discussion

Suggested Activities: Application of Statistics to real world applications.

SEMESTER-IV

Semester - IV

			Total papers	Hours	Credit	Internal	External	Total
Education	**Education**	**Theory**	1	60	4	30	70	100
	School Internship	**Practical**	2	120	4	100	0	100
Science	**Principal**	**Theory**	2	120	8	60	140	200
		Practical	2	120	4	30	70	100
		Total	**7**	**420**	**20**	**220**	**280**	**500**

Sr. No.	Subject	Title	Type	Nature of Paper	Hours	Credit	Internal	External	Total
1	Education	General Pedagogy of Mathematics and Science	Theory	Compulsory	60	4	30	70	100
2	Education	Pre-Internship Practice	Practical	Compulsory	60	2	50	0	50
3	Education	School Observations (Field Practice)	Practical	Compulsory	60	2	50	0	50
4	Chemistry	Organic Chemistry I	Theory	Compulsory	60	4	30	70	100
5	Chemistry	Chemistry Practical III	Practical	Compulsory	60	2	15	35	50
6	Chemistry	Inorganic Chemistry/ Physical Chemistry	Theory	Optional	60	4	30	70	100
7	Chemistry	Chemistry Practical IV	Practical	Compulsory	60	2	15	35	50
8	Botany	Plant Embryology & Plant Anatomy	Theory	Compulsory	60	4	30	70	100
9	Botany	Microbiology & Phytopathology/ Plant Breeding & Horticulture	Theory	Optional	60	4	30	70	100
10	Botany	Laboratory Experiments in Botany III	Practical	Compulsory	60	2	15	35	50
11	Botany	Laboratory Experiments in Botany IV	Practical	Compulsory	60	2	15	35	50
12	Physics	Classical and Nuclear Physics	Theory	Compulsory	60	4	30	70	100
13	Physics	Thermodynamics and Statistical Physics/ Electronics	Theory	Optional	60	4	30	70	100
14	Physics	Physics Practical III	Practical	Compulsory	60	2	15	35	50
15	Physics	Physics Practical IV	Practical	Compulsory	60	2	15	35	50
16	Mathematics	Differential Equations	Theory	Compulsory	60	4	30	70	100
17	Mathematics	Applications of Differential Equations	Practical	Compulsory	60	2	15	35	50
18	Mathematics	Group Theory/Real Analysis	Theory	Optional	60	4	30	70	100
19	Mathematics	Application of Integral Transform	Practical	Compulsory	60	2	15	35	50

Semester-4

General Pedagogy of Mathematics and Science

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- comprehends the concepts of faculty and discipline and knowledge as a whole.
- Appreciates values and recognize correlation.
- Understands pedagogical perspectives.
- Develops skills of microteaching, simulation lesson.

Course Content:

Unit 1: Values and Correlation of Mathematics and Science

1.1 Concept of Mathematics and Science
Concept of Faculty and Discipline with Reference to Mathematics and Science
1.2 Scope of Science and Mathematics; Values - Disciplinarian, Cultural, and Utilitarian
1.3 Correlation:
i) Mathematics: with its branches and Social Sciences
ii) Science: with its branches and Social Sciences
iii) Mathematics and Science
1.4 Mathematics and Science in School Curriculum and day to day life: Need and Importance

Unit 2: Pedagogical Perspectives

2.1 Pedagogy: Meaning and Concept
2.2 Teaching: Concept and Principles, Maxims of Teaching
2.3 Concept & Examples: Techniques, Methods, Devices, Approaches and Models of teaching
2.4 Aims, Objectives and Learning Outcomes in Mathematics and Science

Unit 3: Methods of Teaching Mathematics and Science

3.1 Inductive - Deductive, Demonstration
3.2 Comparison, Problem Solving
3.3 Analysis -Synthesis, Experiment Method
3.4 Project, Exhibition

Unit 4: Microteaching and Simulation

4.1 Microteaching: Origin, Concept, Steps, Advantages, Limitations
4.2 Microteaching Skills : Set Induction, Probing Questions, Fluency in Questioning, Explanation
4.3 Microteaching Skills : Illustration with Example, Board work, Stimulus Variation, Reinforcement, Use of Teaching Aids
4.4 Simulation: Concept,Characteristics and Steps

Mode of Transaction:

- Lecture cum Discussion; Problem Solving Skills; Demonstration; Playing; Seminars; Group Discussion; Mathematicians in Seminar

Suggested Activities:-

- Assignment on construction of Test items
- Analysis of famous quotations on Mathematics
- Group puzzle activity
- Preparation of teaching aids
- Demonstration of teaching aids

Semester-4 | **Compulsory**

Pre-internship Practice | **Credit: 02**

Marks:50

Learning Outcomes:

Prospective teacher...

- Understands the concept of microteaching skills
- Develops the proficiency in application of microteaching skills
- Develops the proficiency in observation of micro teaching skill components
- Develops skills and ability to reflect on microteaching experience

Course Content:

- Microteaching and Reflective Diary

Duration: 2 Weeks

- The main objective of the pre-internship practice is to develop various teaching skills among the prospective teachers. To achieve this objective an orientation cum workshop should be arranged on Micro teaching and Reflective Diary

Orientation cum Workshop for Microteaching

1. What is Microteaching? Steps of Micro teaching
2. Importance and limitations of Microteaching
3. General Orientation about different teaching skills
4. Orientation and Demonstration of the Skill
5. Discussion about the demonstration lesson according to the skill components to develop observation skill among trainees.
6. Preparation of the lesson plan by the trainees
7. Lesson plan guidance
8. Microteaching skill lesson execution in small peer group
9. Feedback by peer group members and faculty
10. Re-plan
11. Reteach
12. Feedback

Microteaching Skills:

- Fluency in Questioning, Set Induction, Skill of Illustration, Skill of Explanation, Skill of Using Writing Board, Skill of Stimulus variation, Skill of reinforcement, Skill of using teaching aid

Reflective Diary:

- Reflection upon the experiences related with microteaching skills

Internal Assesment

No	Activity	Marks
1	4 Skill Lessons in Method 1 and 8 Observations	20
2	4 Skill Lessons in Method 2 and 8 Observations	20
3	Reflective Diary	10
	Total	50

Semester-4

School Observations (Field Practice)

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Experiences school activities in totality
- Develops an insight into the role of a teacher and learner
- Identifies practices of the regular teacher in classroom teaching to engage students in learning process
- Reflects upon the experience during school observation
- Develops understanding about the school activities in different culture/set ups

Course Content:

- A group of prospective teachers need to visit minimum two different types of schools. One week in one school and second week in another school. A care should be taken to identify various types of schools such as Government, Private, Urban, Rural, Residential, Non-residential and specific category schools (e.g. KVs,JNVs, Ashram schools, School for differently abled learner and Sainik School). A brief orientation programme can be arranged before sending the prospective teachers to school to acquaint them with the objectives and modalities of such programme.
- During this programme, the prospective teachers shall observe the school, classroom environment with reference to infrastructure, equipment, teaching learning material, functioning of the school, human resources, organisation of various activities etc.
- Prospective teacher shall observe minimum two lessons each day (24 lessons shall be observed). The prospective teacher shall observe teaching learning process in classroom, ICT use, student participation, classroom management and and based on the observations he/she should identify the practices done by the teacher for effective teaching and engaging students in learning process.
- After the completion of the field exposure programme prospective teacher shall be required to develop a detailed report and share the same at the Institute. The report should include profile report of the school, detailed observation of minimum 24 lessons and reflective writing about the school exposure visit.

Mode of Transaction: Orientation and Observation

Internal Assesment

No.	Activity	Marks
1	Profile Report of two schools	20
2	Lesson Observation Report of 24 lessons	10
3	Reflective writing about the school exposure visit	10
4	Presentation of all above reports	10
	Total	**50**

CHEMISTRY

Semester-4

Organic Chemistry I

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands the fundamentals of organic reactions.
- Grasps the concepts of stereochemistry in organic compounds.
- Becomes familiarise with the physical and chemical properties of hydrocarbons.
- Develops the ability to explain the mechanisms of nucleophilic and electrophilic reactions.

Course Content:

Unit 1: Fundamentals of Organic Reactions

1.1 Inductive Effect, Mesomeric Effect, Electrometric Effect, Hyperconjugation
1.2 Homolytic and Heterolytic Fission
1.3 Reactive intermediates: Carbocations, Carbanions, Free radicals, Carbenes and Nitrene
1.4 Reagent types: Electrophiles and Nucleophiles
1.5 Types of Organic Reactions
1.6 Types of Reaction Mechanism, Exothermic and Endothermic reactions
1.7 Solvents in organic reactions

Unit 2: Stereochemistry of Organic Compounds

2.1 Constitutional (Structural) Isomerism, Geometrical Isomerism
2.2 Optical Isomerism and Optical Activity
2.3 Enantiomers ,Diastereomers, Meso Compounds, Chirality
2.4 Resolution of Racemic Mixtures
2.5 D & L and R & S system of nomenclature
2.6 Absolute Configuration, E & Z Systems of Configuration
2.7 Introduction to Newman projections and sawhorse formulae, Fischer and flying wedge formulae

Unit 3: Alkanes and Cycloalkanes

3.1 Physical properties of alkanes
3.2 Preparation of alkanes
3.3 Chemical properties of alkanes
3.4 Stain in ring compounds: Baeyer's Strain theory
3.5 Preparation of cycloalkanes
3.6 Chemical properties of Cycloalkane

Unit 4: Alkenes and Alkynes

4.1 Physical properties of alkenes
4.2 Preparation of alkenes
4.3 Chemical properties of alkenes
4.4 Physical properties of alkynes
4.5 Preparation of alkynes
4.6 Chemical properties of alkynes

Mode of Transaction: PPT, Video lectures, Chalk & talk

Suggested Activities: Group discussion.

Semester-4

Chemistry Practical III

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Gains an understanding of organic qualitative analysis.
- Acquires knowledge of handling various glassware and chemicals.

Course Content:

Practical 1: Organic qualitative analysis of liquid substances (**Minimum: 8)**

- Identification of Unknown organic Liquid substance is carried out through systematic process having different stages and determination of boiling point of Liquid substances of following type:
- Acetic acid, Aniline, Acetone, Methyl Alcohol, Ethyl Acetate, Nitrobenzene, Chloroform, Chlorobenzene, Benzaldehyde, Methyl acetate, Methyl Ethyl Ketone(MEK),

Mode of Transaction:

- Chalk and Talk, Power Point Presentation

Suggested Activities:

- Group discussion, Practical activities

Semester-4

Inorganic Chemistry

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Comprehends d-block elements and their applications.
- Comprehends lanthanides and actinides elements and their applications.
- Understands the properties of organometallic compounds and their bonding.
- Gains insight into the structural properties and stability of coordination compounds.

Course Content:

Unit 1: Chemistry of d-block elements

1.1 Transition elements, definition, position in periodic table, electronic configuration of atoms and ions
1.2 General characteristics such as oxidation state, size, melting and boiling points
1.3 Reactivity
1.4 Ionization energies
1.5 Magnetic behaviour
1.6 Colour
1.7 Tendency to form complexes
1.8 Comparison of properties of first transition series with second and third transition series

Unit 2: Chemistry of lanthanides and actinides

2.1 Lanthanides: Electronic structure, Oxidation state
2.2 ionic radii and lanthanide contraction
2.3 Complex formation and spectral properties
2.4 Actinides: Electronic structure, Oxidation state, ionic radii
2.5 complex formation of actinides
2.6 Similarities between actinides and lanthanides

Unit 3: Organometallic compounds

3.1 Definition
3.2 Types of organometallic compounds
3.3 Classification
3.4 EAN and nomenclature
3.5 Bonding: metal carbon bonding, metal carbon multiple bonding
3.6 Metal alkyl complexes of group 1, 2 and 13
3.7 Metal olefin complexes and nature of bonding in these complexes

Unit 4: Co-ordination compounds

4.1 Werner's coordination theory and its experimental verification
4.2 Effective atomic number concept
4.3 Chelates
4.4 Nomenclature of coordination compounds
4.5 Thermodynamic and kinetic stability of coordination compounds
4.6 Isomerism (structural, stereo and geometrical isomerism in 4 and 6 coordination number compounds)
4.7 Optical isomerism in four and six coordination number compounds

Mode of Transaction: Chalk and Talk, Power Point Presentation and online videos to understand transitions and complex shapes

Suggested Activities: Group discussion, activities include structure to name and name to structure conversion practice

Semester-4

Physical Chemistry

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands molecular structure through various physical properties like dipole moment and refractive index.
- Differentiates between adsorption and absorption and identify the mechanisms of adsorption using different models.
- Understands how to establish equilibrium in reactions and comprehend the factors influencing equilibrium, including their impact on equilibrium constants.
- Distinguishes between the liquid state and liquid crystals, and identify liquids based on their properties and characteristics.

Course Content:

Unit 1: Physical Properties and Chemical Structure

1.1 Introduction
1.2 Refractive Index
1.3 Optical Activity and Chemical constitution
1.4 Electrical properties elucidating the molecular structure
1.5 Dipole moments
1.6 Electrical polarization of molecules
1.7 Dipole moments and dielectric constant
1.8 Dielectric polarization and dielectric constant
1.9 Clausius-Mosotti equation
1.10 Determination of dipole moments
1.11 vapour-temperature method
1.12 Dilute solution method
1.13 Bond moments and molecular dipole moments
1.14 Dipole moments and structure of molecules
1.15 Numerical

Unit 2: Chemical Equilibrium

2.1 Equilibrium constant and free energy
2.2 Thermodynamic derivation of law of mass action and its application
2.3 Dissociation of HI
2.4 Dissociation of N_2O_4, Synthesis of ammonia
2.5 Le Chatellier's principle
2.6 Van't Hoff reaction isotherms and reaction isochors

Unit 3: Surface Chemistry

3.1 Adsorption
3.2 Difference between Adsorption and absorption
3.3 Adsorption principles
3.4 Adsorption by solids
3.5 Types of adsorptions
3.6 Factors influencing adsorption
3.7 Adsorption of solutes from solutions
3.8 Adsorption isotherm
3.9 Freundlich adsorption isotherm
3.10 Langmuir adsorption isotherm

Unit 4: Liquid State

4.1 Intermolecular forces
4.2 Structure of liquids (a qualitative description)
4.3 Structural difference between solids, liquids and gases
4.4 Surface tension and viscosity: Determination, properties
4.5 Parachor, Rheochor and refractive index
4.6 Liquid Crystals: An introduction to liquid crystals
4.7 Classification and properties of liquid crystals

Mode of Transaction: Chalk and Talk, Power Point Presentation and online videos to understand phases, their properties and reaction kinetics

Suggested Activities: Group discussion, Quiz

Semester-4

Chemistry Practical IV

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands safety norms and hazards.
- Develops analytical skills.
- Master the handling of various glassware and chemicals.
- Performs qualitative analysis of inorganic substances.

Course Content:

Practical 1: Inorganic qualitative analysis (minimum 6)

1.1 Semi micro qualitative analysis of Inorganic compound:

$Pb(NO_3)_2$, $CdCl_2$, $Cu_3(PO_4)_2$, $CaCO_3$, $Al_2(SO_4)_3$, $MnSO_4$, $NiCO_3$, CuS, ZnS, $BaCl_2$,$Sr(NO_3)_2$, $ZnCO_3$, $MgSO_4$, $Al_3(PO_4)_2$, $K_2Cr_2O_7$, KBr, KCl/NH_4Cl, KI, $(NH_4)_3PO_4$, ZnO,MnO_2

Practical 2: Instrumental Practical

2.1 Stalagmometer:

- To Determine the surface tension of a given liquid at room temperature using stalagmometer by drop number method

2.2 Refractometer

- To determine the molar refraction and refractive index of a given salt
- To determine specific refraction and molar refraction of liquid A,B and its Mixture
- To study the variation of refractive index with composition of a given liquid and to determine the composition of unknown mixture

2.3 pH metry:

- To determine Molarity of strong acid by titrating against 0.1 M NaOH solution

2.4 Potentiometry:

- To determine Molarity of strong acid by titrating against 0.1 M NaOH solution

2.5 Conductometry:

- To determine Molarity of strong acid by titrating against 0.1 M NaOH solution

Mode of Transaction: Chalk and Talk, Power Point presentation

Suggested Activities: Group discussion, Practical activities

BOTANY

Semester-4

Plant Embryology & Plant Anatomy

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Discusses the Structure and development process of male and female gametophyte
- Illustrates the types ovules, embryo, seed and endosperm.
- Develops an understanding of concepts and fundamentals of plant anatomy
- Gains knowledge of plant cells, tissues and their functions.

Course Content:

Unit 1: EMBRYO AND ENDOSPERM DEVELOPMENT

1.1 Microsporogenesis and Development of male gametophyte
1.2 Megasporogenesis and Development of Female gametophyte
1.3 Types of Ovules
1.4 Embryo development in Dicotyledons (*Capsella bursa*)
1.5 Embryo development in Monocotyledons (*Sagittaria sagittaefolia)*
1.6 Endosperms: Types and functions of Endosperms

Unit 2: POLLINATION AND FERTILIZATION

2.1 *In Vitro* Pollen Germination.
2.2 Factors affecting pollen germination
2.3 Pollination : types and Pollinators
2.4 Fertilization: Double Fertilisation
2.5 Male Sterility and Methods to Overcome Sterility

Unit 3: PLANT TISSUES AND EPIDERMAL TISSUE SYSTEM

3.1 Types of tissues : Permanent and meristematic tissues, Simple and complex tissues
3.2 Structure and function of epidermal tissue system
3.3 Uniseriate and multiseriate epidermis
3.4 Stomata: structure, types and functions
3.5 Epidermal outgrowth: glandular and non-glandular

Unit 4: IMPORTANT ANATOMICAL ASPECTS IN PLANTS

4.1 Mechanical tissue system.
4.2 Abscission of leaf
4.3 Primary structure of dicot (Sunflower) root, stem and leaves
4.4 Primary structure of monocot (Maize) root, stem and leaves
4.5 Secondary growth of Dicot stem

Mode of Transaction:Lectures; Demonstration of Experiments in Life Science Laboratory; Educational Videos.

Suggested Activities: Identify the different tissue from leaf, stem and fruits, trichomes and Glands importance; identify the embryo in dicot and monocot seed, Abscission and Senescence process in plants.

Semester-4

Microbiology and Phytopathology

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands history and scope of microbiology and applied microbiology
- Understands about the omnipresence of microorganisms
- Interrelates of pathogen, host and environment
- Identifies the disease symptoms

Course Content:

Unit 1: PROKARYOTES

1.1 Microbiology as a field of Biology, Applied areas of Microbiology
1.2 Bacterial Structures – External to Cell Wall : Capsule, Flagella, Pili, Prostheca, Sheath & Stalk, Cell wall of Gm Positive and Gm Negative
1.3 Modes of bacterial cell division and bacterial growth curve
1.4 Nutritional requirements & Nutritional types of bacteria

Unit 2: AKARYOTES

2.1 Introduction and General Characteristics: Definition, Structure, Classification
2.2 Bacterial Viruses: Classification, Lytic life cycle (T4 phage), lysogenic life cycle (Lambda phage)
2.3 Plant Viruses: Classification, Structure of TMV
2.4 Animal Viruses: Classification, Cytocidal effects, HIV, HBV, Ebola, Zeka, SARS-CoViD, Prion

Unit 3: PRINCIPLES OF PLANT PATHOLOGY

3.1 Importance, definitions and concepts of plant diseases
3.2 Classification of Disease
3.3 Disease triangle
3.4 Disease Cycle
3.5 Host Parasite Relationship

Unit 4: IMPORTANT DISEASES

4.1 White rust of crucifers
4.2 Powdery mildew of grapes
4.3 Citrus canker
4.4 Corn smut
4.5 Wheat rust

Mode of Transaction: Lectures; Demonstration of Experiments in Life Science Laboratory; Educational Videos. Emphasis will be given to systematic designing of experiments in the laboratory sessions.

Suggested Activities: Collection of Plant Samples identification of stage of plant diseases in different crops, Agricultural institute visit, Collect the water sample for identification of microorganism, culture the microorganism and identify their colony and measure the growth of species.

Semester-4

Plant Breeding and Horticulture

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands history and scope of microbiology and applied microbiology
- Understands about the omnipresence of microorganisms
- Interrelates of pathogen, host and environment
- Identifies the disease symptoms

Course Content:

Unit 1: PLANT BREEDING AND MODES OF REPRODUCTION

1.1 Introduction to plant breeding
1.2 Scope and importance
1.3 Objective of plant breeding
1.4 Breeding systems: modes of reproduction in crop plants.
1.5 Vegetative, Asexual and Sexual reproduction
1.6 Modes of Reproduction

Unit 2: METHODS AND PRACTICES OF BREEDING

2.1 Introduction to selection methods
2.2 Types of selections: Mass selection, Pure line selection, Bulk selection
2.3 Techniques of Hybridization
2.4 Significance of Hybridization

Unit 3: FUNDAMENTALS OF HORTICULTURE

3.1 Importance and scope
3.2 Classification of Horticultural Crops
3.3 Nursery based propagation: Cutting, Layering, Grafting and Budding
3.4 Role of Biotechnology
3.5 Weed Management
3.6 Pest Management

Unit 4: PRODUCTION, PACKAGING AND MARKETING

4.1 Post-harvest management
4.2 Greenhouse cultivation
4.3 Production and Value Addition (Jam, Jelly, Tomato ketch-up etc)
4.4 Packaging techniques
4.5 Organic Gardening
4.6 Floriculture

Mode of Transaction: Lectures; Demonstration of Experiments in Life Science Laboratory; Educational Videos.

Suggested Activities: Grafting and Budding in Garden Area, Plant Cutting and pruning for Hedges and shape for the different plants, Bonsai, Orchids and ornamental plant cultivation.

Semester-4

Laboratory Experiments in Botany III

Compulsory
Credit: 02
Marks:50

SUGGESTED EXPERIMENTS:

- To study method used for Maceration, peeling and smearing.
- To study the shoot apex and root apex.
- To study the complex plant tissues.
- To study the different types of stomata and trichomes.
- Anatomical study of primary Dicot Root.
- Anatomical study of Monocot roots.
- Anatomical study of primary Dicot stems.
- Anatomical study of primary Monocot stems.
- Anatomical study of primary Dicot leaves and Monocot leaves.
- Characters used for study of pollen Grains.
- The study of pollen grains of some common plants: *Canna indica, Datura stramonium, Hibiscus.*
- Germination of pollen grains.
- To dissect out embryo and cellular Endosperm from cucumber seeds.
- To dissect out from various bean seeds.
- L.S. of maize grain showing monocot embryo.

Semester-4

Laboratory Experiments in Botany IV

Compulsory
Credit: 02
Marks:50

SUGGESTED EXPERIMENTS

MICROBIOLOGY AND PHYTOPATHOLOGY

- Preparation of glassware for sterilization and disposal of laboratory media and cultures
- Study of bacterial motility by hanging drop method.
- Monochrome Staining: Positive Staining of Bacilli and Yeast
- Monochrome Staining : Negative Staining of Tooth Tarter sample
- Differential Staining : Gram's Staining
- Isolation of bacteria by streak plate/pour plate and spread plate technique
- Enumeration of bacterial number by viable count technique.
- To study different symptoms observed in surrounding plants.
- To study Disease triangle
- To study Disease cycle
- Study of symptoms of white rust of crucifers

PLANT BREEDING AND HORTICULTURE

- Phenology of any two of each: fruit, vegetables and flowering crops
- Study of garden containers and filling of pots and pits and plantation
- plants of each fruit, vegetable and flowering crops
- Study of cutting, layering, budding and grafting
- Study of technique of training and pruning
- Methods of harvesting of cut flowers and their preservation methods
- Methods of making dry flowers
- Visit to any one Nursery unit, Commercial Orchards, fruit market, floriculture
- Industry and submission of report in Practical Examination
- To study Fertilization and Life cycle of Angiosperm plants
- To study Reproductive Morphology and Floral Biology of Crops
- To study Hybridization techniques: Selfing, Emasculation and Crossing
- Practice of hybridization techniques in a self-pollinated and cross pollinated plants (any available plant).
- Polyploidy induction in *Allium cepa* by colchicine. (Demonstration only)

PHYSICS

Semester-4

Classical and Nuclear Physics

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands the foundation of physics – the theory of classical mechanics and the laws of Physics in the context of the micro world.
- Understands the underlying mechanics of atomic and sub-atomic phenomena.
- Learns about the wide variety of physical phenomena by the Lagrangian and the Hamiltonian formalisms.
- Can generalise the laws of physics in higher dimensions and can apply the formalism of classical mechanics to more advanced frameworks and basic properties of the nucleus and radioactive processes.
- Understands the working and the functions of nuclear detectors and accelerators.

Course Content:

Unit 1: Lagrangian Formulation

1.1 Constraints; their classification; generalized coordinates
1.2 Principle of virtual work, D'Alembert's Principle
1.3 Lagrange's equations of motion, Linear Generalised Potentials, Generalised Momenta and Energy
1.4 Applications of Lagrange's equation of motion to different physical problems

Unit 2: Hamiltonian Formulation

2.1 Hamilton Jacobi theory, Hamilton's equation of motion in Cartesian, cylindrical and spherical polar co-ordinates
2.2 Application of Hamilton's equation of motion to different physical problems
2.3 Canonical transformation, Generating Function
2.4 Poisson bracket, invariance of Poisson Bracket under canonical transformation

Unit 3: General Properties of Nucleus

3.1 Constituents of Nuclei and their intrinsic properties, Nuclear size, Nuclear mass, packing fraction and binding energy, binding energy curve and its significance, nuclear force, Nuclear stability
3.2 Liquid drop model. Shell Model (basics only), Weizsacher's semi empirical mass formula, nuclear reactions
3.3 Law of radioactive decay; Mean life and half-life; Radioactive equilibrium, Radioactive series, Artificial radioactivity, Age of earth, Carbon dating
3.4 Alpha decay, Geiger Nuttal rules, β-decays, Pauli's neutrino hypothesis, γ-rays and their origin. Interaction of γ-particle with matter, Nuclear isomerism

Unit 4: Nuclear Phenomenon and nuclear detectors

4.1 Nuclear fission and chain reaction, Emission of delayed neutrons by fission fragments, Energy released in the fission of U235, controlled chain reaction and basic principle of nuclear reactor
4.2 Nuclear fusion reaction, fusion and thermonuclear reactions driving stellar energy
4.3 Ionization chamber, Geiger-Muller counter, Cloud chamber, Bubble chamber, Spark chamber
4.4 Van-de-Graff Generator, Linear Accelerator, Cyclotron, Betatron

Mode of Transaction:

To create a comprehensive and effective learning experience for students pursuing this course, combination of methods mentioned below will be used

- Lectures: Classroom lectures using ICT tools to explain the theoretical concepts and principles of Classical and Nuclear Physics
- Using Laboratory Work: Practical laboratory sessions are essential for understanding experimental aspects of Mechanics and Nuclear Physics, like radioactive processes etc.
- Assignments: By giving regular assignments and problem sets to allow students apply the theoretical concepts to solve problems related to Classical Mechanics and Nuclear Physics
- Presentations: Students will be asked to give presentations on specific topics related to Classical Mechanics and Nuclear Physics enhancing their communication and research skills.
- Computer Simulations: The use of computer simulations or software tools can aid in visualizing and understanding certain phenomena in Classical Mechanics and Nuclear Physics.
- Access to Online Resources: Such as e-books, videos, and educational websites, can supplement the learning process.

Suggested Activities:

Hands-on activity to help the students visualize and understand different models of the nucleus.

- Introduce students to computer simulations or software tools that simulate nuclear phenomena like radioactive decay, binding energy, or nuclear force.
- Organize problem-solving sessions where students can work on complex problems related to Classical Mechanics and Nuclear Physics collaboratively. This fosters teamwork and critical thinking.
- Arrange visits to industries or research laboratories to expose students to real-world applications and career opportunities.
- Facilitate group discussions on challenging topics or recent research papers, encouraging students to exchange ideas and opinions.
- Encourage students to create do-it-yourself (DIY) demonstrations of mechanics and nuclear physics

Semester-4

Thermodynamics and Statistical Physics

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- understands and utilizes the terms and basic methods of Statistical Physics.
- derives expressions for the variation of various properties of macroscopic amounts of material, also appreciates the different statistics arising from distinguishable and indistinguishable particles and relates these to the behaviour of solids and gases.
- understands partition functions and Thermodynamic state functions analytically in some specific cases.
- analyses the distinction between Fermi Dirac, Bose-Einstein and Maxwell-Boltzmann statistics, and the origin of these differences.
- comprehends non-classical behaviours such as Electron Degeneracy pressure and Bose-Einstein Condensation.

Course Content:

Unit 1: Basics of Thermodynamics

1.1 Laws of thermodynamics and their consequences

1.2 Thermodynamic potentials, Derivations of Maxwell's Relations. Applications of Maxwell's Relations: Clausius Clapeyron equation, Values of Cp-Cv, Tds Equations, Joule-Kelvin Coefficient for Ideal and Van der Waal Gases, Energy Equations and Change of Temperature during an Adiabatic Process

1.3 phase equilibria. Phase space, Helmholtz Function, Gibbs Function, Enthalpy, Phase Transitions: First-order phase transitions, Second-order phase transitions, The T dS Equations, Related Numerical

1.4 micro- and macro-states. Micro-canonical, canonical and grand-canonical ensembles and partition functions

Unit 2: Classical and Quantum Statistics

2.1 Stefan-Boltzmann Law: Thermodynamic Proof. Radiation Pressure.

2.2 Spectral Distribution of Black Body Radiation. Wien's Distribution Law and Displacement Law. Rayleigh-Jean's Law.

2.3 Ultraviolet Catastrophe. Planck's Quantum Postulates

2.4 Planck's Law of Blackbody Radiation

Unit 3: Statistical Ensemble

3.1 Statistical description of states , Micro canonical ensemble, Canonical ensemble

3.2 Mean value and fluctuations, Grand canonical ensemble

3.3 Fluctuations in the number of particles of a system in a grand canonical ensemble.

3.4 Three Distributions: Maxwell-Boltzmann Distribution, Fermi-Dirac distribution, Bose-Einstein Distribution

Unit 4: Some applications

4.1 Statistical interpretation of basic thermodynamic variables

4.2 Ideal gas, Gibbs paradox

4.3 Law of Equipartition of Energy – Applications to Specific Heat and its Limitations.

4.4 Electron gas in a Metal. Specific Heat of Metals. White Dwarf Stars. Chandrasekhar Mass Limit

Mode of Transaction:

- Classroom lectures with use of visual aids, such as PowerPoint presentations, animations, and Videos, to help students better understand abstract concepts and visualize the processes involved to understand the fundamental concepts and principles of thermodynamics and statistical mechanics.
- Group discussions and debates can help students grasp the concepts from multiple perspectives.
- Using computer simulations and modelling software, students can explore complex systems and observe how variables affect thermodynamic processes or statistical behaviour.

Suggested Activities:

- Suggested to assign students to research and present real-life applications of thermodynamics and statistical mechanics in various industries, such as engineering, meteorology, and materials science.
- Use computer simulations to model the behaviour of a system of particles, such as the ideal gas or the Ising model, to study statistical mechanics concepts like entropy, microstates, and microstates.
- Set up an experiment to verify the ideal gas law using a gas-filled container, pressure gauge, and temperature measurement. This activity reinforces the relationship between pressure, volume, and temperature in gases.

Semester-4

Electronics

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- understands the fundamental concepts in electronics, including voltage, current, resistance, and power and can identify and work with various electronic components such as resistors, capacitors, inductors, diodes, transistors, and integrated circuits (ICs).
- analyses and designs electronic circuits, including series and parallel circuits, using techniques such as Ohm's law and Kirchhoff's laws.
- understands the principles of transistor operation, including bipolar junction transistors (BJTs) and field-effect transistors (FETs), and their use in amplifiers and switching circuits.

Course Content:

Unit 1: Basics of Electronics and Circuits

1.1 Electronic components, Basic idea of Passive components (Resistors, Capacitors, Inductors) and Active components, types of capacitors and different type of inductors.

1.2 RL circuits (Growth and decay of current), RC circuit (Charging and discharging of capacitor) L-C-R circuit in series with DC source.

1.3 How to get better DC, Shunt capacitor filter, Series inductor filter, Choke – input LC filter, The CLC or PI filter.

Unit 2: Diode and Transistor

2.1 Use of diodes in rectifiers, Half wave rectifier, Full wave rectifier, Ripple factor and rectification efficiency, Performance of half wave rectifier, Performance of full wave rectifier.

2.2 Types of diodes, Zener diode, light emitting diode (LED), photo diode, and other diodes: the tunnel diode, the Schottky diode, the PIN diode, Varactor diode, and the silicon-controlled rectifier (SCR).

2.3 Structure of Transistor, Working of a Transistor, Relation between Different Current in Transistor (I_B, I_C, I_E).Three Configurations of Transistor, Transistor Characteristics (CB and CE Configuration)

2.4 Transistor input characteristics, 3 biases of transistors (fixed bias, self-bias and potential divider bias)

Unit 3: Field Effect Transistor (FET) and Operational Amplifier

3.1 FET- Types of FET, Construction and Working of JFET, Advantage of JFET and difference between JFET and BJT, Output Characteristics of JFET, Parameters of JFET.

3.2 UJT- Construction & Working of UJT, Advantages & Applications of UJT.

3.3 Basic Concepts, Ideal operational amplifier, Practical Inverting and Non-Inverting OP-AMP, Characteristics of OP-AMP

3.4 Applications of OP-AMP: As a Scale Changing- Phase Shifting and Summing amplifier, Voltage Follower, Integrator, Differentiator, Logarithmic and Antilogarithmic amplifier.

Unit 4: Digital Electronics

4.1 Analog and Digital Signal, Introduction to Number Systems, Decimal to Binary and Binary to Decimal Conversion, Binary Coded Decimal Code.

4.2 AND, OR and NOT Gates using Diode, NAND & NOR Gate, NAND and NOR Gate as a universal gate, Boolean Algebra and Theorems, De Morgan's Theorems.

4.3 Combinational and Sequential logic circuits. Multiplexer and Demultiplexer.

4.4 RS flip-flop, Clocked RS flip-flop, D flip-flop, JK flip-flop.

Mode of Transaction:

- To Create a comprehensive and effective learning experience for students pursuing electrical circuits and electronics. ICT based learning, Using Laboratory work, Presentation, Assignment and Access to online resources.

Suggested Activities: Topic related live demonstration in the classroom, ICT based Teaching – learning, Experiment work in Physics Lab

Semester-4

Physics Practical III

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Learns about the usage of electrical systems, including various electrical measurements like current, resistance, voltage, capacitance, etc.
- Uses the analytical techniques effectively and performs graphical analysis to the experimental data.
- Gains practical knowledge by applying the experimental methods to correlate with the theories of Physics.

Course Content:

- To determine value of Boltzmann constant using V-I characteristic of PN diode.
- To determine value of Planck's constant using LEDs of at least 4 different colours.
- To calculate the nuclear Binding Energy per nucleon using formula of given atoms.
- To study energy bandgap of PN junction diode.
- To study Zener diode as a voltage regulator.
- To study the characteristics of a Transistor in CE configuration.
- To study the characteristics of a UJT.
- To study and draw the characteristics of half wave and full wave rectifiers.
- To study and draw the characteristics of FET in common drain configuration.
- To study I – V Characteristics of Semiconductor Diode.

Mode of Transaction: Physical experiments in the lab, Board work, E-resources, Virtual Lab

Suggested Activities: Group discussion, Presentation, Quiz, Practical Viva Session

Semester-4

Physics Practical IV

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Learns about the various temperature sensor systems, as well as various electrical measurements like current, resistance, voltage, capacitance, etc.
- Uses the analytical techniques effectively and performs graphical analysis to the experimental data.
- Gains practical knowledge by applying the experimental methods to correlate with the theories of Physics.
- Develops professional skills in acquiring and applying the knowledge outside the classroom through design of a real-life instrumentation system.

Course Content:

- To study the variation of resistance of a Thermistor with temperature.
- To study the variation of hermos emf and sensitivity of thermocouple.
- To study the characteristics of RTD (Resistance Temperature Detector).
- To determine value of Boltzmann constant using V-I characteristic of PN diode.
- To study the I – V Characteristics of FET
- To study the I – V Characteristics of UJT
- To study Semiconductor Diode Characteristics.
- To study the characteristics of a Transistor in CE configuration.
- To verify the truth table of RS flip-flop
- To verify the truth table of JK flip-flop

Mode of Transaction: ICT and Virtual lab learning, Physical experiments in the laboratory

Suggested Activities: Group discussion, Quiz and Presentation

MATHEMATICS

Semester-4

Differential Equations

Compulsory
Credit: 04
Marks:100

Learning Outcomes

This course will enable students to

- Find the solution of ordinary differential equation by various methods.
- Evaluate the solution of higher order differential equation by method of undetermined coefficients and variation of parameter
- Learn the formation of partial differential equations
- Evaluate the first order partial differential equation

Course Content:

Unit 1: Differential Equations: Their Formation and Solutions

1.1 Differential equation: definition, Order and degree of a differential equation, Linear and non-linear differential equations, Solution of a differential equation

1.2 Complete primitive (or general solution). Particular solution and singular solution

1.3 Formation of differential equations

1.4 The Wronskian, Linearly dependent and independent set of functions

Unit 2: Equations of first order and first degree

2.1 Separation of variables, Transformation of some equations in the form in which variables are separable

2.2 Homogeneous equations, Equations reducible to homogeneous form

2.3 Pfaffian differential equation, Exact differential equation, Necessary and sufficient conditions for a differential equation of first order and first degree to be exact

2.4 Integrating factor, Linear differential equation, Equations reducible to linear form, Bernoulli's equation

Unit 3: Higher order differential equations

3.1 Differential operator (D), Linear homogeneous and non-homogeneous higher order differential equation with constant coefficients, Complementary and particular Integral (solution)

3.2 Methods of undetermined coefficients method

3.3 Variation of parameters of second order ODE

3.4 Euler-Cauchy equation

Unit 4: Partial Differential Equation

4.1 Formation of partial differential equations by the elimination of arbitrary constants and arbitrary functions

4.2 Partial differential equations of the first order, The complete and particular Integrals

4.3 Lagrange's solution of linear equations

4.4 Some special types of equations which can be solved easily by the method other than Charpit's method.

Mode of Transaction: Lectures cum Discussion, Project, Presentation, Assisgnment

Suggested Activities: Application of Differential Equations to Real world Problems

Semester-4

Applications of Differential Equations

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Develops the skills to transform real phenomenon to differential equations
- Acquires knowledge of mathematical modelling
- Understands various numerical differentiation technique
- Finds the solution to various differential equations

Course Content:

Unit 1: Applications of equation of first & Second order

1.1 Population growth problems, Radioactive decay problems
1.2 Newton's law of cooling problems
1.3 Newton's second law and Hooke's law
1.4 The differential equation of the vibrations of a mass on a spring, Free, undamped motion, Free, damped motion, Electric circuit problems

Unit 2: Numerical Differentiation

2.1 Taylor series method
2.2 Euler's method, Euler's modified method
2.3 Runge Kutta Methods (2^{nd} and 4^{th} order)
2.4 Milne's predictor-corrector method

Mode of Transaction: Discussion, Mathmetica,Presentation

Suggested Activities: Application of Differential equations to real world applications.

Semester-4

Group Theory

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Checks abelian and non-abelian groups.
- Can verify Lagrange's theorem.
- Evaluates order of permutation.
- Understands and check homomorphism and isomorphism of groups.

Course Content:

Unit 1: Groups

1.1 Basic concepts- Set, Relation, Equivalence relation, Function & binary operation on set
1.2 Definition and examples of group, Basic property of group
1.3 Equivalent definition of group, Finite group and their tables
1.4 Abelian and non-abelian groups

Unit 2: Subgroup

2.1 Subgroup-definition & examples, Order of a group and order of an element
2.2 Cyclic subgroup generated by an element, Cosets and its properties
2.3 Lagrange's theorem and its applications
2.4 Euler's theorem, Fermat theorem

Unit 3: Permutations and normal subgroup

3.1 Definition and example of permutations, Cycle, Transposition, Even and odd permutation
3.2 Order of permutation, Inverse of permutation
3.3 Normal subgroup: definition and examples
3.4 Results on normal subgroups

Unit 4: Homomorphism and isomorphism of Groups

4.1 Isomorphism of groups, Properties of cyclic groups, Isomorphism of cyclic groups
4.2 Homomorphism of groups & their properties
4.3 Kernel of homomorphism
4.4 Fundamental theorem for homomorphism

Mode of Transaction: Lectures, Discussion, Presentation, Assisgnment, Project

Suggested Activities: Application of Groups to real world applications

Semester-4

Real Analysis

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Checks countable and uncountable sets.
- Evaluates the limit superior and inferior of the sequence.
- Can verify the uniform and Lipschitz continuity of the function.
- Finds the limit of the function using L'Hospital rule.

Course Content:

Unit 1: Basics of Real Numbers

1.1 Real number system, algebra of real numbers, real valued function, one-one and onto function
1.2 Upper and lower bounds
1.3 LUB property and its application
1.4 Countable and uncountable sets

Unit 2: Sequences and continuous functions

2.1 Overview of Sequences and its convergence
2.2 Cauchy sequence and results based on it
2.3 Concept of Continuous functions, example and results on it
2.4 uniform continuity

Unit 3: Differentiation

3.1 Derivative of a function, the mean value theorem
3.2 Inverse function theorem
3.3 Intermediate value property for derivative
3.4 L'Hospital rule

Unit 4: Riemann Integration

4.1 Darboux integrability: lower and upper Darboux (Riemann) sums, its properties
4.2 Definition of Darboux (Riemann) integral
4.3 Properties of the Integral
4.4 Fundamental theorem of calculus

Mode of Transaction: Lectures, Discussion, Presentation, Assisgnment, Project

Suggested Activities: Application of basic real analysis to other theories.

Semester-4

Applications of Integral Transform

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Computes the Fourier transform of a function.
- Evaluates the series sum using transforms.
- Understands the applications of transform in detail.

Course Content:

Unit 1: Fourier Transform

1.1 Overview of Fourier series: Basic concepts and definition of Fourier transform
1.2 Fourier cosine and Sine transform
1.3 Properties of Fourier transform
1.4 Important results on Fourier series and Fourier transform

Unit 2: Series solution using Fourier Series and Fourier transform

2.1 Examples of Fourier transform
2.2 Examples of Fourier series
2.3 Sum of the series by Fourier series and Fourier transform
2.4 More applications on Fourier transform

Mode of Transaction: Lectures, Discussion, Presentation, Assisgnment

Suggested Activities:

- Application of Fourier series and Fourier transform to real world

SEMESTER V

Semester - V

			Total papers	Hours	Credit	Internal	External	Total
Education		Theory	2	120	8	60	140	200
Science	Principal	Theory	2	120	8	60	140	200
		Practical	2	120	4	30	70	100
		Total	6	360	20	150	350	500

Sr. No	Subject	Title	Type	Nature of Paper	Hours	Credit	Internal	External	Total
1	Education	Pedagogy of Science	Theory	Compulsory	60	4	30	70	100
2	Education	Pedagogy of Mathematics	Theory	Compulsory	60	4	30	70	100
3	Chemistry	Organic Chemistry II	Theory	Compulsory	60	4	30	70	100
4	Chemistry	Polymer Chemistry/ Analytical Chemistry	Theory	Optional	60	4	30	70	100
5	Chemistry	Chemistry Practical V	Practical	Compulsory	60	2	15	35	50
6	Chemistry	Chemistry Practical VI	Practical	Compulsory	60	2	15	35	50
7	Botany	Plant Physiology & Metabolism	Theory	Compulsory	60	4	30	70	100
8	Botany	Laboratory Experiments in Botany V	Practical	Compulsory	60	2	15	35	50
9	Botany	Plant Tissue Culture & Plant Biotechnology/ Environmental Science & Climate Change	Theory	Optional	60	4	30	70	100
10	Botany	Laboratory Experiments in Botany VI	Practical	Compulsory	60	2	15	35	50
11	Physics	Solid State Physics	Theory	Compulsory	60	4	30	70	100
12	Physics	Physics Practical V	Practical	Compulsory	60	2	15	35	50
13	Physics	Introduction to Nanoscience and Nanotechnology Atomic and Molecular Physics	Theory	Optional	60	4	30	70	100
14	Physics	Physics Practical VI	Practical	Compulsory	60	2	15	35	50
15	Mathematics	Elemantary Number Theory	Theory	Compulsory	60	4	30	70	100
16	Mathematics	Numerical Analysis	Practical	Compulsory	60	2	15	35	50
17	Mathematics	Metric Space/ Operations Research	Theory	Optional	60	4	30	70	100
18	Mathematics	LaTeX programming	Practical	Compulsory	60	2	15	35	50

Semester-5

Pedagogy of Science

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teachers...

- Understands the aims and objectives of teaching Science.
- Understands Lesson Planning and Unit Lesson Planning.
- Understands Teaching Learning Resources in Science.
- Understands Curriculum of Science and Science Textbook.

Course Content:

Unit 1: Aims and Objectives of Teaching Science

1.1 Meaning of Science and Elements of Science: Facts, Concept, Principles, Law, Hypothesis, Generalization

1.2 Taxonomy of Educational Objectives with reference to various domain

1.3 General, Specific and Instructional Objectives of Teaching Science

1.4 Aims and Objectives of Teaching Science according to NCFSE-2023

Unit 2: Lesson planning and Unit Lesson Planning

2.1 Lesson planning : Concept, Characteristics, Steps and Advantages

2.2 Unit Lesson Planning: Concept, Characteristics, Steps and Advantages

2.3 Techniques: Oral work, Drill and review, Assignment, Brain-storming, Play-way

2.4 Evaluation of lesson Execution with various point of view

Unit 3: Teaching Learning Resources in Science

3.1 Teachng Aids: Concept, Importance, Principles of selection of Teaching Aid

3.2 Classification of Teaching Aids and Improvised teaching aids

3.3 Various Learning and Reference Resources in science: Science fiction (Rhymes, Hykus, Drama) Journal and Magazine,Encyclopedia, Reference Books, Virtual lab, Apps, Documentaries and Movies of Science and Scientists, Websites and Blogs

3.4 Science Laboratory: Concept, Types and Importance, Planning and layout of General Science Laboratory, Characteristics of Laboratories at Higher Secondary Level, Maintenance of Science laboratory

Unit 4: Curriculum of Science and Science Textbook

4.1 Objectives of Science Curriculum at Various level

4.2 Importance of Textbook, Characteristics of ideal textbook and Evaluation of Science Textbook.

4.3 Teacher Handbook: Concept, Characteristics and Importance

4.4 Co-curricular activities: Science club, Science fair, Field Trip, National Talent Search examination

Suggested Activities: Prepare Lesson Plan, Book Review of Text Book, Collection of Teacher's Handbook, Visit of Science fair, Visit of Science Lab of various school

Semester-5

Pedagogy of Mathematics

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands the aims and objectives of teaching Mathematics.
- Understands Lesson Planning and Unit Lesson Planning.
- Understands Teaching Learning Resources in Mathematics.
- Understands Curriculum of Mathematics and Mathematics Textbook.

Course Content:

Unit 1: Aims and Objectives of Mathematics

1.1 Elements of Mathematics: Axioms, Postulates, Propositions and Theorems
1.2 Taxonomy & Revised Taxonomy of Educational Objectives
1.3 General and Specific Objectives and Instructional Objectives of Teaching Mathematics
1.4 Aims and Objectives with reference to NCFSE 2023

Unit 2: Lesson Planning and Unit Lesson Planning

2.1 Lesson planning : Concept, Steps and Advantages and Characteristics of Ideal lesson plan
2.2 Unit Lesson Planning: Concept, Steps and Advantages
2.3 Techniques: Oral work, Drill and review, Assignment, Brain-storming, Group work
2.4 Evaluation of Lesson execution with various point of view

Unit 3: Teaching Learning Resources in Mathematics

3.1 Teaching Aids: Concept, Importance, Principles of selection and Classification of Teaching Aids, Improvised teaching aids
3.2 Various Learning and Reference Resources in Mathematics: Journal and Magazine, Reference Books, Virtual lab, Apps, Documentaries and Movies of Mathematics and Mathematicians, Websites and Blogs
3.3 Mathematics Laboratory : Need, Importance, Use and Resources
3.4 Contribution of Indian Mathematicians: Aryabhatta, Brahmgupta, Bhaskaracharya, Shridhar Achary, Shrinivas Ramanujan, Lilavati, Shakuntaladevi

Unit 4: Curriculum of Mathematics and Mathematics Textbook

4.1 Objectives of Mathematics Curriculum at Various level
4.2 Importance of Textbook, Characteristics of ideal textbook and Evaluation of Mathematics textbook
4.3 Teacher Handbook: Concept, Characteristics and Importance
4.4 Co-curricular activities: Mathematics Club, Fair, Field Trip, Maths Olympiad

Suggested Activities: Prepare Lesson Plan, Book Review of Text Book, Collection of Teacher's Handbook

CHEMISTRY

Semester-5

Organic Chemistry II

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Develops an understanding of aromaticity.
- Gains knowledge of polynuclear hydrocarbons.
- Understands the chemistry of heterocyclic compounds.
- Grasps the chemistry of organometallic compounds and their applications.

Course Content:

Unit 1: Concept of Aromaticity

1.1 Structure of Benzene
1.2 Huckel's Rule and Aromaticity
1.3 Aromaticity in three , four, five, six, seven, eight membered ring system
1.4 Aromaticity in annulenes and other ring system
1.5 Anti-aromatic and non aromatic compounds
1.6 Nomenclature of aromatic compounds
1.7 Preparation and chemical properties of benzene, toluene and styrene

Unit 2: Polynuclear Hydrocarbons

2.1 Introduction
2.2 Structure of Naphthalene
2.3 Aromaticity of Naphthalene
2.4 Preparation and chemical properties of Naphthalene
2.5 Structure of Anthracene
2.6 Preparation and chemical properties of Anthracene

Unit 3: Heterocyclic compounds

3.1 Introduction
3.2 Classification and nomenclature of heterocyclic compounds
3.3 Structure, Aromatic characteristics of pyrrole, furan, thiophene and pyridine.
3.4 Basicity of pyridine
3.5 Preparation of pyrrole, furan, thiophene and pyridine
3.6 Chemical reactions of pyrrole, furan, thiophene and pyridine
3.7 Introduction to fused heterocyclic compounds

Unit 4: Organometallic compounds

4.1 Introduction, properties and applications
4.2 Organomagnesium Halides- Grignard reagent : Preparation
4.3 Grignard reagent : Chemical reactions and limitations
4.4 Organolithiums: preparation, Chemical reactions

Mode of Transaction:

- PPT, Video lectures, Chalk & talk

Suggested Activities:,

- Group discussion, Study 3-dimensional models of heterocyclic structures

Semester-5

Polymer Chemistry

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands basic polymer concepts and classification.
- Learns about polymerization types, including addition and condensation polymerization.
- Acquires knowledge of techniques for determining polymer molecular weight.
- Gains insight into the synthesis of well-known polymers.

Course Content:

Unit 1: Basic concepts of polymer chemistry -

1.1 Introduction- Monomer, Polymer, Degree of Polymerisation, Constitutional Repeating Unit (CRU), Functionality

1.2 Classification of polymers on basis of (i) Source (ii) type of polymerisation process used in synthesis (iii) nature and type of chain (iv) Solid state behaviour of polymer chains,

1.3 Isomerism in Polymer chains

1.4 Intermolecular forces in Polymers

1.5 Polymer waste disposal and remedies

Unit 2: Types of Polymerization -

2.1 Introduction, Distinction between Chain Growth Polymerisation (Addition Polymerisation) and Step Growth Polymerisation (Polycondensation Polymerisation)

2.2 Mechanism of Polymerisation (Free Radical, Cationic and Anionic), Coordination Polymerisation

2.3 Kinetics of Free Radical Addition (Chain) Polymerisation

2.4 Kinetics of Cationic Polymerisation

2.5 Kinetics of Anionic Polymerisation

Unit 3: Molecular weight of Polymers -

3.1 Concepts of mass, number, viscosity and sedimentation average molecular weights

3.2 Polydispersity and molecular weight distribution

3.3 Measurements of molecular weights, end group, viscosity, light scattering, osmotic and ultracentrifugation method

3.4 Gel permeation chromatography, polymer fractionation

3.5 The practical significance of molecular weights

Unit 4: Important polymers -

4.1 Polyesters

4.2 Polyamides

4.3 Phenol formaldehyde resins urea formaldehyde resins, epoxy resins

4.4 Polyurethanes

4.5 Natural and synthetic rubber

Mode of Transaction:PPT, Video lectures, Chalk & talk

Suggested Activities: Group discussion, Hands on training

Semester-5

Analytical Chemistry

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands titration phenomena based on the nature of compounds.
- Grasps the electrochemical responses of compounds to different electrical parameters.
- Can prepare samples for chromatographic analysis, gaining practical expertise.
- Comprehends the phenomena underlying specific characteristic spectra obtained in spectroscopy.

Course Content:

Unit 1: Titrimetric analysis

1.1 Introduction and types of titrations
1.2 Acid–Base Titration curves, detection of endpoint, qualitative and quantitative applications
1.3 Redox titration, detection of endpoint, quantitative applications
1.4 Complexometric titration, detection of endpoint, quantitative applications
1.5 Precipitation titration, detection of endpoint, quantitative applications

Unit 2: Electroanalytical methods

2.1 General introduction, advantages and disadvantages
2.2 Classification of electroanalytical methods
2.3 Conductometry and applications
2.4 Potentiometry and applications
2.5 pH metry and applications

Unit 3: Chromatographic methods

3.1 Introduction
3.2 Classification of chromatographic techniques and short outlines of all chromatography
3.3 Paper chromatography
3.4 Thin layer chromatography
3.5 Column chromatography and types of columns

Unit 4: spectroscopic methods

4.1 Introduction
4.2 Electromagnetic spectrum
4.3 Interaction of Electromagnetic Radiation with Matter
4.4 Classification into atomic spectroscopy and molecular spectroscopy
4.5 Atomic absorption and atomic emission spectroscopy
4.6 Molecular fluorescence, phosphorescence and chemiluminescence spectroscopy

Mode of Transaction: Chalk and Talk, Projector presentation and online videos to understand analytical methods

Suggested Activities: Group discussion, Practical activities

Semester-5

Chemistry Practical V

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Gains an understanding of organic qualitative analysis.
- Acquires knowledge of handling various glassware and chemicals.

Course Content:-

Practical 1: Organic solid binary mixture separation: (Minimum : 8)

To carryout separation of binary organic mixtures (solid + solid) and qualitative analysis of separated substances.Mixture of following types can be given for separation and identification purpose.
Combination of Soluble (Acid/Phenol/Neutral) +Insoluble (Acid/Base/Phenol/Neutral)

Mode of Transaction:

- Chalk and Talk, Power point presentation

Suggested Activities:

- Group discussion, Practical activities

Semester-5

Chemistry Practical VI

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Determines polymer molecular weight.
- Develops analytical skills.
- Masters the use of chromatographic techniques.
- Handles chemicals and other utilities with skill.
- Conducts qualitative analysis of polymers.
- Enhances accuracy and precision in experiments.
- Performs the separation of amino acid mixtures using chromatography.
- Performs both qualitative and quantitative analysis of inorganic substances.

Course Content:

Practical 1: Polymer analysis (Minimum 4)

1.1 To determine the viscosity of various resins
1.2 Determination of molecular weight of a polymer (Polystyrene) by viscometry
1.3 Determination of molecular weight of a polymer (Polyvinyl alcohol) by viscometry
1.4 Determination of molecular weight of a polymer (PEG-400) by viscometry
1.5 Determination of molecular weight of a polymer (PEG-6000) by viscometry
1.6 Determination of molecular weight of a polymer (Gelatine) by viscometry
1.7 Determination of molecular weight of a polymer (Starch) by viscometry

Practical 2: Chromatographic separation (Minimum 4)

2.1 Separation and identification of DL-alanine and L-lysine amino acids by paperchromatography
2.2 Separation and identification of L-leucine and L-alanine amino acids by paperchromatography
2.3 Separation and identification of L-leucine and glycine amino acids by paperchromatography
2.4 Separation and identification of sugars (glucose, fructose and sucrose) by paper chromatography
2.5 Separation and identification of DL-alanine and L-lysine amino acids by thin layer chromatography (TLC)
2.6 Separation and identification of DL-alanine and L-leucine amino acids by thin layer chromatography (TLC)
2.7 Separation and identification of mixture of organic compounds
2.9 Separation of pigments from the extract of spinach leaves by thin layer chromatography(TLC)

Mode of Transaction:

- Chalk and Talk, Power point presentation

Suggested Activities:

- Group discussion, Practical exercise

BOTANY

Semester-5

Plant Physiology and Metabolism

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Defines plant physiological concepts and biochemical terms.
- Explains of the physiological processes like photosynthesis, respiration, transpiration and vernalization
- Demonstrates various physiological and metabolic pathways in plant.
- Learns about the movement of sap and absorption of water in plant body

Course Content:

Unit 1: PLANT-WATER RELATIONS

1.1 Physical properties of water, Importance of water to plant life
1.2 Diffusion, imbibition and osmosis; concept & components of Water potential
1.3 Absorption and transport of water (Ascent of sap)
1.4 Transpiration –Definition, types of transpiration, structure and opening and closing mechanism of stomata

Unit 2: PHOTOSYNTHESIS

2.1 Photosynthetic Pigments (Chl a, b, xanthophylls, carotene)
2.2 Photosystem I and II, reaction center, antenna molecules
2.3 Electron transport and mechanism of ATP synthesis
2.4 C3, C4 and CAM pathways of Carbon fixation

Unit 3: RESPIRATION

3.1 Glycolysis (EMP) and its significance
3.2 TCA Cycle and its significance, Calculation of ATP
3.3 ETS in Mitochondria: Carriers and Complexes
3.4 Pentose phosphate pathway (HMP Shunt) and Glyoxylate Cycle

Unit 4: PHOTOMORPHOGENESIS

4.1 Photoperiodism (SDP, LDP, Day Neutral plants)
4.2 Phytochrome, Cryptochrome and Phototropins
4.3 Red and far red light responses on photo morphogenesis
4.4 Vernalization: role of low temperature in flowering

Mode of Transaction:

- Lectures; Demonstration of Experiments in Life Science Laboratory; Educational Videos.

Suggested Activities:

- Photosynthesis and respiration process, Transportation of water, Plant Developmentand Growthanalysis

Semester-5

Laboratory Experiments in Botany V

Compulsory
Credit: 02
Marks:50

SUGGESTED EXPERIMENTS

- Demonstration of imbibition.
- To determine the water potential of given tissue (Any tuber).
- Study of tissue water potential through potato.
- To study of transpiration in leaves.
- To study the evolution of oxygen during photosynthesis in aquatic plants.
- Estimation of chlorophyll-a and chlorophyll-b by spectrometric or colorimetric method.
- To demonstrate the phenomenon of plasmolysis.
- To demonstrate that Xylem is the Path of Conduction of Water.
- Measurement of stomata index on leaf.
- To study impact of light on seed germination and plant growth.

Semester-5

Plant Tissue Culture And Plant Biotechnology

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Defines biotechnology and plant tissue culture
- Describes Plant Tissue Culture techniques.
- Explains the concept and technique of Germplasm and Cryopreservation
- Understands the technique of Hybrid plant

Course Content

Unit 1: INTRODUCTION AND LABORATORY ORGANIZATION

1.1 Definition, Origin and History of plant tissue culture
1.2 Laboratory organization (washing area, transfer area, culture area, green house)
1.3 Instruments (autoclave, laminar air flow, pH meter, oven, distillation unit)
1.4 Application of plant tissue culture

Unit 2: TECHNIQUES IN PLANT TISSUE CULTURE

2.1 Sterilization techniques
2.2 Media composition and preparation
2.3 Roles of various plant growth regulators (PGRs)
2.4 Inoculation of the explants

Unit 3: TYPES OF CULTURES

3.1 Organ and Callus culture
3.2 Cell and protoplast culture
3.3 Meristem Culture
3.4 Micro propagation

Unit 4: BIOTECHNOLOGY

4.1 Plant regeneration, Somatic embryogenesis
4.2 Germplasm and Cryopreservation
4.3 Synthetic seed
4.4 Distant hybridization

Mode of Transaction:

- Lectures; Demonstration of Experiments in Life Science Laboratory; Educational Videos.

Suggested Activities:

- Collection of Plant Samples for in vitro culture using different explants, explant sterilization methods, Inoculation and multiplication of culture plants, Hardening of plants.

Semester-5

Environmental Science and Climate Change

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands core concepts and methods from ecological and physical sciences and their application in environmental problem-solving.
- Appreciates that one can apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.'
- Understands the global environment threats and will start thinking in the direction to resolve the
- Knows the key concept of waste and its management

Course Content:

Unit 1: THE BIOSPHERE

1.1 Ecosystems: Types and Structure
1.2 Biomes: Introduction and the types of Biomes, Characteristic features of biomes
1.3 Biodiversity
1.4 Carbon Cycle, Nitrogen Cycle, Phosphorus Cycle, Sulphur Cycle

Unit 2: CLIMATE CHANGE

2.1 Greenhouse effect
2.2 Global Warming
2.3 Acid rain
2.4 Ozone depletion
2.5 Climate Change

Unit 3: ENVIRONMENTAL ISSUES

3.1 Carbon Sequestration and Carbon credit
3.2 Deforestation
3.3 Global atmospheric composition
3.4 Greenhouse gases and aerosols
3.5 Desertification
3.6 Biodiversity loss

Unit 4: CONSEQUENCES OF CLIMATE CHANGE

4.1 Impact of Climate change on Agriculture
4.2 Impact of Climate change on Indian Forest Ecosystem
4.3 Impact of Climate change on Marine Flora
4.4 Impact of Climate change on Major grassland of India
4.5 Remote sensing: Application and process

Mode of Transaction:

- Lectures; Demonstration of Experiments in Life Science Laboratory; Educational Videos.

Suggested Activities:

- Educational Institute and Industrial visit. National park and Sanctuary Visit

Semester-5

Laboratory Experiments in Botany 6

Compulsory
Credit: 02
Marks:50

SUGGESTED EXPERIMENTS

PLANT TISSUE CULTURE AND PLANT BIOTECHNOLOGY

- To study the lab instruments used for tissue culture.
- Preparation of Artificial seed and their germination.
- To study a protocol for Preparation of Stock Solution
- To study a protocol Preparation of M.S. Media.
- To study Inoculation of various explant.
- To study protocol of hardening in tissue culture using any cultured plant.
- To study protocol of direct organogenesis using appropriate explants.
- To study protocol of indirect organogenesis using appropriate explants.
- To study protocol of pollen culture.
- To study protocol of Banana tissue culture.

ENVIRONMENT SCIENCE AND CLIMATE CHANGE

- To study types of Biomes.
- To study structure and types of Ecosystem.
- To study Carbon Cycle through chart.
- To study Nitrogen Cycle through chart.
- To study Phosphorus Cycle through chart.
- To study Sulphur Cycle through chart.
- To study population dynamics
- To study impact of various pollution on seed germination
- To study the types of waste and waste management
- Phytoremediation through Plants
- To study Ecosystem change on marine flora by remote sensing

PHYSICS

Semester-5

Solid State Physics

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands the basic principles of crystallography, including crystal systems, lattice structures, unit cells, and crystallographic notation.
- Learns about the various symmetry operations and symmetry elements in crystals, which are essential for describing their properties.
- Explores the concept of reciprocal space, which is crucial for understanding diffraction patterns and the relationship between real and reciprocal lattices.
- Understands the seven Bravais lattices and how they are related to different crystal structures.
- Understands the electrical properties of solids, including electrical conductivity in metals, semiconductors, and insulators.
- Learns about energy bands in solids, including the valence band, conduction band, and energy band gaps and understands the concept of electron and hole carriers.
- Understands the phenomenon of superconductivity and its applications in technology, including the BCS theory and critical temperature.
- Has a clear concept of dielectric materials and their applications in capacitors and insulators, including polarization and dielectric constants.

Course Content:

Unit 1: Crystal Structure

1.1 Amorphous and Crystalline Materials. Lattice Translation Vectors.

1.2 Lattice with a Basis – Central and Non-Central Elements. Unit Cell. Reciprocal Lattice. Types of Lattices, Miller Indices

1.3 Types of Bonds. Ionic Bond. Covalent Bond. Van der Waals Bond.

1.4 Diffraction of x-rays by Crystals. Bragg's Law

Unit 2: Elementary Lattice Dynamics

2.1 Lattice Vibrations and Phonons: - Linear Monoatomic and Diatomic Chains and Brillouin Zones

2.2 Acoustical and Optical Phonons.

2.3 Qualitative Description of the Phonon Spectrum in Solids.

2.4 Einstein and Debye Theories of Specific Heat of Solids and T^3 Law

Unit 3: Magnetic and Dielectric Properties of Matter

3.1 Dia-, Para-, Ferri- and Ferromagnetic Materials, Classical Langevin Theory of dia – and Paramagnetic Domains

3.2 Quantum Mechanical Treatment of Paramagnetism, Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains.

3.3 Discussion of B-H Curve. Hysteresis and Energy Loss, Polarization and Depolarization field

3.4 Dielectric constant, Electric Susceptibility, Polarizability, Electric Susceptibility and Classical Theory of Electric Polarizability, Clausius Mosotti Equation.

3.3 Discussion of B-H Curve. Hysteresis and Energy Loss, Polarization and Depolarization field

3.4 Dielectric constant, Electric Susceptibility, Polarizability, Electric Susceptibility and Classical Theory of Electric Polarizability, Clausius Mosotti Equation.

Unit 4: Electrical Properties and Superconductivity

4.1 Elementary Band Theory of Solids, Bloch Theorem. Kronig-Penney Model. Effective Mass of Electron. Concept of Holes

4.2 Band Gaps, Energy Band Diagram and Classification of Solids. Law of Mass Action. Insulators, and Semi conductors, Direct and Indirect Band Gap

4.3 Superconductivity, Properties of Superconducting State, Type I and type II Superconductors

4.4 BCS theory of superconductivity, Application of superconductors, related numerical

Mode of Transaction:

To create a comprehensive and effective learning experience for students pursuing Solid State Physics combination of methods mentioned below will be used

- Lectures: Classroom lectures using ICT tools to explains the theoretical concepts and principles of Solid State Physics.
- Using Laboratory Work: Practical laboratory sessions are essential for understanding experimental aspects of Solid State Physics, like crystal structures, electrical properties, etc.
- Assignments: By giving regular assignments and problem sets to allow students apply the theoretical concepts to solve problems related to Solid State Physics.
- Presentations: Students will be asked to give presentations on specific topics related to Solid State Physics, enhancing their communication and research skills.
- Computer Simulations: The use of computer simulations or software tools can aid in visualizing and understanding certain phenomena in Solid State Physics.
- Access to Online Resources: Such as e-books, videos, and educational websites, can supplement the learning process.

Suggested Activities:

- Hands-on activity helps them visualize and understand different crystal structures.
- Introduce students to computer simulations or software tools that simulate solid-state phenomena like crystal growth, lattice vibrations, or electronic band structures.
- Organize problem-solving sessions where students can work on complex problems related to Solid State Physics collaboratively. This fosters teamwork and critical thinking.
- Arrange visits to industries or research laboratories working on solid-state materials to expose students to real-world applications and career opportunities.
- Facilitate group discussions on challenging topics or recent research papers, encouraging students to exchange ideas and opinions.
- Encourage students to create do-it-yourself (DIY) demonstrations of solid-state phenomena, such as making simple electronic components.

Semester-5

Introduction to Nanoscience and Nanotechnology

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- understands the concept of the nanoscale and its difference from macroscopic and microscopic scales, thereby gaining basic knowledge of quantum mechanics, as it plays a crucial role in understanding nanoscale phenomena.
- Learns how the properties of materials change at the nanoscale, including size-dependent properties such as surface area, melting point, and optical properties.
- Understands various methods for synthesizing nanomaterials, such as bottom-up approaches (e.g., chemical vapour deposition) and top-down approaches (e.g., lithography).
- Becomes familiar with the techniques for characterizing nanomaterials, such as scanning electron microscopy (SEM), transmission electron microscopy (TEM), and atomic force microscopy (AFM).

Course Content:

Unit 1: Introduction to Nanoscience

1.1 Introduction, Definitions of nanomaterials, Brief history of Nanomaterials and challenges in Nanotechnology
1.2 Size effects, Classification of Nanomaterials
1.3 Various properties of nanomaterials and Applications

Unit 2: Synthesis of Nanomaterials

2.1 Bottom-up and Top-down approaches – Top-Down Processes (Physical Methods) - Ball milling, Lithography, Arc Discharge, LASER ablation
2.2 Bottom-Up Processes (Chemical Methods) - Homogenous Nucleation, Chemical Vapor Deposition (CVD), Molecular Beam Epitaxy (MBE), Sol-Gel, Hydrothermal growth, Microwave method.
2.3 Special Nanomaterials: Graphite, Diamond, Fullerenes, Graphene, Carbon Nanotubes – Structure, Types, Properties, Growth and Applications

Unit 3: Nanomaterial Characterization techniques and Application

3.1 X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM),
3.2 Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM)
3.3 Chemical Characterization: Optical Spectroscopy, Electron Spectroscopy
3.4 Photoluminescence (PL) Spectroscopy, Raman Spectroscopy, Photoelectron Spectroscopy (PES)

Unit 4: Applications of Nanomaterials

4.1 Electronic Applications, Optical Applications (nanophotonics), Energy Applications
4.2 Computing Applications, Nanomedicines, Agriculture & Food applications, Nanotechnology and Environment
4.3 Nanotribology: Nano Tribometer
4.4 Various nano-bio-sensors and application

Mode of Transaction:

- To Create a comprehensive and effective learning experience for students pursuing nanoscience and nanotechnology. ICT based learning, Using Laboratory work, Presentation, Assignment and Access to online resources.

Suggested Activities:-

- Topic related live demonstration in the classroom, ICT based Teaching – learning, Experiment work in Physics Lab

Semester-5

Atomic and Molecular Physics

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands the structure of atoms, including the nucleus, electrons, and energy levels, the atomic spectra, including the Bohr model, line spectra, and the quantization of energy levels.
- Analyses the hydrogen atom as a model system for understanding atomic physics, including the quantization of angular momentum and the energy levels.
- Comprehends the techniques of atomic spectroscopy, such as absorption and emission spectroscopy and their applications in identifying elements and studying atomic properties.
- Understands the infrared and Raman Spectra through classical and quantum theory and their potential applications.
- Learns about lasers, laser operation, and their applications in spectroscopy and quantum optics.

Course Content:

Unit 1: Models of the atom

1.1 Rutherford's nuclear atom model, alpha scattering experiment; Bohr's theory of hydrogen spectra; energy level diagram

1.2 Larmor's Theorem, Fine structures of the spectral lines, Sommerfeld's extension of the Bohr's theory

1.3 Stern-Gerlach experiment, Vector atom model, L-S and J-J coupling

1.4 Normal Zeeman effect, Anomalous Zeeman effect

Unit 2: Laser and X-Rays

2.1 Characteristics of laser light, absorption, Spontaneous emission, Stimulated emission, Metastable states,Pumping mechanisms

2.2 Theory of Laser Action, Einstein coefficients, Population inversion and light amplification

2.3 Essential components of laser, Types of Lasers, Construction and working of Ruby and He-Ne laser with energy level diagram, Applications of Lasers

2.4 X-rays: Continuous and characteristic X-rays, Mosley's law, Compton effect.

Unit 3: Pure Rotational and Rotational-Vibrational Spectra

3.1 Salient features of Rotational spectra, Diatomic Molecule as a rigid rotator

3.2 Explanation of rotational spectra, the non-rigid rotator, Isotope effect on rotational spectrum

3.3 Salient features of vibrational - Rotational spectra, Molecule as a harmonic oscillator, Molecule as anharmonic oscillator

3.4 Fine structure of Infrared bands: Molecule as vibrating rotator, Diatomic molecule as symmetric top

Unit 4: Electronic and Raman Spectra

4.1 Born-Oppenheimer approximation, vibrational coarse structure of electronic transition, progressions and sequences of vibrational bands

4.2 Franck-Condon principle, Rotational fine structure of electronic transition, band head information

4.3 Quantum and classical theory of Raman effect, Stokes and anti-Stokes lines

4.4 Vibrational Raman spectrum, Rotational Raman spectrum, selection rules

Mode of Transaction:

To create a comprehensive and effective learning experience for students pursuing this course, combination of methods mentioned below will be used

- Lectures: Classroom lectures using ICT tools to explain the theoretical concepts and principles of Atomic and Molecular Physics
- Using Laboratory Work: Practical laboratory sessions are essential for understanding experimental aspects of Atomic and Molecular Physics, like working of Laser etc.
- Assignments: By giving regular assignments and problem sets to allow students apply the theoretical concepts to solve problems related to Atomic and Molecular Physics
- Presentations: Students will be asked to give presentations on specific topics related to Atomic and Molecular Physics enhancing their communication and research skills.
- Computer Simulations: The use of computer simulations or software tools can aid in visualizing and understanding certain phenomena in Atomic and Molecular Physics.
- Access to Online Resources: Such as e-books, videos, and educational websites, can supplement the learning process.

Suggested Activities:

- Hands-on activity helps them visualize and understand different models of the atom.
- Introduce students to computer simulations or software tools that simulate the working of a laser
- Organize problem-solving sessions where students can work on complex problems related to Atomic and Molecular Physics collaboratively. This fosters teamwork and critical thinking.
- Arrange visits to industries or research laboratories to expose students to real-world applications and career opportunities.
- Facilitate group discussions on challenging topics or recent research papers, encouraging students to exchange ideas and opinions.
- Encourage students to create do-it-yourself (DIY) demonstrations of Atomic and Molecular Physics

Semester-5

Physics Practical V

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Uses various equipment to measure dielectric constant, magnetic susceptibility, Energy band gap etc.
- Uses the analytical techniques effectively and performs graphical analysis to the experimental data.
- Gains practical knowledge by applying the experimental methods to correlate with the theories of Physics.
- Applies scientific approaches to analyse different physical problems through brainstorming in a group of peers.

Course Content:

1. To determine value of dielectric constant at room temperature.
2. To study the temperature dependent of dielectric constant of given material.
3. To determine the temperature coefficient using Platinum resistance thermometer
4. To verify Stefan's law using electrical method
5. Study of semiconductors (Band gap, Carrier, Mobility)
6. To study the resistance temperature characteristics of Thermistor & Determine energy band gap of semiconductor material by Thermistor.
7. To study the X-ray Diffraction method (Theoretical)
8. To determine the value of Planck's constant
9. To study the behavior of ferromagnetic material.
10. To determine the magnetic susceptibility of magnetic material.

Mode of Transaction: ICT and Virtual lab learning, Physical experiments in laboratory

Suggested Activities: Group discussion and Presentation

Semester-5

Physics Practical VI

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Handles various optical instruments, including Hydrogen spectra, LASER Beam, Photoconductivity etc.
- Uses the analytical techniques effectively and perform graphical analysis to the experimental data.
- Gains practical knowledge by applying the experimental methods to correlate with the theories of Physics.

Course Content:

- To determine the birefringence of MICA using Babinet compensator
- To determine the absorption lines in a rotational spectrum of Iodine vapours and calculate Electronic Energy Gap and Vibrational Energies.
- To determine Cauchy's constant A and B using given formula and to find the wavelength of unknown line of a mercury spectrum.
- To determine the wavelength of a given source using Michelson interferometer.
- To determine the wavelength of a given source using Fabry Perot Etalon
- To study the Photoconductivity of CdS photo-resistor at constant irradiance and constant voltage
- To determine the wavelength of H-alpha emission line of Hydrogen atom.
- To find the Rydberg Constant using hydrogen tube.
- To setup the Millikan oil drop apparatus and determine the charge of an electron.
- To determine the wavelength of laser light.

Mode of Transaction: E-resources and ICT based learning,Physical experiments in laboratory

Suggested Activities: Group discussion, quiz and presentation

MATHEMATICS

Semester-5

Elementary Number Theory

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Finds GCD and LCM of an integers
- Verifies prime number using the Sieve of Eratosthenes
- Finds smallest solution of system of congruence equation using Chinese remainder theorem
- Evaluates the remainder using Fermat's and Euler's equation

Course Content:

Unit 1: Divisibility Theory

1.1 The division algorithm, Divisor, Remainder, Prime, Relatively prime
1.2 The greatest common divisor (G.C.D) and least common multiple (L.C.M)
1.3 The Euclidean algorithm (without proof)
1.4 The Diophantine Equation and its solution

Unit 2: Prime Numbers

2.1 Prime and composite numbers
2.2 The fundamental theorem of arithmetic (without proof)
2.3 Canonical form of a number
2.4 The Sieve of Eratosthenes

Unit 3: Theory of Congruence

3.1 Basic Concepts- definition, examples & Properties. CRS and RRS (Only definitions)
3.2 Linear congruence, solution of congruence equation
3.3 Special divisibility test
3.4 Chinese remainder theorem (without proof) and its examples

Unit 4: Euler's and Fermat's Theorem

4.1 Fermat's factorization method, Fermat's little theorem
4.2 Wilson theorem
4.3 Example based on Fermat's theorem and Wilson theorem
4.4 Euler's Phi-function and its formula, Euler's theorem (without proof) and only problems on Euler's theorem

Mode of Transaction: Lectures cum Discussion,Presentations,Assisgnments,Project

Suggested Activities:-

- Check any number that is prime or composite.
- Relation between different number theoretic functions.

Semester-5

Numerical Analysis

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Finds the roots of equation by various methods
- Evaluates the value of the function using different finite difference operator techniques.
- Evaluates the numerical integration by different techniques
- Develops the skills of comparing Numerical solution and exact solutions.

Course Content:

Unit 1: Solution of Nonlinear Equation

1.1 Algebraic and transcendental equation-method for finding roots of algebraic and transcendental equations, Bisection method
1.2 Secant method
1.3 Regula-Falsi method
1.4 Newton-Raphson method

Unit 2: Numerical Integration

2.1 Newton-Cotes formula
2.2 Trapezoidal and Simpson's formulae
2.3 Error formulae
2.4 Gaussian quadrature formulae

Mode of Transaction: Lectures cum Discussion,Presentations,Assisgnments,Project

Suggested Activities:-

- Solution of various nonlinear equations and numerical integration.

Semester-5

Metric Space

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Knows partially ordered sets.
- Solves the examples related to metric space.
- Knows the concept of continuity in metric space.
- Evaluates compact and connected sets of metric space.

Course Content:

Unit 1: Metric

1.1 Concept of function
1.2 Definition and examples of metric
1.3 Inner product and Inner product space
1.4 Norm on a vector space

Unit 2: Metric Space

2.1 Definition of metric space, Examples
2.2 Open sphere, open set, closed set, Examples
2.3 Closure of a set in a metric space and its properties
2.4 Interior of a set in a metric space and its properties

Unit 3: Continuous Function

3.1 Definition and examples of continuous function
3.2 Results on continuity
3.3 Space of continuous functions

Unit 4: Compact and Connected Metric space

4.1 Compact metric space
4.2 Results on compact metric spaces
4.3 Connected metric space
4.4 Results on connected metric spaces

Mode of Transaction: Lectures,Discussion,Presentations,Assisgnments,Project

Suggested Activities:-

- Application of Metric space to real world

Semester-5

Operations Research

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Knows the concept of convex sets.
- Evaluates the LPP using Simplex, Big-M method.
- Finds a solution of Assignment problem using various methods.
- Finds solutions to transportation problems using various methods.

Course Content:

Unit 1: Convex Set and LPP

1.1 Convex Set, Extreme points of a convex set, Convex combination
1.2 Examples of convex sets, Theorems on convex sets
1.3 Introduction to LPP, Formulation of LPP problems
1.4 Solution of LPP using graphical method

Unit 2: Solution of LPP

2.1 Solution of LPP using simplex method
2.2 Big M method
2.3 Two-phase method

Unit 3 : Duality and Dual Simplex method

3.1 Introduction, Definition of the dual problem, General rule of converting primal into its dual
3.2 How to interpret the solution of the dual from its primal and vice versa
3.3 Comparison of the solution of the primal and its dual
3.4 Dual simplex Method

Unit 4: Transportation and Assignment Problems

4.1 Introduction, Mathematical formulation of transportation problem, Methods of finding initial basic feasible solution : North West Corner Method (N-W Corner Method)
4.2 Row Minima Method, Column Minima Method, Matrix Minima Method (Least Cost Entry Method), Vogel's Approximation Method (VAM)
4.3 Modified distribution (MODI) method for finding optimum solution of transportation Problem, Unbalanced TP, Degenerate TP, Introduction of assignment problems
4.4 Hungarian method for solving assignment problem

Mode of Transaction: Lectures,Discussion,Presentations,Assisgnments,Project

Suggested Activities:-

- Application of Operations research to real world problems

Semester-5

LaTeX Programming

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands the concept of LaTeX.
- Develops the skills of obtaining various output through LaTeX.
- Acquires Knowledge of LaTeX.
- Applies the knowledge of LaTeX for any type setting problem.

Course Content:

Unit 1:

1.1 Basic Elements of LaTeX: Basic Concepts-Input files, Standard characters, control sequence, components in LaTeX

1.2 Basic Elements- Font Size, Margin, Line Spacing, Section, Subsection, Paragraph, Font Style

1.3 Practical Based on: Producing simple documents- Letter, Article, Resume, Report, Book by observing various effects and using different environments & packages

1.4 Practical Based on: Producing mathematical document which represent formulas & theorems by observing various effects and using different environments & packages

Unit 2:

2.1 Text formatting and graphics in LaTeX: Text formatting- basic programming for simple documents: Letter, Article, Resume, Report, etc.

2.2 Mathematical document- Formulas, Theorems, Various environments & packages
Graphics- slide class & beamer class documents, Picture environment

2.3 Practical: Based on
Producing slides and graphical documents by observing various effects and using different environ ments & packages

Mode of Transaction: Programming, Documents, Research paper, Book writing,Assignments

Suggested Activities:-

- Write scientific documents through LaTeX programming

SEMESTER VI

Semester - VI

			Total papers	Hours	Credit	Internal	External	Total
Ability Enhancement and Value added Courses		Theory	1	30	2	15	35	50
Education	Education	Theory	3	120	8	60	140	200
	School Internship	Practical	1	60	2	50	0	50
Science	Principal	Theory	1	60	4	30	70	100
		Practical	2	120	4	30	70	100
		Total	**8**	**390**	**20**	**185**	**315**	**500**

Sr. No.	Subject	Title	Type	Nature of Paper	Hours	Credit	Internal	External	Total
1	Ability Enhancement and Value added Courses	Mathematics and Quantitative Reasoning	Theory	Compulsory	30	2	15	35	50
2	Education	Assessment and Evaluation	Theory	Compulsory	30	2	15	35	50
3	Education	Inclusive Education	Theory	Compulsory	30	2	15	35	50
4	Education	Advance Pedagogy	Theory	Compulsory	60	4	30	70	100
5	Education	Internship in Teaching I	Practical	Compulsory	60	2	50	0	50
6	Chemistry	Advanced Organic Chemistry	Theory	Compulsory	60	4	30	70	100
7	Chemistry	Chemistry Practical VII	Practical	Compulsory	60	2	15	35	50
8	Chemistry	Chemistry Project	Practical	Compulsory	60	2	15	35	50
9	Botany	Genetics & Molecular Biology	Theory	Compulsory	60	4	30	70	100
10	Botany	Laboratory Experiments in Botany VII	Practical	Compulsory	60	2	15	35	50
11	Botany	Life science Project	Practical	Compulsory	60	2	15	35	50
12	Physics	Mathematical and Quantum Physics	Theory	Compulsory	60	4	30	70	100
13	Physics	Physics Practical VI	Practical	Compulsory	60	2	15	35	50
14	Physics	Physics Project	Practical	Compulsory	60	2	15	35	50
15	Mathematics	Complex Analysis	Theory	Compulsory	60	4	30	70	100
16	Mathematics	Geometrical Approach in Mathematics	Practical	Compulsory	60	2	15	35	50
17	Mathematics	Mathematics Project	Practical	Compulsory	60	2	15	35	50

Semester-6

Mathematics and Quantitative Reasoning

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands basic problems in MQR problem.
- Develops the skills of solving problems.
- Acquires the Knowledge of mathematical skills to solve problems.
- Applies the knowledge of mathematical skills to solve various logical problems.

Unit 1: Mental ability skills

1.1 Analogy, classification, coding-decoding, distance & direction problems, Blood relations, puzzles

1.2 Alphabet problems, age problems.

1.3 Number, ranking, time sequence, mathematical operations, inserting or missing character, arithmetical reasoning.

1.4 Data interpretation, decision making , situation reaction problems, assentation and reason problems , cause and effect problems.

Unit 2: Reasoning Skills

2.1 Logical reasoning: statement- arguments, statement- assumption, statement-conclusion

2.2 Theme detection, Question- statement.

2.3 Nonverbal reasoning: Series, analytical reasoning, mirror images, water images, figure matrix, paper folding, paper cutting, Embedded figures , dot situation.

2.4 Verbal reasoning: series completion, logical sequence of words, pattern finding, verification of truth, character puzzle, data sufficiency, seating arrangement.

Mode of Transaction:

- Lecture , Audio – Visual Aids

Semester-6

Assessment and Evaluation

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands concept of assessment and evaluation
- Understands and differentiate tools of assessment and evaluation
- Understands about elementary statistics in evaluation
- Develops ability to critically review current trends in evaluation

Unit 1: Assessment & Evaluation

1.1 Meaning of Testing, Measurement, Assessment and Evaluation
1.2 Steps of Evaluation Process, Principles of Evaluation, Importance of Evaluation
1.3 Meaning of assessment of learning, assessment for learning and assessment as learning
1.4 Formative, Summative, Continuous and Comprehensive Evaluation

Unit 2: Tools of Assessment and Evaluation

2.1 Types of Examination: Written, Oral and Performance base
2.2 Preparation of Blue Print based Question Paper and Characteristics of Ideal Question Paper
2.3 Techniques of Assessment (Concept, Merit & Demerit) Observation, Interview, self-assessment, peer-assessment and Sociometry
2.4 Tools of Assessment (Concept, Merit & Demerit) Questionnaire, Checklist, Scales, Anecdotal Records, Achievement test, Diagnostic Test and Psychological Test

Unit 3: Elementary Statistics

3.1 Nature of Data: Grouped and ungrouped, Frequency distribution
3.2 Measure of central tendency: Mean , Median and Mode
3.3 Measure of dispersion: Average Deviation, Standard Deviation
3.4 Concept of correlation, Spearman's Rank Difference Correlation, Percentile and Percentile Rank

Unit 4: Current Trends in Evaluation

4.1 Examination Reforms- Scrapping of CCE by CBSE, Choice Based Credit System
4.2 Uniform system of Assessment, Standardized testing- ASSET and Olympiad
4.3 On-Line Examination and Open-Book Examination: Concept, need, benefit
4.4 Grade and Grading System: Meaning, Types (Absolute and Comparative or Relative Grading), Merits and limitations

Mode of Transaction:

- Lecture cum Discussion,
- Field trip
- Assignment
- Project

Suggested Activities:

- Analysis of result of school students
- Study trends in evaluation at school level
- Developing question paper for school subject
- Developing any suitable tool for measuring qualities of students
- Internal Assessment: Marks:

Semester-6

Inclusive Education

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands the concept of Inclusive Education
- Develops sensitivity about the various Disabilities
- Understands the instructional strategies for inclusion of disabled child
- Develops knowledge about policies and provissions of inclusive Education

Unit 1: Introduction to Inclusive Education

1.1 Inclusive Education: Concept, Scope and Target Groups (Diverse learner, Learners with Disabilities, Marginalized Group, and Socio-Economic Disadvantaged Group
1.2 Concept of Segregation Integration and Inclusion and Connotation of Inclusion in Indian Knowledge Tradition
1.3 Concept of Impairment, Disability and Handicapped
1.4 Principles of Inclusive Education: Access, Equity, Relevance, Participation & Empowerment

Unit 2: Introduction to Disabilities

2.1 Introduction of disabilties as per RPWD Act-2016
2.2 Concept and Characteristics of V.I and H.I
2.3 Concept and Characteristics of ID and ASD
2.4 Concept and Characteristics of SLD (Dyslexia, Dyscalculia & Dysgraphia)

Unit 3: Teaching in Inclusive Classroom

3.1 Meaning & Concept of Adaptation, Accomodation and Modification
3.2 Concept and Principles of Universal Design for Learning
3.3 Assistive and Adaptive Technology for Diverse learners
3.4 Differentiated Instruction for Diverse learners

Unit 4: Provisions and Policies for Inclusive Education

4.1 Rehabilitation Council of India 1992
4.2 Rights of Person with Disabilities Act 2016
4.3 Contribution of NGO, Govt and Semi Government Bodies
4.4 Provisions for Concession and Benefits by State & Central Govt.

Mode of Transaction:

- Lecture cum Discussion, Field trip, Project & Case studies, Assignment, Practical work

Suggested Activities:

- Group discussions following videos and visits.
- Debate for Inclusion vs. Segregation &
- Self study for legislations and frameworks

Semester-6

Advance Pedagogy

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands the concept of advanced pedagogy
- Understands the concept and need of different advanced pedagogies
- Use rubrics, portfolios as an assessment tool
- Understands use of remedial measures

Unit 1: Introduction to Advance Pedagogy

1.1 Advanced Pedagogy: Concept, Need, and Importance
1.2 Principles of Advance Pedagogy
1.3 STEAM (Science, Technology, Engineering, Arts, Maths) learning: Concept, Need and Importance
1.4 Experiential learning and Project-based learning, Critical Thinking, Problem Solving

Unit 2: Advance Pedagogy-1

2.1 Constructivist Approach: Concept, Principles and Role of Teacher
2.2 5E Model: Steps and Role of Teacher
2.3 Concept Mapping: Concept, Types, Importance and Role of Teacher
2.4 Reflective Learning: Concept, Gibb's Cycle and Role of Teacher

Unit 3: Advance Pedagogy- 2

3.1 Cooperative Learning: Concept, Strategies and Role of Teacher
3.2 Collaborative Learning: Concept, Strategies and Role of Teacher
3.3 Techno Pedagogy: Concept, Skills and Role of teacher
3.4 Integrated Pedagogy: Concept, Role of Teacher

Unit 4: Assessment and Evaluation

4.1 Rubrics: Concept, Types, Development and its effective use
4.2 Portfolio: Concept, Types, Development and its effective use
4.3 Diagnosis and Remedial measures , Action Research
4.4 Modern tools and techniques for formative assessment

Mode of Transaction: Lecture cum discussion, Experiential Learning, self- study, Visits to language teaching institutes, presentations in seminar and group discussions, Penal Discussion, Project Method

Suggested Activities: Preparation two lessons using advance pedagogy

Semester-6

Internship in Teaching I

Compulsary
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Defines clearly the general objectives and specific objectives
- Selects unit and subject matter suitable to the class and resource material and aids suitable to the units
- Plans the lesson effectively with an understanding of the principles of learning and organise the subject matter suitably indicating the appropriate techniques and aids to be used
- Motivates the pupils sufficiently and sustain their interest as well as maintain discipline in the class
- Adjusts the teaching method to the varying needs interests and abilities of the pupil, while making for maximum group progress.
- Use of different methods and techniques effectively in appropriate situations.

Course Content:

Duration: 2 Weeks

Number of Schools for Internship: Minimum two different kind of Schools

Number of prospective teachers per school: Maximum 8 to 12 for Stray lessons

Activities:

- Stray lessons- 5 in each Method, Total 10 lessons

Internal Assessment:

No	Activity	Marks
1	5 Lessons in Method 1 and 10 Observations	20
2	5 Lessons in Method 2 and 10 Observations	20
3	Reflective Diary	10
	Total	**50**

CHEMISTRY

Semester-6

Advanced Organic Chemistry

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Develops an understanding of reagents.
- Gains knowledge of name reactions.
- Understands the chemistry of photochemical reactions.
- Grasps the chemistry of spectroscopy.

Course Content: -

Unit 1: Name reactions

1.1 Aldol condensation and Cross Aldol condensation
1.2 Cannizzaro reaction
1.3 Wolff-Kishner reduction
1.4 Wittig Reaction
1.5 Clemmensen reduction
1.6 Michael addition
1.7 Diels-alder reaction

Unit 2: Reagents in organic synthesis

2.1 Introduction
2.2 $NaBH_4$
2.3 $LiAlH_4$
2.4 DIBAL-H
2.5 MnO_2
2.6 Grignard reagent
2.7 Sodium periodide

Unit 3: Photochemistry

3.1 Difference between thermal and photochemical processes
3.2 Laws of photochemistry: Grothus- Draper's law, Stark Einstein's Law
3.3 Jablonski diagram depicting various processes occurring in the excited state
3.4 Fluorescence, phosphorescence
3.5 Norrish type I reaction, Norrish type II reaction
3.6 Application of Photochemistry

Unit 4: Basics of spectroscopy

4.1 Electromagnetic radiation, electromagnetic spectra
4.2 Energy levels in molecule
4.3 Classification of spectroscopic techniques
4.4 Rotational, Vibrational and Electronic transitions
4.5 Photoelectric effect
4.6 Born-Oppenheimer approximation
4.7 Absorption and emission spectra, Instrumentation and various Components

Mode of Transaction:

- PPT, Video lectures, Chalk & talk

Suggested Activities:

- Group discussion, Hands on training

Semester-6

Chemistry Practical VII

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands organic qualitative analysis.
- Acquires knowledge of handling various glassware and chemicals.

Course Content:

Practical 1: Organic Synthesis: (Minimum : 8)

1. Dibenzal acetone
2. Yara yara
3. Benzotriazole
4. 2,3 Diphenyl quinoxalines
5. 6-methyl-4-oxo-1,2,3,4-tetrahydro-2-thiopyrimidine
6. Phthalimide
7. Benzilic acid
8. Methyl orange
9. Orange-II
10. Methyl Red
11. 1-phenylazo-2 Naphthol
12. Chrysoidine
13. Diazoaminobenzene

Mode of Transaction:

- Chalk and Talk, Power Point Presentation

Suggested Activities:

- Group discussion, practical activities

Semester-6

Chemistry Project

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Becomes aware of current developments in chemistry.
- Understands the systematic approach to conducting literature surveys on assigned topics.
- Develops skills for planning and executing research or project work.
- Acquires the ability to manage laboratory work, including synthesis, characterization, data analysis, and applications.

Course Content: -

- Topic selection
- Literature work
- Data collection
- Analysis
- Conclusion

Mode of Transaction:

- Presentations

Suggested Activities:

- Group Discussion

BOTANY

Semester-6

Genetics and Molecular Biology

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Defines the terminologies of Genetics and evolution
- Studies of Classical Genetics
- Defines the science of molecular biology and related topics such as biotechnology Describe cell components and cell molecules
- Describes DNA and RNA structure and their properties

Course Content:

Unit 1: Classical Genetics

1.1 Historical Background of Genetics and Contribution of Gregor Johann Mendel
1.2 Monohybrid crosses: Law of Dominance and Law of Segregation
1.3 Dihybrid crosses and Law of Independent assortment
1.4 Modified Mendelian Ratios: Lethal Genes; Co- dominance, Incomplete dominance
1.5 Complimentary and Supplementary genes

Unit 2: HEREDITY

2.1 Cytoplasmic Inheritance: Shell Coiling in Snail, Kappa particles in Paramecium, Leaf variegation in *Mirabilis jalapa*, Male sterility
2.2 Multiple Allelism
2.3 Epistatsis : Dominant and Recessive Epistasis
2.4 Chromosomal theory of Inheritance

Unit 3: NUCLEIC ACIDS AND REPLICATION

3.1 Physical and Chemical properties of Nucleic Acids
3.2 Nucleic Acid is the universal genetic material: Experiments of Griffith, Avery *et al*, Hershey & Chase and Heinz Fraenkel-Conrat
3.3 DNA Replication is a Semi Conservative Process: Experiment of Meselson & Stahl
3.4 Role of various enzymes in DNA replication

Unit 4: BIOSYNTHESIS OF PROTEIN

4.1 Transcription
4.2 Post transcriptional modifications
4.3 Genetic code and Ribosome
4.4 Translation
4.5 Post translational modifications

Mode of Transaction:

- Lectures; Demonstration of Experiments in Life Science Laboratory; Educational Videos. Emphasis will be given to systematic designing of experiments in the laboratory sessions.

Suggested Activities:

- Chart and models of Genetics and Evolution, Genetic problems

Semester-6

Laboratory Experiments in Botany VII

Compulsory
Credit: 02
Marks:50

SUGGESTED EXPERIMENTS

- Genetics problems related to law of Dominance.
- Genetic problems related to law of segregation.
- Genetic problems related to law of Independent Assortment.
- Genetic problems of Incomplete Dominance.
- Genetic problems of Co-dominance.
- Genetic problems of Multiple alleles.
- Genetic Problems of Supplementary gene.
- Genetic problems of Complementary Gene.
- To extract DNA from different fruits.
- To study DNA replication in prokaryotes through chart and models.
- To study Transcription in prokaryotes through chart and models.
- To study Genetic code.
- To study central dogma of molecular biology.

Semester-6

Life Science Project

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Develops and evaluate the working skills of a student through applications of knowledge of botany gathered throughout the B Sc B Ed course by assigning individual projects to them.
- Learns how to write research paper/article.
- Carries out the Project work in botany
- studies of Results and Discussion coming out from Project work in botany.

Course Content:

Project Guidelines:

- The department will assign project topics and student has to work under allotted project supervisor for the project. After required literature survey, the student will formulate the methodology required for the project. At the end of the semester, the student has to submit project report and give a presentation and viva-voce.

Mode of Transaction:

- To Create a comprehensive and effective learning experience for students pursuing Dissertation work. ICT based learning, Using Laboratory work, Presentation, Assignment and Access to online resources.

Suggested Activities:-

- ICT based Research activities, Experiment work in Botany Lab, Field work, Research institute visit

PHYSICS

Semester-6

Mathematical and Quantum Physics

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- understands the various mathematical techniques necessary for solving physical problems like matrices, differential equations, Special Functions and Fourier series
- understands the development of quantum mechanics and the differences between classical and quantum mechanics.
- learns about the central concepts and principles in quantum mechanics, such the wave function, Schrodinger equation, operators and different applications of quantum mechanics to physical systems

Course Content:

Unit 1: Matrix and Differential Equation

1.1 Types of Matrices, Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix. Hermitian and Skew-Hermitian Matrices. Singular and Non-Singular matrices. Orthogonal and Unitary Matrices. Trace of a Matrix.

1.2 Finding Eigen values and Eigen vectors of a Matrix, Diagonalization of Matrices, Cayley-Hamilton Theorem, Finding inverse of a matrix using Cayley-Hamilton Theorem, Rank of a matrix

1.3 Solving First Order Differential equations through separation of variables, homogeneous, non-homogeneous, exact differential equations and Integrating Factor.

1.4 Solving Second Order Differential equations with constant coefficients. Solution of one dimensional wave equation and Heat equation.

Unit 2: Fourier series, Laplace Transform and Special functions

2.1 Periodic functions, Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients, Even and odd functions and their Fourier expansions. Applications

2.2 Legendre and Bessel Differential Equation, Rodrigue's Formula, Generating Function,Recurrence relations

2.3 Laplace Transform of Elementary functions. Properties of Laplace Transforms, Change of Scale Theorem, Shifting Theorem, Laplace Transforms of 1^{st} and 2^{nd} order Derivatives and Integrals of Functions, Derivatives and Integrals of Laplace Transforms

2.4 Beta and Gamma Functions and Relation between them, Expression of Integrals in terms of Gamma Functions.

Unit 3: Wave Function and Operators

3.1 Wave function and its probabilistic interpretation as probability amplitude;Continuity equation, probability density and probability current density J; Normalisation condition and normalised wave function; properties of well behaved wave function in quantum mechanics

3.2 Wave packets, Superposition of waves, phase velocity and group velocity and their relation.

3.3 Introduction to operator formalism, Dynamical variable as operator (position, momentum and Hamiltonian)

3.4 Eigen values and eigen function; Expectation value, Ehrenfest's theorem.

Unit 4: Schroedinger Equation

4.1 Schrodinger wave equation – (i) time dependent and (ii) time independent.Correspondence Principle.

4.2 Application of Schrodinger's wave equation –(i) one dimensional step potential (ii) one dimensional potential barrier,

4.3 Reflection and transmission coefficients and tunneling effect, a particle in a one dimensional potential well of infinite depth

Mode of Transaction:

To create a comprehensive and effective learning experience for students pursuing this course, combination of methods mentioned below will be used

- Lectures: Classroom lectures using ICT tools to explain the theoretical concepts and principles of Mathematical and Quantum Physics
- Assignments: By giving regular assignments and problem sets to allow students apply the theoretical concepts to solve problems related to Mathematical and Quantum Physics
- Presentations: Students will be asked to give presentations on specific topics related to Mathematical and Quantum Physics enhancing their communication and research skills.
- Computer Simulations: The use of computer simulations or software tools can aid in visualizing and understanding certain phenomena in Mathematical and Quantum Physics
- Access to Online Resources: Such as e-books, videos, and educational websites, can supplement the learning process.

Suggested Activities:

- Introduce students to computer simulations or software tools that are helpful to understand the concepts of Mathematical and Quantum Physics.
- Organize problem-solving sessions where students can work on complex problems related to Mathematical and Quantum Physics collaboratively. This fosters teamwork and critical thinking.
- Arrange visits to industries or research laboratories to expose students to real-world applications and career opportunities.
- Facilitate group discussions on challenging topics or recent research papers, encouraging students to exchange ideas and opinions.
- Encourage students to create do-it-yourself (DIY) demonstrations of Mathematical Models and Quantum mechanics

Semester-6

Physics Practical VII

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Learns about the basics of various computer programming features including Linux, C- language and related software.
- Uses the analytical techniques effectively and performs graphical analysis to the experimental data.
- Gains practical knowledge by applying the experimental methods to correlate with the theories of Physics.
- Solves mathematical equations through computer programming.
- Learns the useful computational techniques to find out solutions to those complicated physical problems where analytic solutions are not obtainable

Course Content:

1. Solve the mathematical problem using computer programming
2. Solve the mathematical function using computer programming
3. Solve the mathematical problem using software
4. To calculate / solve theoretical problems using software
5. To study the various scientific software for educational purpose
6. Solution of Algebraic and Transcendental equations by Bisection
7. Numerical differentiation (Forward and Backward difference formula) and Integration (Trapezoidal and Simpson rules), Monte Carlo method
8. Solution of Ordinary Differential Equations (ODE)

Mode of Transaction:

- ICT and Software based learning

Suggested Activities:

- Group discussion and Presentation

Semester-6

Physics Project

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Comprehends the fundamental physics concepts related to the project's topic, such as mechanics, electromagnetism, thermodynamics, optics, or quantum mechanics.
- Develops practical skills in setting up experiments, collecting data, and making measurements accurately.
- Learns how to analyse and interpret experimental data using statistical and mathematical tools, including graph, curve fitting, and error analysis.
- Evaluates experimental results, identifies sources of error, and makes conclusions based on evidence.
- Develops research skills by gathering information from scientific literature, textbooks, and online sources to support the project.

Course Content:

Unit 1: Introduction

1.1 The department will assign project topics and student has to work under allotted project supervisor for the project. After required literature survey, the student will formulate the methodology required for the project and develop a working model. At the end of the semester, the student has to submit project report and give a presentation and viva-voce.

Mode of Transaction:

- To Create a comprehensive and effective learning experience for students pursuing Dissertation work. ICT based learning, Using Laboratory work, Presentation, Assignment and Access to online resources.

Suggested Activities:-

- ICT based Research activities, Experiment work in Physics Lab, Field work, Research institute visit

MATHEMATICS

Semester-6

Complex Analysis

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Finds roots of a complex number.
- Verifies the Cauchy-Riemann condition.
- Knows exponential and logarithm function of a complex number.
- Evaluates bilinear Transformations of a complex function.

Course Content:

Unit 1: Complex Number

1.1 Sum and Products, Basic algebraic properties, Vectors and Moduli, Complex conjugate
1.2 Exponential Form, Products and Quotients in exponential forms
1.3 Roots of Complex Numbers
1.4 Regions in the complex plane

Unit 2: Analytic Function

2.1 Functions of complex variables, mappings, mappings by the exponential function
2.2 Theorems on limits, continuity, derivatives, differentiation formulas Cauchy-Riemann equations
2.3 sufficient condition for differentiability, polar coordinates
2.4 Analytic functions and harmonic functions, basic concepts of singularities

Unit 3: Elementary Function

3.1 Exponential function
3.2 Logarithmic function and derivatives of logarithms, some identities involving alogarithms, complex exponents
3.3 Trigonometric functions
3.4 Hyperbolic functions, inverse trigonometric and hyperbolic functions

Unit 4: Conformal Mapping

4.1 Bilinear map
4.2 The transformation W=1/Z
4.3 Conformal Mapping
4.4 Canonical forms of Bilinear map

Mode of Transaction: Lectures,Discussion,Presentations,Assisgnment,Project

Suggested Activities:-

- Application of Complex analysis to real world problems

Semester-6

Geometrical approach in Mathematics

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands and think subject with different aspect.
- Sees the interrelation between the subjects.
- Visualizes the subject using geometry and so clear the concept in depth.

Course Content:

Unit 1:

1.1 Overview of Geometry and other areas of undergraduate mathematics
1.2 Interrelation of the areas mentioned in 1.1
1.3 Linear Programming: a geometric approach,
maximization applications in business, economics, social and life sciences

Unit 2:

2.1 A geometric approach to functions: geometric transformations as a function, reflections, translations, rotations, dilations, and glide reflections
2.2 Linear algebra: a geometric approach
2.3 Applications of geometric approach to solve problems

Mode of Transaction: Lectures,Discussion,Presentations,Assisgnment,Project

Suggested Activities: Application to other branches of Mathematics and real world problem

Semester-6

Mathematics Project

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands various concepts of Mathematics which can be applicable to the assigned project.
- Develops the skills of Collection of the data and work in group.
- acquires the Knowledge of Mathematics applicability in different problem.
- Applies the Mathematics Application to the assigned project.

Course Content:

Unit 1:

1.1 Students will be assigned a topic in the area of Mathematics like, current developments in mathematics, applications of Mathematics, etc.

1.2 Students will have to carry out literature survey on the assigned topic

1.3 Students will have to write a report of assigned topic And Analyze the Applications of Mathematics.

1.4 Students will have to submit the project.

Mode of Transaction: Project, Field trip, Disccussion, Programming

Suggested Activities: Application of different problems to real world phenomenon

SEMESTER VII

Semester - VII

			Total papers	Hours	Credit	Internal	External	Total
Ability Enhancement and Value added Courses		Theory	3	90	6	45	105	150
		Practical	1	60	2	30	20	50
Education	Education	Theory	1	30	2	15	35	50
	School Internship	Practical	2	300	10	250	100	350
		Total	**7**	**480**	**20**	**340**	**260**	**600**

Sr. No.	Subject	Title	Type	Nature of Paper	Hours	Credit	Internal	External	Total
1	Ability Enhancement and Value added Courses	ICT in Education	Theory	Compulsory	30	2	15	35	50
2	Ability Enhancement and Value added Courses	Perspectives on School Leadership and Management	Theory	Compulsory	30	2	15	35	50
3	Ability Enhancement and Value added Courses	Sports, Nutritions and Fitness	Practical	Compulsory	60	2	30	20	50
4	Ability Enhancement and Value added Courses	Teacher and Society	Theory	Compulsory	30	2	15	35	50
5	Education	Curriculum Development Principles	Theory	Compulsory	30	2	15	35	50
6	Education	School based Research Project	Practical	Compulsory	60	2	50	0	50
7	Education	Internship in Teaching II	Practical	Compulsory	240	8	200	100	300

Semester-7

ICT in Education

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Comprehends the concept of ICT
- Appreciates and adopts the ethical use of ICT
- Integrates ICT in teaching, assessment and management.
- Develops and applies knowledge and skills for creating ICT enabled learning environment.

Unit 1: Introduction to ICT

1.1 Meaning, Principles and significance of ICT in Education
1.2 Historical Development of ICT in Education
1.3 Emerging Trends and Technologies for ICT in Education
1.4 Digital Literacy Skills and Ethical use of Technology

Unit 2: ICT Integration for teaching, assessment and administration

2.1 Theoretical Frameworks for ICT Integration:
- Framework, integration and application
- Technological Pedagogical and Content Knowledge (TPACK),
- Substitution, augmentation, modification, redefinition (SMAR)

2.2 ICT enabled teaching learning strategies:
- types, use of application software and online resources.

2.3 ICT enabled assessment:
- use of application software and online resources.
- Skills for managing assessment data: Data gathering, sorting, analysis and reporting

2.4 ICT medicated administrative support for students, teachers and functioning of schools.
- Maintenance of Institutional Records

Mode of Transaction:

- Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:

- Practical, hands-on experiences and real-world applications of ICT tools

Semester-7

Perspectives on School Leadership and Management

Compulsory
Credit: 02
Marks:50

Learning Outcomes:
Prospective teacher...

- Develops an understanding of educational management and organisation
- Develops ability to analyse structure and governance of school management and systems
- Acquaints with leadership styles and analyses various styles.
- Develops skills for planning and decision making for schools.

Unit 1: **Understanding Indian School System**

1.1 Concept of Educational Management, Educational Organisation and Educational Administration School diversity and the challenges for Educational Management and Administration

1.2 Meaning, Objectives and Basic Principles of School Organisation
Components and Functions of School Organisation

1.3 Forms of School Organisation Bureaucratic, Social and Complex System
Structure and governance of School Organisation w.r.t Management: Government, Private and Grant-in-Aid

1.4 Definition and scope of school management
Functions of school management: Financial management, human resource management, infrastructure management and time management

Unit-2: Educational Leadership and School Improvement

2.1 Definition and Scope of Educational Leadership,
Role of Principle as a school Leadership Styles w.r.t their relationship with the governance structures, autonomy and accountability mechanisms Democratic, Autocratic & Lassaize Fair, Transformational and Instructional

2.3 Planning for School Improvement
Data Informed decision making for school improvement, in terms of enhanced participation in school education and improved student learning outcomes

2.4 School Development Plan and Building Partnerships: Concept and process
Change management: Concept and strategies

Mode of Transaction:

- Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:-

- Case Study Analysis with real-life cases school leadership and management challenges.
- School Visit and Observation: to analyze the leadership and management practices
- Leadership Style Assessment: such as the Myers-Briggs Type Indicator (MBTI) or the Leadership Grid,
- Budgeting Exercise: by providing students with a fictional school budget \
- School Improvement Project: small group projects or teacher professional development.
- Leadership Portfolio Development: Create a leadership portfolio

Semester-7

Sports, Nutritions, and Fitness

Compulsory
Credit: 02
Marks:50

Learning Outcomes:
Prospective teacher...

- Familiarises with the fundamentals of Sports for holistic fitness.
- Applies the knowledge in assessment and planning fitness regimes.
- Acquires knowledge of nutrition, its components and energy requirements.
- Applies the knowledge of basic concepts on healthy nutrition in planning and assessing healthy life-styles.

Unit 1:
Section A: Fundamentals of Sports for Holistic Fitness

1.1 Concept of Sport, Nutrition and Fitness
Factors affecting health and wellness Physiological, psychological and social health
Interrelationship between sports, nutrition, and fitness in leading a healthy life
1.2 Holistic Fitness: Concept and Types (physical and psychological fitness)
Importance of balanced nutrition for fitness.
1.1 Fitness for life: Importance of exercise and sports in preventing life style diseases - Diabetes, CVD, hypertension, obesity and osteoporosis
1.4 Fitness Program Regime: Concept and plan
Factors affecting Adherence to fitness regime and Difficulties faced in adherence

Section B: Fundamentals of Nutrition for Holistic Fitness

2.1 Nutrition: concept of micro and macro nutrients, deficiency disease
2.2 Energy: Components of energy expenditure & Energy requirement
Analyse specific nutrient requirements for different age groups and use of nutrient supplement
Quality issues in nutrition and Energy imbalances
2.3 Effect of macro (carbohydrates, amino acids, EFA) and micronutrients (Vitamins & Minerals) on physical & mental fitness
2.4 Fitness Assessment:
Methods of assessing fitness and interpretation of results
Principles of exercise prescription for fitness and its application in designing exercise programs

Instructions for the Course:

- The paper is a practical paper with focus on workshop, discussion and activities. Section A & B comprises of theoretical base for developing the skills related to ideation and conceptualisation of sports, nutrition and fitness and related concepts for holistic fitness and wellness. The theoretical consideration mentioned in the paper are to support development of activities listed in section A & B.

Activity of Section A
The activity listed in Section A is an individual activity and is to be conducted on a selected sample for ex. Peers/parents/friends/students/teachers etc. The list is mere suggestions and new activities can be framed based on the practical applications of the sport, nutrition and fitness.

- Plan a Fitness Testing assessment schedule, such as cardiorespiratory endurance, muscular strength, and flexibility tests, and conduct it on at least 10 sample. Analyse and interpret the results and prepare a report.
- Meal Planning and Analysis: Select a meal of your choice: Hostel Meal/Canteen Meal/ home/restraint etc. Conduct the assessment of dietary nutrients and prepare a report with suggestions for balanced and holistic diet.

- Meal Planning and Analysis: Record your own diet for at least one week. Analyse your own dietary intake and create a balanced meal plan based on their specific nutritional needs for your age group.
- Hydration Monitoring: Record your own intake of hydrated fluid/water/cold drinks etc. for at least one week. Analyse its nutritive value and create a balanced plan based on their specific hydration needs for your age group.
- Designing Exercise Programs: Prepare an exercise program for your own self after conducting an assessment of your fitness on the basis of exercise prescription. Follow that plan for a week and list out the challenges faced in adherence to the planned prescription and how have you managed them.
- Ergogenic Aids Research Project: Select any specific ergogenic aid, such as creatinine or caffeine, and research on its effects on performance of an individual. Prepare a report.
- Any other topic of your choice that can help you identify and reflect upon the practical aspect of the course.

Activity of Section B

The activity listed in Section B is a group and project based learning activity. It is to be conducted on a selected sample for ex. Peers/parents/friends/students/teachers etc. The list is mere suggestions and new activities can be framed based on the practical applications of the sport, nutrition and fitness

- Sports Nutrition Workshop: Plan and Organize a workshop where students learn about the importance of proper nutrition for sports performance. They can create balanced meal plans and discuss the nutritional demands of different sports.
- Injury Prevention Workshop: Conduct a workshop on injury prevention techniques, including warm-up exercises, proper form, and safety precautions during physical activities and prepare a report.
- Sports Performance Analysis: Select the students from sports/NCC/NSS and conduct a small performance analysis in a specific sports activity. Interpret the data and provide feedback on techniques or strategies for improvement. Compare it with the students with little or no physical activity.
- Fitness Training Camp: Plan a fitness training camp for a week and conduct a training program for fitness. Analyse the fitness and endurance of the group before and after training.
- Identify the traditional methods of physical activity/sports/wellness/fitness etc. Prepare a research article on the same with recommendations to integrate it in present curriculum.
- Identify any dance forms/ traditional and religious festivals involving physical activities, dances, movements etc. Study/survey/research /assess their significance in maintaining the holistic fitness.
- Select indigenous and traditional food items/recipes/diets/ food specific to particular festival in particular season. Research the significance of the food item/ingredient/diet plan with relevance to the season/ association with the region and prepare a report.
- Conduct a survey on any topic of your choice related to sports, fitness and nutrition and prepare a report.
- Any other topic of your choice that can help you identify and reflect upon the practical aspect of the course.
- The student/student group is required to submit a detailed report may be in form of document /podcast, YouTube video, blog post, or any other suitable method.

Mode of Transaction:

- Workshop to describe the idea, concepts listed, selecting and planning the activities one each from Section A and B respectively and field work to complete the activity

Note:

1. Trainees will select one activity from each section for submission but for the better exposure for conceptual understanding maximum activities from each section must be carried out at institutional level
2. The practicum will be considered as completed on the basis of the submission document of the activities

Semester-7

Teacher and Society

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Acquaints with evolving roles of teachers in emerging Indian society.
- Appraises the role of the teacher to appreciate and evolve teacher identity.
- Familiarises with professional and social responsibilities of teacher.
- Reflects on the professional and social skills acquired during the course.

Unit 1 Evolution of role of teachers in classrooms as a miniature society

1.1 Society as system
- Concept of a system, society as a system and education as subsystem to society
- Concept of education and Education as a process of socialisation
- School as formal education system and miniature society
- Concept of School Complex

1.2 Evolving roles and responsibilities of Teacher
- Overview of transformation of classrooms due to changing societies.
- Changing roles from teacher centred to student centred classrooms
- Progression from teaching for transferring information to education for sustainbility

1.3 Role of teacher while teaching as a Manager
- Equipping with skills to face classrooms influenced by global flows of people, culture and resources
- Responding to learning needs of students from diverse cultural, linguistic, social and economic backgrounds,
- Addressing volatile, complex and ambiguous nature of society

1.4 Teacher as a social role model, guide and facilitator for:
- creating awareness about cultural ethos, traditions, and diversity,
- Imbibing values for fostering national integration.
- Sensitization towards gender issues, promote tolerance and social cohesion,

Unit-2: Teacher's Professional Ethics and Social Responsibilities

2.1 Teacher Profession and its Development
- Teaching as a profession and its characteristics
- Professional and Personal traits of teachers
- Integrated Personality of teacher

2.2 Teacher's responsibilities inside and outside the classroom:
- Engaging in professional organizations and networking,
- Contributing to educational research and development
- Maintaining confidentiality and professionalism

2.3 Upholding students' rights and well-being:
- Ensuring a safe and inclusive classroom environment,
- Addressing issues of bullying, violence, and discrimination
- Safeguarding mental health and spiritual well-being

2.4 Reflective practice and professional growth:
- Avoiding conflicts of interest in professional relationships
- Engaging in self-reflection for continuous improvement,
- Seeking feedback and implementing feedback for professional development

Mode of Transaction:

- Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:-

- Role-play and Community engagement project
- Case studies on role models
- Panel discussion and debates on evolving roles
- Research projects on the impact of teachers on society,
- Professional development workshops

Semester-7

Curriculum Development Principles

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Develops an understanding of basic concepts of curriculum development.
- Analyzes the different models and approaches to curriculum development.
- Acquaints themselves with foundations of curriculum development
- Develops an understanding of the process of curriculum development.

Unit 1: Curriculum Development

1.1 Curriculum Development: Concept and Principles
1.2 Sources of Curriculum Design: Science, Society, Knowledge and Learner
1.3 Dimensions of Curriculum Design: Scope, Integration, Sequence & Continuity
1.4 Difference: Curriculum Framework, Curriculum, Syllabus and Textbook

Unit 2: Curriculum Development and NCFSE 2023

1.1 Approaches to Curriculum: Subject Area, Broad Fields, Problem Centered & Learner Centered Approach
2.2 Determinants of Curriculum: Societal Diversity, Political and Economic factors, Professional organisations, Environment and Institutional Considerations
2.3 Curriculum Design in National Curriculum Framework for School Education 2023 for foundation, preparatory – Curricular Structure, Content, Pedagogy, Assessment, Classroom Arrangement & Teachers
2.4 Curriculum Design in National Curriculum Framework for School Education 2023 for middle and secondary stage – Curricular Structure, Content, Pedagogy, Assessment, Classroom Arrangement & Teachers

Unit 3: Foundations of Curriculum Development

3.1 Philosophical Foundations w.r.t curriculum: Idealism, Naturalism and Pragmatism
3.2 Psychological Foundations w.r.t behaviourism and cognitivism
3.3 Sociological Foundations w.r.t society, social change and schooling
3.4 Significance of foundations of curriculum development

Unit 4: Process of Curriculum Development

4.1 Aims to Learning Outcomes w.r.t. NCFSE 2023
The Learning Standards (Curricular Goals, Competencies and Learning Outcomes)
4.2 Selection of content, learning experiences Assessment Approaches (Formative and Summative Assessment)
4.3 Principles of textbook design and process of textbook development
4.4 Process of Feedback on curriculum

Mode of Transaction: Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:

- Evaluate curriculum of any standard of secondary level education
- Design draft curriculum by adopting any model or approach of curriculum
- Visit Gujarat State School Textbook Board (GSSTB) to understand process of textbook preparation
- Analysing school curriculum with reference to NEP 2020

Semester-7

School Based Research Project

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands the concept and steps of case study
- Understands the concept and steps of actions research
- Assesses effectiveness of remediation through action research
- Collects the information about the student through case study

Course Content:

- An orientation programme shall be arranged to explain the action research and case study.
- A prospective teacher should conduct one case study and one action research during the internship. He/She shall submit a detailed report of case study and action research at the end of the internship.

Mode Of Transaction: Orientation and Workshop

*Assessment based on the report & viva.

Internal Assessment:

No.	**Activity**	**Marks**
1	Case study	25
2	Action Research	25
	Total	**50**

Semester-7

Internship in Teaching II

Compulsary
Credit: 08
Marks:300

Learning Outcomes:

Prospective teacher...

- Defines clearly the general objectives and specific objectives
- Selects unit and subject matter suitable to the class and resource material and aids suitable to the units
- Plans the lesson effectively with an understanding of the principles of learning and organise the subject matter suitably indicating the appropriate techniques and aids to be used
- Motivates the pupils sufficiently and sustain their interest as well as maintain discipline in the class
- Adjusts the teaching method to the varying needs interests and abilities of the pupil, while making for maximum group progress.
- Uses different methods and techniques of teaching and use them effectively in appropriate situations.
- Develops and apply different techniques and tools for the continuous evaluation of the achievement and progress of the pupils, taken as individual and as a group, especially the ability to construct and use oral, written and performance tests.
- Develops the ability to diagnose the strengths and weakness and the achievements and failures of the individual pupils, in relation to the objectives and decide plan and organise the reinforcement of remedial assistance needed by each.
- Correlates his/her subject and its teaching with other subjects taught in the class, with other activities in the school life, so that, the education of the child becomes an integrated programme.
- Plans, organises and guide various co-curricular and curricular activities.
- Selects the educational film and to write a review of the selected film
- Writes the book review
- Reflects upon the school internship experiences
- Selects appropriate psychological tool and administer it on the group of the pupils to prepare the comprehensive report about the characteristics of the pupils

Course Content:

Duration: 8 Weeks

Number of Schools for Internship: Minimum two different kind of Schools

Number of prospective teachers per school: Maximum 8 to 12 for Unit lessons

Nomination of a mentor teacher (from school) **:** Role of a mentor teacher would be to share his/her professional experiences, present model lessons, assess prospective teachers' performance and provide onsite guidance and support during internship.

Identification of supervisors (Faculty member of the Institute): Each group will be allotted a supervisor. The faculty member who is performing the role of the supervisor shall be to coordinate with mentor teacher of the school, assess prospective teachers' performance and provide onsite guidance and support during internship. Stray lessons and Unit lessons shall be guided and supervised by the allotted supervisor. After the completion of the stray lessons and unit lessons the supervisor shall visit the school twice in a week.

Activities:

- Unit Planning and Lesson Plan Execution: 5 in each method (supervised)- **(50 Marks)**
- Classroom teaching in two school subjects assigned by school other than stray lessons and block teaching.- Minimum 20 lessons in each method under the guidance of mentor teacher. **(40 Marks) (Assessment by mentor Teacher)**

- Lesson observations of peers, mentor teacher and other teachers of the school (everyday minimum 1 observation)- (**20 Marks) (Assessment by mentor teacher)**
- Preparation of Blue Print based question paper with answer key in both method-(**30 Marks)**
- Preparation of diagnostic test and identifying learning difficulties-**(10 Marks)**
- Planning and Execution of remediation-(**10 Marks)**
- Organising all types of Curricular and co-curricular activities like sports and games, yoga, debate, cultural activities, paining, music, art etc.- (**10 Marks) (Assessment by mentor teacher)**
- Film review **-(5 Marks)**
- Book Review**-(5 Marks)**
- Writing a reflective Journal-**(10 Marks)**
- Administration of psychological test and preparation of report-**(10 Marks)**
- Institutional visit-**(10 Marks)**
- Studying documentation done at school in form of registers, records etc **(10 Marks) (assessment by mentor teacher)**

Internal Assessment: Marks:200
Assessment by Supervisor: 120 Marks
Assessment by Mentor Teacher: 80 Marks

External Assessment: Annual lessons in each Method of Teaching: 50+50=100 Marks

SEMESTER VIII

Semester - VIII

			Total papers	Hours	Credit	Internal	External	Total
Ability Enhancement and Value added Courses		Theory	2	60	4	30	70	100
Education	Education	Theory	2	90	6	45	105	150
		Theory+Practical	1	90	4	30	70	100
	School Internship	Practical	3	180	6	150	0	150
		Total	8	420	20	255	245	500

Sr. No.	Subject	Title	Type	Nature of Paper	Hours	Credit	Internal	Exter-nal	Total
1	Ability Enhancement and Value added Courses	Understanding Self	Theory	Compulsory	30	2	15	35	50
2	Ability Enhancement and Value added Courses	Citizenship Education, Sustainability and Environment Education	Theory	Compulsory	30	2	15	35	50
3	Education	Sociological Perspectives of Education	Theory	Compulsory	60	4	30	70	100
4	Education	Education Policy Analysis	Theory	Compulsory	30	2	15	35	50
5	Education	Adolescence Education/ Education for Mental Health/Guidance and Counselling/Gender Education/Human Rights Education/Peace Education/Health and Yoga Education/Tribal Education/Emerging Technologies in Education/Langauge across curriculum/ School Leadership and Management	Theory + Pracitcal	Optional	90	4	30	70	100
6	Education	Internship in Teaching III	Practical	Compulsory	60	2	50	0	50
7	Education	Community Engagement and Services	Practical	Compulsory	60	2	50	0	50
8	Education	Creating Teaching Learning Material	Practical	Compulsory	60	2	50	0	50

Semester-8

Understanding Self

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Appraises and develops viewpoints on self and its components.
- Appraises and embraces Indian concept of self and Panchkosh.
- Familiarises with the role of teacher in understanding and developing self of learner.
- Develops skills and attitude for handling stereotypes, prejudices and addressing challenges.

Unit-1: Perspectives on understanding self

1.1 Concept & Components of Self – Attitude, Beliefs, Values
Types of Self- Material Self, Social Self and Spiritual Self

1.2 Social Self and Cultural Self Concept and agencies shaping self
Self-identity concept and crisis for self-identity

1.3 Spiritual Self Concept of spiritual self, spiritualism Integral Humanity
Process of Self-awareness, self-observation, introspection and austerity-

1.4 Indian Concept of Self with reference to Satva, Rajas and Tamas Guna
Constituents of Panch Kosh & Concept of Sthitpragya

Unit-2: Role of Teacher in Developing Self and addressing challenges

2.1 Self , Self Esteem, Self-Image and concept of Integrated Approach to self
Characteristics of well-integrated self and Challenges for Understanding Self

2.2 Creating awareness about self and self-image
Skills for enhancing self – self-reflection, communication and self-expression, listening, acceptance of self, emotional resilience, mindfulness, yoga

2.3 Role of Media, and Challenges for Self-Identity: Selfies: Narcissism or Self Exploration; Celebrity culture and body image; Media's Externalization of Self-identity etc.
Role of Peers, Family and society in Identity formation.

2.4 Stereotypes and Prejudice: Concept and role of Gender, caste, language, religion etc. in shaping self
Schooling as a Process of Identity formation

Mode of Transaction:

- Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:

- Questionnaires on transactional analysis/self-esteem/beliefs or any other tool to understand and identify self and writing of self-reflective journal.
- Reflective Practices and discussions for self-evaluation/peers evaluation/prejudices/stereotypes etc. and write reflection reviews.
- Survey /Analysis of self: Measuring Self-esteem/self-concept/ and other domains related to helping understand the self for selected sample.
- Case Studies/Narrations/Reflections on one's own childhood and growing up/personal experiences/ social experiences etc.

Semester-8

Citizenship Education, Sustainability, and Environment Education

Compulsary
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Acquaints with roles and responsibilities of a citizen.
- Contemplates and sensitizes towards duties of citizenship and global citizenship.
- Appraises the requisites of providing environment education for sensitization towards sustainable growth.
- Reflects on the need for practicing and accomplishing sustainable development goals.

Unit-1 Introduction to Citizenship Education & Global Citizenship

1.1 Citizenship
- Concepts of citizen, citizenship and citizenship education
- Concept and aims of Global Citizenship and Global Citizenship Education

1.2 Citizenship and Indian Constitution
- Criteria for being a Citizens of India & Recognition of Community
- Directive Principles of State Policy, Rights, Franchise and Duties of Citizenship

1.3 Global Citizenship Education
- Concept and characteristics of global citizenship and global citizenship education
- Role of education in fostering global awareness, intercultural understanding and addressing global challenges

1.4 Themes and Approaches
- Themes for Global Citizenship Education
- Curriculum and Pedagogical Approaches for Global Citizenship Education

Unit-2: Environmental Education and Education for Sustainable Development

2.1 Environmental Education
- Concept of Environmental Education – Education for environment, about environment and through environment
- Scope of Environmental Education Biological, Physical and sociocultural aspects
- Environment, Environment Education and relationship between ecology, ecosystem and society

2.2 Education for Sustainable Development
- Concept and historical overview of Education for Sustainable Development
- From Environmental Education to Education for sustainable development & Interaction between society, economy and environmental sustainability

2.3 Sustainable development goals (SDGs)
- SDGs with special reference to SDG 4 - Quality Education for all
- Implementing SDG: Integrating SDGs into the curriculum and textbooks, classroom settings and teacher education

Mode of Transaction: Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:

- Workshops for SDG Targets
- Environment Drives for cleanliness, waste segregation, water conservation, etc.
- Audits and Impact Assessment Studies for institutions, cities, ecosystems etc.
- Field Trip for Sustainable Practices to eco-friendly institutions, sustainable development projects etc.
- Community Service Project with local NGOs or social organizations.

Semester-8

Sociological Perspectives of Education

Compulsory
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Familiarises with the important aspects of sociological perspectives of education.
- Develops an understanding of relationship between education and society.
- Critically appraises the socialisation process and its link with education
- Analyses and deliberates on the focus areas & trends of Indian education system.

Unit-1: Introduction to Sociology of Education

1.1 Meaning of sociology, education and sociology of education
- Nature and Scope of Sociology of Education

1.2 Understanding the relationship between education and society
- Meaning and Types of Society
- The impact of societal factors on educational outcomes

1.3 Educational institutions as social systems
- Functionalist perspective on education
- Conflict perspective on education

1.4 Education as Process of Societal Development and its impact on society
- Social Development
- Human Development
- Cultural Development

Unit-2: Education and Society

2.1 Social Change
- Meaning and Nature of social change
- Factor affecting social change and impact of social change
- Education for social change and role of teacher in social change

2.2 Social Mobility
- Meaning, types and impact of Social Mobility
- Dimensions of Social Mobility
- Role of Education in social mobility

2.3 Social Culture
- Meaning and Nature of Culture; Acculturation, Enculturation and cultural change
- Impact of culture on education through a study of the different dimensions of culture and their importance to education practices

2.4 School and community relationships
- The importance of community involvement in education
- The role of schools in community development

Unit-3: Education and Socialization

3.1 Socialization and education
- Concept and Process of Socialisation
- Agents of socialization and role of schools in socializing students
  Link between education and socialization process

3.2 Social behaviour of individuals, groups, and societies
- The transmission of cultural values and norms through education
- The impact of cultural diversity on educational processes

3.3 Social stratification and education
- Education as a mechanism of social stratification
- Social context of education and its implication for curricular and pedagogical practices;
- different aspects of social stratification

3.4 Relationship between social structures and educational provision.
- Policies and programs aimed at promoting social mobility
- The role of education in reducing social inequality

Unit 4 Education for Community and Social Transformation

4.1 School, Community and neighbourhood
- Relationship between School and community and school and neighbourhood.
- Process and significance of involvement of civic societies, community stakeholders and parents in school development

4.3 Education and Modernisation
- Role of Education in modernisation
- Relationship between education and modernisation, and constraints to social change.

4.3 Gender and education
- Gender inequalities in educational attainment
- Efforts to promote gender equity in education

4.4 Addressing social issues and challenges in addressing educational needs
- Access, equity, equality and factors affecting dropout and retention
- Classroom dynamics and challenges for Inclusion, diversity and social inclusion

Mode of Transaction:
- Lecture cum Discussion, Field trip, Assignment, Project

Suggested Activities:-
- Classroom dynamic studies to understand the social processes in educational setting.
- Sociological surveys on social change, mobility, stratification, access equity etc.
- Case studies: related to educational inequality, social stratification, or cultural diversity.
- Community mapping to identify social resources and challenges that impact education, such as access to educational institutions, community support, and socio-economic factors.
- Role-play for societal system and enact scenarios related to educational issues and social dynamics.
- Research project on sociological aspect of education, impact of social media, the influence of cultural beliefs on education.

Semester-8

Education Policy Analysis

Compulsory
Credit: 02
Marks:50

Learning Outcomes:
Prospective teacher...

- Acquaints with concepts of Policy Formulation and Implementation.
- Familiarises with the concepts of Policy Evaluation, Impact and analysis
- Appraises the process for developing policy and analysing the impact.
- Applies the understanding of Policy Formulation and Implementation in assessing the educational policies.

Unit-1: Introduction to Policy Formulation and Implementation

1.1 Concept and importance of Public, Policy and Public Policy
- Nature of Policy Analysis Policy-Making and Decision-Making, Policies and Goals, Policy-Making and Planning, Policy Analysis and Policy Advocacy, Policy Analysis and Policy Management

1.2 Types of Policy Issues: Distributive, Redistributive Regulatory, Constituent, Conflict and Bargaining Policy Issues
- Role of Agencies in Policy Making: Intergovernmental Relations, Niti Ayog, Cabinet Secretariat & Prime Minister's Office, Civil Society and International Agencies

1.3 Process of Policy Making and Policy Implementation
- Constraints of Policy Making: Choice of rationality, Bureaucracy, Values, etc.
- Concept, scope and limitations of Policy Analysis

1.4 Process of Policy Implementation and Problems in Implementation of Policy
- Role of Administrative Organisations, Legislative Bodies, Judicial Bodies, Civil Societies in implementation of Policy

Unit-2: Policy Evaluation, Impact and Analysis

2.1 Concept, Importance and Criteria of Policy Evaluation
- Types of Policy Evaluation (Process, Impact & Comprehensive) and Problems of Policy Evaluation (Goal Specification. Measurement, Targets, Efficiency and effectiveness, Values and Evaluation, Information and Data, Resource Optimisation, Unforeseen Consequences Dilemma, Equity Dilemma, Partisan Dilemma)
- Methods of Policy Evaluation: Benefit-Cost Analysis, Cost-Effectiveness Analysis, and Research based Analysis.

2.2 Significance and Purpose of Policy Impact
- Types of Policy Impact: Direct & Indirect; Positive & Negative; Immediate & Futuristic
- Tools and Techniques for Assessing Policy Impact

2.3 Concept and Types of Policy Analysis
- Empirical/Evaluative or Normative; Retrospective/Prospective; Predictive/Prescriptive/ Descriptive
- Methods and Techniques of Policy Analysis
- Process of Policy Analysis and Ethics in Policy Analysis

2.4 National Education Policy 202
- Case Study for Policy Evaluation, Impact and Analysis w.r.t Secondary and Higher Education

Mode of Transaction: Lecture cum Discussion, Field trip, Assignment, Project,
Suggested Activities:

- Comparative Policy Analysis and Policy Analysis Case Study of education policies.
- Policy Simulation Exercise for developing policies and planning the implementation.
- Stakeholder Mapping: Ask students to identify and map the various stakeholders involved in a specific education policy in Gujarat State.
- Policy Memo Writing: Assign students to write a policy memo addressing a specific educational issue in Gujarat State.
- Policy Evaluation and analysis Workshop and Policy Advocacy Campaign for students.

Semester-8

Adolescence Education

(Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Develops insight about aspects of Adolescent and related theories
- Identifies and relates with the needs and problems of adolescents
- Understands the role of school in the development of adolescent
- Designs various activities for adolescent development.

Unit 1: Introduction to Adolescent and Cognition (Theory)

1.1 Concept and Characteristics of Adolescence, Concept and Characteristics of Adolescence in Indian context

1.2 Role of Heredity and Environment in Adolescent development

1.3 Piaget's Cognitive Development Theory: Educational Implications

1.4 Erikson's theory : Educational Implications

Unit 2: Development theories of Adolescent (Theory)

2.1 Jung's theory : Ed Implications in General, Ed Implications in Indian context

2.2 Kohlberg's Moral Development theory: Educational Implications

2.3 Goleman's Theory of Emotional Intelligence : Educational Implications

2.4 Role of School in Cognitive Development: Educational Implications

Practical Component

Any two practical from Unit 3 and any two Practical from Unit 4 individually or in group.

Unit 3: Developmental Theories in Indian context (Practical)

Students have to choose and two activities from this section.

The evaluation of this component will be through the practical examination.

3.1 Write the educational implications of Kohlberg's Moral Development theory in context to Indian adolescent.

3.2 Write the educational implications of Erikson's theory in context to Indian adolescent.

3.3 Write the educational implications of Goleman's Theory of Emotional Intelligence in context to Indian adolescent.

3.4 Write your reflections on Role of Indian Schools, Parents and Society in Cognitive Development of adolescents.

Unit 4: Understanding Adolescence: Issues and Concerns (Practical)

Students have to choose and two activities from this section.

The evaluation of this component will be through the practical examination.

4.1 Identify the Adjustment Problems related to cultural and social aspects in an adolescent.

4.2 Write a report on Influence of Media on behaviours of adolescent: (Depiction of children, and men and women in television and cinema, social networking)

4.3 Write a report on any one Indian adolescent observing his behavioural changes with global impact in society.

4.4 Do a case study on Adolescent behaviour in reference to current era.

Suggested Activities:

- Case Study on Adolescent Behaviour (at least two) and presentation of same
- Observation of Issues and Concerns of Adolescents in schools

Mode of Transaction

- **Theory Component:** Unit 1 and 2 are theory units. And are to be transacted through Lecture cum Discussion, Field trip, Assignment, Project etc. during classes scheduled in time-table.
  The Theory Component is to be evaluated from Unit 1 and 2 Only.
- **Practical Component:** Unit 3 and 4 are practical units. The Practical Components and the exercises related to each practical component are listed in Unit 3 and 4.
  - The practical component is to be evaluated by the submission of journal with selected activity from the given list.
  - The practicum will be considered as completed on the basis of the submission of Journal.

Semester-8

Education for Mental Health

(Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:
Prospective teacher...

- Develops insight about concepts associated with Mental Health and Hygiene
- Identifies and reviews basic concepts associated with Mental Health and Illness.
- Reviews and reflects on the Psychology of Adjustment and Mental Health.
- Reviews and writes about various aspects of practicability of Adjustment

Unit 1: Mental Health and Hygiene, Stress and its effect (Theory)

1.1 Mental Health and Hygiene: Meaning, elements and purposes, Characteristics and causes of poor mental health
1.2 Role of teachers, Food and Nutrition in achieving Mental Health
1.3 Stress: Nature, meaning and types, Factors influencing stress
1.4 Stress: Causes and remedial measures, Schools' and Teachers' Role

Unit 2: Concepts associated with mental health (Theory)

2.1 Frustration: Meaning, causes and classification, remedial measures
2.2 Abnormal Behavior: Meaning, Causes, Classification, remedial Measures
2.3 Mental Diseases: Meaning, Causes and Types, Remedial Measures
2.4 Adjustment: Meaning, Methods and Process , Defence Mechanisms: Displacement, Repression, Projection,Sublimation, Rationalization, Denial, Reaction Formation

Practical Component
Any two practical from Unit 3 and any two Practical from Unit 4 individually or in group.

Unit 3: Strengthening Mental Health (Practical)

3.1 Prepare a chart on food and nutrition elements which support Mental Health.
3.2 Prepare a report on listing characteristics of maladjusted person you observed.
3.3 Write a report on any one Mental diseased person you have come through.
3.4 Identify any one educational movie based on Mental problem of a student and write a review over it.

Unit 4: Practicability of Adjustment (Practical)

4.1 Identify the events of your life wherein you portrayed Defence mechanism in behaviour (any 5) and write down a report over it.
4.2 'Frustration can be overcome' Justify the statement
4.3 Identify the Types of Stress prevalent in today's times and suggest remedial measures over it.
4.4 Write five Remedial Measures on Abnormal Behavior of a student in the class.

Mode of Transaction

- **Theory Component:** Unit 1 and 2 are theory units. And are to be transacted through Lecture cum Discussion, Field trip, Assignment, Project etc. during classes scheduled in time-table. The Theory Component is to be evaluated from Unit 1 and 2 Only.
- **Practical Component:** Unit 3 and 4 are practical units. The Practical Components and the exercises related to each practical component are listed in Unit 3 and 4.
  - The practical component is to be evaluated by the submission of journal with selected activity from the given list.
  - The practicum will be considered as completed on the basis of the submission of Journal**.**

Semester-8

Guidance and Counselling

(Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands concepts related to guidance and its types.
- Gets acquainted with concepts and areas of counselling.
- Relates and reflects on the organisation of guidance services.
- Knows and uses the agencies for providing guidance and counselling services to students and tounderstand issues in counselling services.

Unit 1: Basic concepts of Guidance and its types (Theory)

1.1 Guidance : Concept, Characteristics, Scope, Misconceptions about guidance
1.2 Purpose of guidance: self-understanding, self-discovery, self-reliance, self-direction, self-actualization
1.3 Types of Guidance: Educational, Vocational/Career and Personal
Individual guidance and group guidance
1.4 Group guidance techniques: class talk, career talk, orientation talk, group discussion, career conference, career corner, bulletin board, role play.

Unit 2: Basic concepts and Areas of Counselling (Theory)

2.1 Counselling: Concept, Characteristics, Scope, Misconceptions about counselling
2.2 Goals of counselling: resolution of problems, modification of behaviour, promotion of mental health
2.3 Stages of the counselling process
- Counselling Techniques-Person centred and Group centred,
- Cognitive interventions, behavioural interventions, and systematic interventions strategies

2.4 Areas of counselling: Family counselling, Parental counselling, Adolescent counselling, Peer counselling

Practical Component

Any two practical from Unit 3 and any two Practical from Unit 4 individually or in group.

Unit 3: Organisation of Guidance (Practical)

3.1 Select a school and organise a Vocational/Career Guidance for Class IX students.
3.2 Select a group of students and provide them with Group Guidance in relation to their Educational problems.
3.3 Identify 2 students with acute personal problems which hampers their educational achievement and process the individual guidance for them accordingly.
3.4 Integrate Bulletin Board of any school on the theme: Career Options after 12^{th} in 21^{st} century

Unit 4: Organisation of Counselling (Practical)

4.1 Visit an Educational Counsellor, gain insights on his role and functions and prepare a relevant report
4.2 Identify Counselling centres of your district and write a report on their areas and activities
4.3 Be a part of Parent Teachers' Meet and explain parents about awareness, need and importance of counselling in modern era
4.4 Implement Peer counselling in the classroom through a seminar

Mode of Transaction

- **Theory Component:** Unit 1 and 2 are theory units. And are to be transacted through Lecture cum Discussion, Field trip, Assignment, Project etc. during classes scheduled in time-table.
  The Theory Component is to be evaluated from Unit 1 and 2 Only.
- **Practical Component:** Unit 3 and 4 are practical units. The Practical Components and the exercises related to each practical component are listed in Unit 3 and 4.
  - The practical component is to be evaluated by the submission of journal with selected activity from the given list.
  - The practicum will be considered as completed on the basis of the submission of Journal.

Suggested Activities:

- Identification of the cases for counselling
- Exploring the possibilities for peer counselling in the institutions

Semester-8
Gender Education
(Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:
Prospective teacher...

- Acquaints with the concepts associated with gender, gender equality, and stereotypes.
- Appraise the role of education in gender responsive school environment and teaching.
- Familiarises and embraces the actions needed for gender sensitive society.
- Reviews and reflects on the gender laws, legislations and policies for gender sensitive society.

Unit 1: Introduction to Gender Education (Theory)

1.1 Understanding Gender, Sex and transgender: Definitions, concepts, and perspectives
Gender and Education: Nation, Education and Gender
Feminist perspective in education: Curriculum Analysis of content and pedagogy

1.2 Concept of Gender Equality

- Gender Equality and Law: Provisions in constitution, Test of Discrimination, Special Provisions and Right to life.
- Need to promote gender equality

1.3 Education and Gender

- Biological Differences, Structural Constraints, Social Interaction, Gender Socialisation and Gender Schemas and their role in in shaping gender norms and expectations

1.4 Gender Stereotypes and Bias: w.r.t society, employment, family and educational settings

Unit 2: **Gender and Education (Theory)**

2.1 Historical Perspective of Women's Education

2.2 Gender Gap in education access, attainment and employment

- Reasons for gap and implications for society
- Gender and Knowledge Construction

2.3 Gendered Education and Environment in School

- Gender and Learning: gender impacts on learning processes and outcomes
- Gender and Classroom Dynamics: Power dynamics and gendered interactions

2.4 Genderresponsive Teaching Strategies:

- Strategies for creating inclusive and gendersensitive learning environments
- Gender sensitive classrooms, power equations, Diversity and Intersectionality

Practical Component
Any two practical from Unit 3 and any two Practical from Unit 4 individually or in group.

Unit 3: Gender, Society and Role Expectations (Practical)

3.1 Education Policies and Education for women and gender

- New Education Policy 1986 and Education for Women's Equality
- NEP 2020 and women education
  - ❖ Select an education policy/policies of your choice and study and review the women/ transgender specific recommendations and the impact of those recommendation

3.2 Gender and Curriculum

- ❖ Select a text/curriculum/syllabus of your choice. Analyse it with feminist lens. Describe/narrate/ depict/perform/ etc. gender roles/expectations/violence/ stereotypes/ prejudices etc. Trace the changing depictions and prepare a report/perform a drama.

3.3 Gender Roles and Expectations and Genderbased Violence

- ❖ Select a society/region/period/era of your choice. Study and record the events depicting the gender specific roles/violence/stereotypic behaviour/disparities. Prepare a detailed report tracing the evolution of gender role and its impact on family and society.

3.4 Gender and Work Place

- ❖ Select a society/region/period/era of your choice. Trace the existence/roles/ of women in workplace in various roles/leaders/managers/workers/breaking the glass ceiling. Develop a research report based on the data/historical evidences/ and reflect on the transitional role of the women in society.

Unit 4: Gender, Law, Legislation and Policy (Practical)

4.1 Gender Equality and Legislations:

- Personal Laws (Hindu Succession Act, 1956; Hindu Minority and Guardianship Act, 1956, Prohibition of Child Marriages Act, 2006
- Gender Specific Legislation The Protection of Women from Domestic Violence Act, Pre Natal Diagnostics Techniques Act, 1994 (PNDT)
- Gender Specific Legislation in Labour law: Equal Remuneration Act, 1976, Maternity Benefit Act, 1961
  - ❖ Select any one of the listed law/legislation /any other law of your choice. Prepare a report of the law. Develop a survey questionnaire to know the awareness of the society towards the law/ develop and intervention to create awareness about the law in the society.

4.2 Gender Campaigns responsive Policies in Education:

- ❖ Identify the gender responsive policies like provisions for equality/access/mainstreaming/empowering and trace the impact of the recommendations for the select society/ Develop a survey questionnaire to know the awareness of the society towards the policy/ develop and intervention to create awareness about the policy in the society.

4.3 Empowered Girls and Women in society

- ❖ Select the women role model from the history/contemporary India/world/. You can select women educationist/scientists/ entrepreneur/musicians/dancers etc. from ancient India/ Prepare the case study on the life of the leader tracing the birth, education, challenges. Initiatives etc. Reflect on the inspiration that you acquire from their life.

4.4 Gendered Education and school as sites of socialisation: Gendered environment at schools, Gendered attitude, educational experiences, choices, language, Gendersensitive Assessment and ways ahead.

- ❖ Select an institution/school/society of your choice and area. Observe/record/survey/interview gendered perspectives and the impact on the learners. Suggest ways for creating gender inclusive environment in the society.

Mode of Transaction:

- **Theory Component:** Unit 1 and 2 are theory units. And are to be transacted through Lecture cum Discussion, Field trip, Assignment, Project etc. during classes scheduled in timetable.
  The Theory Component is to be evaluated from Unit 1 and 2 Only.
- **Practical Component:** Unit 3 and 4 are practical units. The Practical Components and the exercises related to each practical component are listed in Unit 3 and 4.
  - The practical component is to be evaluated by the submission of journal with selected activity from the given list.
  - The practicum will be considered as completed on the basis of the submission of Journal.

Suggested Activities:

- Gender Stereotype Analysis through critical thinking and reflection on the impact of these stereotypes on society.
- Gender RolePlay, Interview with Gender Advocates to discuss and promote gender inclusive environment.
- Gendersensitive teaching strategies and Plans: designing genderinclusive teaching strategies and plans for different subjects.
- Gender and Literature read and analyse literature that explores gender themes.
- Gender Equity in Education and Social Movements: Organize workshops or group activities to discuss strategies for promoting gender equity in educational settings.
- Cultural Gender Norms: research and present gender norms and practices in different societies.

Semester-8

Human Rights Education
(Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:
Prospective teacher...

- Acquaints with the concepts of Human Rights, international initiatives and constitutional provisions.
- Familiarise with and appraises the principles and perspectives of Human Rights Education.
- Practices and adopts approaches for integration of concepts for Human Rights Education.
- Examines and evaluates the need of Human Rights Education for social justice and harmony.

Unit 1: **Introduction to Human Rights Education (Theory)**

1.1 Concept of Rights, Human Rights, Human Rights violation and Human rights education
Nature and Need of Human Rights
Generational classification of Human Rights

1.2 International Initiatives for Human Rights

- Humanitarian Interventions, International humanitarian law (Geneva Convention 1949), Abolition of slavery,
- United Nations and
- Universal Declaration of Human Rights(UDHR)1948,
- UN Council on Human Rights,

1.3 Rights and Indian Constitution

- Fundamental Rights, Directive Principles of State Policy and Fundamental Duties as Constitutional Obligations, Acts and Articles

Human Rights Protection Mechanism in India:

- Law Enforcement Agencies
- Judicial System, Adjudication Process and Judicial Activism
- Remedies: Writs, Public Interest Litigation (PIL), Judicial Review,
- Protection of Human Rights Act 1993
- Institutional Mechanisms
- National/State Commissions for Human Rights
- Role of Civil Society Organizations and Media

1.4 Impact of globalisation on human rights

- Emerging Issues in human rights – communalism, terrorism corruption, governance and accountability, tribal rights, forest protection rights, traditional & cultural rights, displacement & rehabilitation rights

Unit2: Principles and Perspectives of Human Rights Education (Theory)

2.1 Human Rights Education

- Concept, Principles. Human Rights Pedagogy and reason for including Human Rights Education in school curriculum
- Educational Policies and Human Right

2.2 Human Rights perspective in education and curriculum methodology, context and approaches for integration of content like core values, history & culture, constitutional obligation, democratic values, equality, dignity, justice, etc. in curriculum

2.3 Human Rights perspectives in teachinglearning process, assessment and school culture using subject integration, pedagogy, curricular and cocurricular integration.

2.4 Challenges and opportunities in implementing human rights curriculum in schools

Practical Component

Any two practical from Unit 3 and any two Practical from Unit 4 individually or in group.

Unit3: Approaches for Practicing Human Rights Education (Practical)

This section is divided into 4 subunits and 4 Practical. The theory content listed is to facilitate conceptual understanding for completing the activities listed. Students have to choose any two activities from this section. The evaluation of this component will be through the practical examination.

3.1 Human Rights violation and Movements

Articles in Indian Constitution for protection of human rights

- ❖ Select an event/movement/case study of your choice in which human rights are violated. Develop a research project by creating relevant research questions on violation and measure for protection of these rights./Develop a lesson plan and pedagogical approach to teach these topics in the class like story telling/ drama/role play /debate etc.

3.2 Indian Constitution Rights and Duties, Articles and policies

- ❖ Identify the content from a select curriculum/text book/ India freedom struggle/constituent assembly/fundamental rights/Articles, Acts and Policies/ etc. Use this content to develop a theme/text/etc. which can be used to teach and integrate concepts across the subjects like science, social science, language, mathematics etc.

3.3 Human Rights and role models

- ❖ Select a thinker Thomas Hobbes, John Locke, JeanJacques Rousseau/Educationist like Gandhi/Rabindranath Tagore/ Nelson Mandela etc./ Activists/ Socialist who have contributed significantly in the protection of human rights. Trace the origin of their action and its impact. Prepare a module for dialogue/discussion/critical thinking/and means in which the students can be motivated to become agents of change.

3.4 Human Rights and educational institution

- ❖ Select an Article /Policy of your choice. Survey/interview the select sample from you institution/society about the incident revolving around selected topic/event in which they might have witnessed violation and action taken by them. Suggest measures to integrate the topic in the curriculum.

Unit 4: Human Rights Education and Social Justice (Practical)

This section is divided into 4 subunits and 4 Practical. The theory content listed is to facilitate conceptual understanding for completing the activities listed. Students have to choose any two activities from this section. The evaluation of this component will be through the practical examination.

4.1 Human Rights and International Efforts

- ❖ Select the report related to indicators on education/ human rights/ human rights education/ curriculum for human rights etc. published by any International Organisation/Institution/Civil society like UNDP/UN/UNICEF/UDHR/ UNCRC/etc. Use the data on India with select indicators and compare it with the global data. Present your findings in the form of the report. Suggest means and measures to improve the status of India in terms of human rights,

4.2 Human Rights and Indian Constitution

- ❖ Select identify an Act Protection of Civil Rights Act 1955,/ Prevention of Atrocities Act, 1989/Persons with Disabilities Act, 1995, / Prohibition of Sex Selection Act, 1994, /Environment (Protection) Act, 1986, /Prevention of Domestic Violence Act 2006./or any other Act of your choice. Trace the history of its origin and evolution with specific reference to the cause/movements/loss of life/impact on society. Prepare a report /documentary film/small narration video film/etc. for creating an awareness in the society/teaching students. Prepare a learning module/ report on the whole process.

4.3 Human Rights Violation of Marginalised and disadvantaged groups Women, Scheduled Castes,Scheduled Tribes, Backward Classes , Minorities, Minority Educational Institutions and others

- ❖ Select a historical/contemporary event/episode/war/domestic or societal situation. Explore it terms of their respective violations of human rights, constitutional provisions, international conventions, movements, landmark judgments. Prepare a learning module and report on the process, violations and impact.

4.4 Select any one indicator of human right violation in India w.r.t. social justice/ discrimination/ inequality/ social exclusion/ domestic violence/ terrorism/atrocity/ rehabilitation/refugees/ displacement due to development/challenges due to globalisation/economic, social and cultural rights/civil rights/ etc.

- ❖ Conduct a survey/interview of the select sample to with an objective of finding exposure to human rights violation act/knowledge of their constitutional rights / mechanism of protecting rights etc. Present your findings in terms of the project report.

Mode of Transaction:

- **Theory Component:** Unit 1 and 2 are theory units. And are to be transacted through Lecture cum Discussion, Field trip, Assignment, Project etc. during classes scheduled in timetable.
  The Theory Component is to be evaluated from Unit 1 and 2 Only.
- **Practical Component:** Unit 3 and 4 are practical units. The Practical Components and the exercises related to each practical component are listed in Unit 3 and 4.
  - The practical component is to be evaluated by the submission of journal with selected activity from the given list.
  - The practicum will be considered as completed on the basis of the submission of Journal.

Suggested Activities:

- Human rights debate and case studies related to human rights violations
- Model United Nations/Moot Court/role play where students can act as representatives, delegates, lawyers, judges, and witnesses to discuss and decide on a fictional human rights case.
- Community interview projects community members, including marginalized groups, to explore their experiences with human rights and understand the challenges they face.
- Human rights mapping activity in small groups,.
- Human rights action project: that addresses a specific human rights issue in their school or community, such as organizing an awareness campaign or advocating for policy changes.

Semester-8
Peace Education
(Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:
Prospective teacher...

- Acquaints with the concepts of peace, culture of peace, conflict and aggression.
- Assimilates concepts for peace education and peace sensitive curriculum.
- Reviews and adopts elements and curriculum for Peace Education Pedagogy
- Examines and evaluates the role of peace agencies, movements and laws in maintaining peaceful societies.

Unit-1: Introduction to Peace Education (Theory)

1.1 Peace: Concept, types and conditions for sustenance of peace
Relevance of peace and peace education in building a harmonious society
1.2 World views on Peace, well-being and justice: Modern and traditional
1.3 Participatory Democracy and Peace : Relation between peace and democracy
Pillars of Culture of Peace: World view & belief systems, Enculturation, education, institutional mechanism
1.4 Peace and aggression : Meaning and approaches for positive peace
Peace, conflict and war : Reasons for conflict and war and Strategies for conflict resolution

Unit-2: Elements of Peace Education (Theory)

2.1 Peace Education: Meaning, principles, and institutional support for peace education
2.2 Theoretical, moral and spiritual foundations of peace education
2.3 Peace Education and Curriculum: Strategies for selection and organisation of content related to peace, conflict, war, justice, empathy, compassion etc. in curriculum of school education
Learning experiences and strategies for teaching peace curriculum
2.4 Teacher and Peace: Skills needed for transacting peace curriculam
Role of teacher in developing culture of peace

Practical Component
Any two practical from Unit 3 and any two Practical from Unit 4 individually or in group.

Unit 3: Peace Education Pedagogy (Practical)
This section is divided into 4 subunits and 5 Practical. The theory content listed is to facilitate conceptual understanding for completing the activities listed. Students have to choose and two activities from this section. The evaluation of this component will be through the practical examination.

3.1 Designing and implementing peace education lessons and activities
- ❖ Select a content/course/syllabi of your choice. Analyse it for the elements/components related to depiction of conflict/war/peace/ compassion/ empathy/justice etc. Prepare a report of content analysis and means of improving them.
- ❖ Select a content/course/syllabi of your choice. Design Lesson plans and learning activities for it.

3.2 Using storytelling, literature, and arts for peace education
- ❖ Select depiction of storytelling/arts/music/dance from curricula/mythology/ancient texts etc. Develop outcome based teaching plans for teaching them to teach in classrooms. Prepare a published lesson plan report.

3.3 Engaging students in dialogue and critical thinking about peace and justice.
- ❖ Select an event of peace/war/conflict from curriculum / existing situations from society/country/ world. Develop, plan and implement forum for discussion on impact of the situation and means for conflict resolution. Submit a detailed report.

3.4 Moral and Spiritual foundations, traditional knowledge and peace

- ❖ Select a traditional knowledge/oral traditions/folk lore/ etc. og your choice. Develop a teaching module of one credit to explore collaborative and cooperative efforts for peace in the society and its contribution in prosperity and development.

Unit 4: Peace Education and Global Citizenship (Practical)

This section is divided into 4 subunits and 4 Practical. The theory content listed is to facilitate conceptual understanding for completing the activities listed. Students have to choose and two activities from this section. The evaluation of this component will be through the practical examination.

4.1 Human Security and Human Development: Concept and threats for developing country.

- ❖ Trace the evolution of the concept of comprehensive human development and exploring the link between violence and security needs/ violence and poverty/ religious & regional terrorism. Prepare a report based on the primary data available. Identify the root cause of the conflict and strategies for reducing them

4.2 Agencies for Peace and role in peace keeping: Indian and International

- ❖ Select an agency working at National/ International level. Study and document their role in maintain peace/ peace initiatives etc. Prepare a case study of at least two initiatives of the organisation. Support the case study with the data from the authentic source.

4.3 Culture of Peace, Peace movements, Duality of Peace concept and agents for change

- ❖ Trace the evolution of the peace movements. Select a movement of your choice from India/world. It can be current/past event. Record the cycle of the event and the impact it has created on the society. You can use a questionnaire/interview schedule to study the opinion of the selected sample.

4.4 Religion, spiritualism, peace and peace keepers

- ❖ Study the role of religion/spiritualism/traditions/culture/customs/texts/thinkers. Select any one component of your choice. Develop a one credit module for training students on the role of the selected component in maintaining peace and religious harmony.

Mode of Transaction:

- **Theory Component:** Unit 1 and 2 are theory units. And are to be transacted through Lecture cum Discussion, Field trip, Assignment, Project etc. during classes scheduled in time-table.
  The Theory Component is to be evaluated from Unit 1 and 2 Only.
- **Practical Component:** Unit 3 and 4 are practical units. The Practical Components and the exercises related to each practical component are listed in Unit 3 and 4.
  - The practical component is to be evaluated by the submission of journal with selected activity from the given list.
  - The practicum will be considered as completed on the basis of the submission of Journal.

Suggested Activities:

- Role play, storytelling etc. to promote peace, peace education and conflict resolution.
- Community service project in local community, such as volunteering at a homeless shelter or organizing a charity event.
- Peace education workshop, competition, debates etc. for promoting peace and unity.
- Conflict resolution simulation to practice conflict resolution skills, such as active listening, empathy, and negotiation.
- Peace-themed art exhibition, Peace education campaign using various media and advocacy strategies.

Semester-8

Health and Yoga Education

(Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:
Prospective teacher...

- Acquanits with Philosophy and Practices of yoga
- Appraises and embraces the lifestyle based on yogic philosophy.
- Practices and preforms asana and yoga.
- Practices and performs meditation and mindfulness exercises and evaluation.

Unit1: Introduction to Yoga Philosophy and Practices (Theory)

1.1 Introduction to Yoga
- Meaning, origin, and historical development of yoga.
- Philosophy and Psychology of Yoga and its Role in Wellbeing

1.2 Patanjali's Yoga Sutra
- Ashtanga Yoga: Eight Limbs of Yoga: Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana, Samadhi
- Use of Yoga in Different Contexts

1.3 Organisation of Yoga Sutras: Samadhipada, Sadhnapada, Vibhutipada,and Kaivalyapada
- Stages of Chitta: Kshipta (Restless), Mudha (Torpid), Viksipta (Distracted), Ekagra (concentrated), Niruddha (Restricted)

1.4 Yogic Principles of Healthy Living: Ahara (Food), Vihara (Recreation), Achara (Conduct), Vichara (Thinking), Vyavahara (Behaviour)
- Stress Management through Yoga and Yogic Dietary Consideration

Unit2: Yogic Philosophy and Lifestyle (Theory)

2.1 Concept of Health: Concept of Panch Kosha and Yogic concept of health and disease
- Role of yoga in prevention of disease and promotion of health

2.2 Need of Yoga for Positive Health
- Role of Mind in Positive Health as per Ancient Yogic Literature
- Concept of Health, Healing and Disease: Yogic Perspective

2.3 Meditation and Mindfulness
- Yoga and Meditation
- Yoga to Live in Peace and Harmony with surroundings

2.4 Yogic Concepts of the Self, Karma and Bhakti
- Application of yogic concepts in

Practical Component
08 Practical from Unit 3 and Unit 4.

Unit 3: Yoga Practices: Asana & Pranayam etc. (Practical)

The asana and pranayama listed under this section are to be taught and practiced during the practical classes. The list here is indicative and can be modified as per the requirements under the heading of asana and pranayama. The students need to conduct selfevaluation/ group evaluation for the changes observed before and after practicing through selfreflection and other tools available. The practical component will include preparation of Journal for minimum five Asana & Pranayam/reflections that are practiced.

The evaluation of this component will be through the practical examination.

3.1 Yogic practices: Kriyas, Āsana, Prāṇāyāma, Bandha & mudra, Dhāraṇa & Dhyāna, etc.

3.2 Pranayama: Poorak, Kumbhak, Rechak, Bhastrika, Bhramari, Ujjayi

3.3 Sitting Posture: Matsyendrasana, Kukkutasana, Vakrasana, JanuShirshasana, Bakasana)
Standing Posture: Katichakrasana, Ustrasana, Garudasana, Virbhadrasana, Adho mukhasana)
3.4 Sleeping Posture: rdha Salbhasana, Navkasana, Mandukasana, Matsyasana, Setubandhasana)

Unit 4: Meditation and Mindfulness (Practical)

The meditation and mindfulness exercise listed under this section are to be taught and practiced during the practical classes. The list here is indicative and can be modified as per the requirements under the heading of meditation and mindfulness. The students need to conduct selfevaluation/ group evaluation for the changes observed before and after practicing through selfreflection and other tools available. The practical component will include preparation of Journal for minimum 03 meditation and mindfulness exercise /selfassessment practiced..

The evaluation of this component will be through the practical examination.

4.1 Meditation: Mindfulness, Transcendental, Guided meditation: relaxation techniques and mindfulness breathing and stretching exercise
4.2 Vipasana Meditation and practices
4.3 Mindfulness based interventions: Mindfulness based stress reductions, MindfulnessBased Cognitive Therapy , Dialectical Behaviour Therapy, Acceptance and Commitment Therapy
4.4 Selfassessment and impact of yoga and meditation using selfreflections/surveys using questionnaire and other tools for wellbeing/stress management etc.

Mode of Transaction:

- **Theory Component:** Lecture cum Discussion, Field trip, Assignment, Project etc. during classes scheduled in timetable.
- **Practical Component:** Scheduling of the practical classes in the timetable for training and practicing the exercises. Preparation of the Journal with minimum 10 Practicals.
  The practicum will be considered as completed on the basis of the submission of Journal.

Suggested Activities:

- Selfreflections/journals/evaluation based on the observed benefits of performing exercises.
- Prepare journals and submissions of list of the diseases, disorders and postural deformities and write down some yogic remedies.
- Develop diet plans/ daily plans / routines/recipe booklets based on the yogic lifestyles for healthy living.
- Plan visits to yoga, vipasna and meditation centres for exposure to various yogic practices.
- Conduct selfevaluation/Survey and prepare a group data for various aspects of physiology to check the physiological development when indulging in regular practice of Yoga.
- Practice and demonstrate different yoga asana/ Yoga Games/ Yoga for Stress Management/flexibility/ selfawareness and maintain a journal for experience sharing and narration.

Semester-8

Tribal Education (Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Familiarises with the concepts associated with tribes and their social systems.
- Appraise the perspectives, initiatives, curricular provisions for tribes and tribal education.
- Associates with various aspects of tribal language and research for tribal community.
- Analyses and appraises tribal art, culture customs and practices.

Unit-1: Introduction to Tribes and their Social Systems (Theory)

1.1 Concept of Tribe, Tribal Study and Tribal Education

- Relevance of Tribal Studies in Today's Context
- India and Indigenous People; Tribal People Vs. Indigenous People and significance of this discourse

1.2 Social System and Organisation w.r.t Gujarat – Definition and Characteristics

- Units of Social system- Tribe (The Little Community)
- Subunits and Patterns: Subtribe, Moiety, Phratry, Local Group of Village Community, Clan, Lineage, Family
- Major Tribes in Gujarat and their socioeconomic and educational conditions

1.3 Distribution of Indian Tribes : Geographical, Racial Size, Economy, Degree of Incorporation

- Causes of Variation : Migration, Acculturation and Assimilation, Geography
- Socio-economic and educational status of tribal communities
- Approaches for Tribal Development: Isolation, Assimilation, Integration

1.4 Constitutional Status of Scheduled Tribes, De-notified and Nomadic Tribes

- Constitutional Safeguards : Educational, Social, Economic and Service Provisions
- Recent Government initiatives and policies for Tribal Education

Unit 2 : Tribal Education, Research (Theory)

2.1 Various Perspectives on Tribal Studies: Historical, Institutional, Development and Planning, Integration, Stratification, Gender, Administration, Anthropological, Comparative, Ethnographic, Demographic

- Role of Ministry of Tribal Affairs in Tribal Development and Education

2.2 Indigenous People and International Bodies: Role of International Labour Organisation, World Bank, United Nations

- Strategy for Tribal Development with reference to International Measures: Human Development Index (HDI), Human Poverty Index (HPI), Gender Development
- Index (GDI) and Gender Empowerment Measure (GEM)

2.3 Educational Provisions in Curriculum at Secondary Stage for Indian Tribes w.r.t content, medium of instructions and availability of text in local language

- Curricular Provisions for Certification in indigenous knowledge systems and skills relevant for development and generating employment for tribes
- Role of Tribal communities in their education

2.4 Provisions in Teacher Training for developing skills for inclusion and assimilation of learners from tribes and indigenous population

- Pedagogical Approaches, Research and Practices, for facilitating education of Tribes
- Challenges for addressing the curricular provisions and learning needs of tribal learners

Practical Component

Any two practical from Unit 3 and any two Practical from Unit 4 individually or in group.

Unit-3: Tribal Language, Research and Development (Practical)

This section is divided into 4 subunits and 8 Practical. The theory content listed is to facilitate conceptual understanding for completing the activities listed. Students have to choose and two activities from this section. The evaluation of this component will be through the practical examination.

3.1 Spoken Languages in Tribal Gujarat: Ethnicity (Negritos, Austrics, Mongoloids, Dravidian, Western Brachycephals, Nordics); Language Group (Indo-Aryan, Dravidian, Sino-Tibetan, Negroid, Austric, Others) and Tribal Language in Gujarat

- ❖ List out the Tribes and Subtribes of Gujarat and group them according to their Region, Ethnicity and Language Group
- ❖ Select any one language and prepare an e-content/text relevant to their language w.r.t Fundamental Literacy and Numeracy
- ❖ Develop a Language Training Program of 1 Credit for Teacher Educators w.r.t the Basics of Teaching of the selected language

3.2 Ministry of Tribal Affairs: Role, initiatives, schemes and central assistance

- ❖ Identify the Initiatives and schemes of the Ministry for promotion of Tribal and Indigenous Language/vocations/occupations etc. and create an awareness program of one week for a language and region of your choice. Prepare a plan for its implementation.
- ❖ Study the status of implementation of the recommendation of NEP 2020 w.r.t Tribal and indigenous population and present a report on its findings.

3.3 Research Institutes working for Tribal Development: Tribal Research Institute and Central Institute of Indian Languages: Role and relevant Researches

- ❖ Study the work done by the research institute and select any research relevant to your area and interest and reflect on the findings of that research and its implications to Tribes and indigenous people of Gujarat.

3.4 Surveys and Data Bases: Research studies on ethnicity/demography/socio economic status/development Indicators etc.

- ❖ Study and select a data base of your choice w.r.t various development indicators of Tribes and prepare a report on status in Tribes and Indigenous population in Gujarat
- ❖ Prepare your own questionnaire and conduct a survey relevant to the region and area of your choice and present a report on its findings.

Unit 4: Tribal Culture, Art, Music, Rite of Passage (Practical)

This section is divided into 4 subunits and 6 Practical. The theory content listed is to facilitate conceptual understanding for completing the activities listed. Students have to choose and two activities from this section. The evaluation of this component will be through the practical examination.

4.1 Tribal Culture and Practices: Religious practices, customs, food, fairs, festivals, costumes, vocations & occupations etc.

- ❖ Spend a week with a select tribal population of your interest and choice. Conduct an ethnographic study indicators of your choice- vocation/culture/practices/language/food etc. Maintain a daily reflective diary with narration and present an ethnographic report on its findings.

4.2 Rites of Passage: Rites related to ceremonial and other events for pregnancy, child birth, puberty, initiations, maturity, marriage, funeral, myths beliefs, oral traditions etc.

- ❖ Select a tribe related to your preferably of the area in which you live and study rites followed by the tribe , customs, dress, festivals, food, dance etc. associated with the rite and present a report on its findings.

4.3 Tribal Art, Dance, Music and other art forms: Folk dance, indigenous practices, message, oral histories etc. behind the art and music.

- ❖ Study the tribe of your choice and develop a bilingual (Local language and English) database for the art, music and other practices relevant to that tribe and prepare a published report.

4.4 Vocation and Skills: Vocations and skills associated with the employment, major occupations both agricultural and non-agricultural, indigenous knowledge and practices etc.

- ❖ Select a tribe related to your preferably of the area in which you live and study the vocations, skills, occupations practiced by the tribes. Prepare one credit course for providing skill training to the tribal inhabitants / your peers/school students
- ❖ Select a tribe related to your preferably of the area in which you live and study the indigenous practices of the tribe. Prepare a data base for the same. Include the details of the practice, origin, oral history or folk lore associated with it and present it in the form of published report.

Mode of Transaction:

- **Theory Component:** Unit 1 and 2 are theory units. And are to be transacted through Lecture cum Discussion, Field trip, Assignment, Project etc. during classes scheduled in time-table.
- The Theory Component is to be evaluated from Unit 1 and 2 Only.
- **Practical Component:** Unit 3 and 4 are practical units. The Practical Components and the exercises related to each practical component are listed in Unit 3 and 4.
- The practical component is to be evaluated by the submission of journal with selected activity from the given list.
  The practicum will be considered as completed on the basis of the submission of Journal.

Suggested Activities:

- Research surveys/interviews/ observations etc.
- Visits to the institutions catering to the tribal population like tribal schools, community groups, NGOs etc.
- Camping and Stay in the tribal village for observation, practice and reflections on practices, customs, festivals, fairs etc.
- Preparing and performing dance/drama/music etc. relevant to the particular tribe.
- Awareness programs and campaigns for the tribal people.

Semester-8

Emerging Technology in Education

(Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands the concept of emerging technologies in education and their potential impact on teaching and learning.
- Comprehends and evaluates the use of synchronous and asynchronous learning approaches.
- Develops and Designs Learning Experiences using multimedia and interactive elements.
- Researches and reflects on the challenges and impact of emerging technologies.

Unit 1: Introduction to emerging technologies in Education (Theory)

1.1 Concept and Significance of Technology, Technology of Education and Technology in Education
1.2 Historical Context of Technology integration in educational settings
1.3 Generations of Computer Technology and their Use in Pedagogy
1.4 Ethical Consideration and Responsible use of emerging technologies in Education

Unit 2: Synchronous and Asynchronous (Theory)

2.1 E-Learning: Concept, advantages and limitations
2.2 Synchronous & Asynchronous Learning: Meaning, advantages and limitations
2.3 E-Learning Strategies: Virtual Classrooms, Online Learning, Audio Video Conferencing and Application Sharing.
- Flipped Classrooms and Blended Learning Models

2.4 Learning Management Systems: Features, Criteria for selecting LMS, advantages and limitations
- Practical Component
- Any one practical from Unit 3 and any one Practical from Unit 4 individually or in group.

Unit 3: Integrating Multimedia and Interactive Elements (Practical)

- **This section is divided into 4 subunits and 4 Practical. The theory content listed is to facilitate conceptual understanding for completing the activities listed. Students have to choose any two activities from this section.**
- **The evaluation of this component will be through the practical examination.**

3.1 Utilizing Multimedia resources (Video, Audio, Images) to enhance learning
- ❖ Develop a multimedia program for teaching a topic at school level. The duration of the program should be at least 2 hours (divided into sections of 30 min. each). Prepare a report and host it on a platform.
- ❖ Select a Digital Repository of your choice. Study the content available on it. Select a school level content of your choice and prepare a MOOC Quadrant for self-learning of the students. Prepare a report and host it on a platform.
- ❖ Review any 5 popular Podcasts/ Vodcasts of educational purpose. Take inspiration from it and prepare your own podcast. You may select a topic related to motivation/leaderships/ value education / guidance/ relevance etc.
- ❖ Prepare a survey questionnaire on digital literacy/take standardised questionnaire available and conduct a survey on at least 50 students/stakeholders and prepare a report of the results.

3.2 Digital Platforms and e-learning Modules: DIKSHA, SWAYAM, NPTEL, Virtual Labs etc.
3.3 Podcasts and Vodcasts
3.4 Digital Literacy and Responsible use of Technology

Unit 4: Emerging technologies and their impact (Practical)

- **This section is divided into 4 subunits and 4 Practical. The theory content listed is to facilitate conceptual understanding for completing the activities listed. Students have to choose and two activities from this section.**
- **The evaluation of this component will be through the practical examination.**

4.1 Exploration of Emerging Technologies such as AI, AR, VR, and IoT in Education

- ❖ Select an emerging technology of your choice/available on digital repository/ platforms offering education content. Study the technology with reference to its features/ applications/ augmentation/ virtual reality/ impact etc. Prepare a case study on the select technology/platform using empirical data/news reports/events/discussion. Present the findings of the study in the form of report.

4.2 Gamification and game-based learning for engagement

- ❖ Select a game based learning platform of your choice. Analyse the type of the games and learning experiences provided by these apps. Based on the understanding of the app develop your own learning app for teaching students using traditional or contemporary games/ conduct a survey of students/teachers about the use/addiction/ impact of the game based apps.

4.3 Social media and networking for collaborative learning

- ❖ Identify types of social media that can be used for the purpose of learning. Select a social media platform of your choice and prepare a collaborative learning lesson plan using a select content and its integration with the platform or Conduct a survey on the use of social media platform in education/awareness and skills available with the teachers/ impact on student learning etc.

4.4 Addressing Challenges and concerns related to Educational Technology: access, equity, equality, digital literacy

- ❖ Select a school/institutions/ children in your neighbourhood. Study the availability of digital infrastructure/ digital facilities/skills and knowledge/ethics etc. You may use survey/empirical data available. Suggest measures to cope with the challenges of access/equity/ equality/ digital literacy etc.

Mode of Transaction:

- **Theory Component:** Unit 1 and 2 are theory units. And are to be transacted through Lecture cum Discussion, Field trip, Assignment, Project etc. during classes scheduled in time-table.
  The Theory Component is to be evaluated from Unit 1 and 2 Only.
- **Practical Component:** Unit 3 and 4 are practical units. The Practical Components and the exercises related to each practical component are listed in Unit 3 and 4.
  - The practical component is to be evaluated by the submission of journal with selected activity from the given list.
  - The practicum will be considered as completed on the basis of the submission of Journal.

Suggested Activities:

- Group Discussion, Lectures, visits, assignments

Semester-8

Language Across Curriculum

(Theory & Practical)

Optional
Credit: 04
Marks:100

Learning Outcomes:

Prospective teacher...

- Understands language, its various roles in society and its various shades.
- Familiarizes with theoretical issues of the language acquisition.
- develops and implement the language skills of the students and analyze their reading and writing
- Knows how oral and written language can be used in the classroom to ensure optimal learning of the subject area.

Unit 1 : Language and Language Acquisition (Theory)

1.1Concept of Language Across Curriculum; Meaning of Dialect and Standard Language, Role of Language in Life (Intellectual, Emotional, Social and Cultural Development)

1.2 Factors Affecting Language Learning (Physical, Psychological and Social)

1.3 Stages of Language acquisition: First Language and Second Language acquisition; Principles of language development: Nativist and Interactionist Theories (behavioral and cognitive)

1.4 Deficit Theory and Discontinuity Theory; Cultural Reference in the Text and Language of textbook in different subjects

Unit 2: Language and Classroom (Theory)

2.1 Nature of Expository Texts vs. Narrative Texts, Transactional vs. Reflexive Texts

2.2 Writing: The concept of register and style (Note-making, summarizing; making reading-writing connections; process writing)

2.3 Language as a tool of communication in the classroom; The nature of classroom discourse (describing/ reporting, naming/defining, explaining, exemplifying, arguing/supporting, assessing, evaluating) and oral language in the classroom

2.4 Language Diversity in Indian Classrooms; Multilingualism in the classroom and its effect

Unit 3: Language skills and classrooms (Practical)

List of suggested Practical are provided in unit-3 and 4.

Any two practical from Unit 3 and any two Practical from Unit 4 individually or in group. Students have to choose and two activities from this section. The evaluation of this component will be through the practical examination.

List of suggested Practicum :

- Take any two chapters from Science, Social-science and Maths textbooks of Classes VI to VIII and analyse: (i) How the different registers of language have been introduced? (ii) Does the language clearly convey the meaning of the topic being discussed? (iii) Is the language learner-friendly? (iv) Is the language too technical? (v) Does it help in language learning? And write an analysis based on the above issues.
- Analysis of advertisements aired on Radio/Television on the basis of language and culture reflected through them.
- Visit any two schools in the neighbourhood and prepare a report on the three language formula being implemented in the schools
- Project : Prepare a report on the status of language given in the Constitution of India and language policies in Kothari Commission/ NPE 1986/POA-1992/NEP-2020
- Conduct a survey on problems faced by students while second language learning.
- Study any one behavioural and cognitive theory of language learning and write your criticism.
- Conduct a workshop on writing skill development and write a report.
- Conduct a Workshop on reading strategies in the school and prepare a report.

Unit 4: Classroom and Oral and Written Language (Practical)

- Write a note on dialects interviewing 10 students from standard VI to VIII./ Make a report of the dialects used by the students in your class.
- Select a Text Book form standard V/ VII/ VII/ VIII/ IX or X and review it from linguistic / cultural point of view.
- Analyse any book from standard VI to VIII and prepare subject-based glossaries.
- Review any two subject books and criticize the language components in concept formation.
- Study the communication pattern during classroom teaching and write your reflections.
- Study a case of a student having multilingual background and its effect in various facets.
- Observe five periods and write your observations regarding classroom discourse.
- Visit a Language Laboratory and make a brief note on its functioning

Semester-8

Internship in Teaching III

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Develops ability to handle school activities independently
- Develops the ability to report the administrative and management system of school.
- Reflects upon internship experience
- Develops the proficiency in imparting lessons.

Course Content:

Activities:

- Duration of the Internship: 2 weeks
- Participation in school activities and completing all work assigned by Internship school
- Report on Administration and Management of School
- Reflect upon the internship experience
- Performing subject related activities like: Science Practical/ Map Reading/
- Literary Activity/ Math Puzzle/ Budget Analysis /any other activity related to the subject

Internal Assessment: Marks: 50 Marks

No.	Activity	Marks
1	Report of teaching learning activities	10
2	Report on Administration and Management of the school	10
3	Reflective Journal	10
4	Report in participation of various school activities	05
5	Report of subject related activities	05
6	Presentation	10
	Total	**50**

Semester-8

Community Engagement and Services

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Acquaints with the factors working within the society.
- Develops the dignity of labour.
- Understands and prepares youth for sustainable development.

Course Content:

- School is a miniature of community and a big gap is found between the school and community. Mutual exchange and sharing of resources and facilities between the two is essential for national development. The prospective teacher need to have knowledge and awareness about the community and neighbourhood and the relationship between school and community. The programme aims at enriching their ability to enlist community support for school and contribute for national development. The programme aims at acquainting them with social realities, developing dignity of labour among them and preparing them for sustainable development.
- Prospective teachers shall be provided exposure to community life for at least **one week** during which they shall live with the community members.

Activities of Section-I

- Survey of community resources – Educational survey of a slum area
- Survey of a village/town with at least 20 households in order to study the socio-economic and educational status
- Study of wastage and stagnation in local primary school
- Tree plantation programme
- Literacy programme

Activities of Section-II

- Organization of non-formal education centre for dropouts and out of school children in a locality
- Organization of campus beautification programme
- Road Safety, Human Rights, Women rights awareness programmes
- Cleanliness drives in the community and awareness about its need
- Developing healthy food habits among community members
- Action research on local problems

Mode of Transaction:

- Discussion, Rally, Competitions, Posters and Banner displays, working in community setting, Mass movement, Nukkad Performance, Local action group formation, surveys, interviews, dissemination of success stories etc.

Note:-

- Trainee will select any one activity from each section for submission but for the better exposure & understanding maximum activities from each section must be carried out at institutional level.

Internal Assessment: Marks: 50 marks

- Evaluation shall be done on the bases of Participation in minimum two activities during the one week of community life and its presentation

Semester-8

Creating Teaching Learning Material

Compulsory
Credit: 02
Marks:50

Learning Outcomes:

Prospective teacher...

- Understands the importance of using Teaching Learning Material
- Creates Teaching Learning Material by using available resources

Course Content:

- An orientation programme and a workshop shall be arranged to explain about the various methods, techniques and tools to create Teaching Learning Material

Activities of Section-I

- E-content development
- STEM/STEAM education Model
- Programme Learning Material
- Game Based Learning
- Working Model

Activities of Section-II

- Teaching Learning Material for children with special need
- Story writing/ Poem writing/ Script writing
- Mime/Drama/ Bhavai
- Puppet with Script
- Specimen Collection (Minimum 8 to 10)

Mode of Transaction:

- Orientation & Practical workshop

Note:-

- Trainee will select any one activity from each section for submission but for the better exposure & understanding maximum activities from each section must be carried out at institutional level.

Internal Assesment:

No.	Activity	Marks
1	Teaching Learning Material for School Subject 1	25
2	Teaching Learning Material for School Subject 2	25

Evaluation Patterns

Type of Paper	Internal			External			Total Marks
	Particulars	Marks	Total Marks	Particulars	Marks	Total Marks	
Theory (4 Credit)	Assignment/ Seminar/ Project/ Workshop	5	30	Semester end Written Examination	70	70	100
	Attendance	5					
	CCE	5					
	From Prelim Exam	15					
Theory (2 Credit)	Assignment/ Seminar/ Project/ Workshop	5	15	Semester end Written Examination	35	35	50
	From Prelim Exam	10					
Practical (2 Credit)	Performance Based Assessment: Section A	15	30	Submission on Section A & Section B	10	20	50
	Performance Based Assessment: Section B	15		Viva Voce based on submissions	10		
Theory+ Practical (4 Credit)	Assignment/ Seminar/ Project/ Workshop (Unit 1 & 2)/ Attendance	5	30	Semester end Written Examination	35	70	100
	Prelim Exam	5					
	CCE (Unit 1 & 2)	5					
	Two Assignments from Unit 3 & 4	15		Submission of Assignments and Viva based on submissions from Unit 3 & 4	35		
Science Practical (2 Credit)	Attendance	5	15	Experiment	20	35	50
				Test	5		
	Practical Examination	10		Journal submission	5		
				Viva voce	5		
Project (2 Credit)	Submission	10	15	Submission	20	35	50
	Viva	5		viva	15		

Format of Question Paper

General Instructions:

1. **All questions are compulsory, options are internal.**
2. **Digits marked at the end of questions shows total marks of that questions.**
3. **Answer briefly and to the point.**

For 70 Marks: (Time 3 Hours)

Question 1 Answer following questions as directed: (From Unit 1)	
(A): Answer any two out of three In 400 words	08 Marks
(B): Answer any two out of three In 250 words	06 Marks
Question 2 Answer following questions as directed: (From Unit 2)	
(A): Answer any two out of three In 400 words	08 Marks
(B): Answer any two out of three In 250 words	06 Marks
Question 3 Answer following questions as directed: (From Unit 3)	
(A): Answer any two out of three In 400 words	08 Marks
(B): Answer any two out of three In 250 words	06 Marks
Question 4 Answer following questions as directed: (From Unit 4)	
(A): Answer any two out of three In 400 words	08 Marks
(B): Answer any two out of three In 250 words	06 Marks
Question 5: Answer any 7 out of 10 questions: (From All four Units)	14 Marks

For 35 Marks:(Time 2 Hours)

Question 1 Answer following questions as directed: (From Unit 1 & 2)	
(A): Answer any two out of three In 400 words	08 Marks
(B): Answer any two out of three In 250 words	06 Marks
Question 2 Answer following questions as directed: (From Unit 3 & 4)	
(A): Answer any two out of three In 400 words	08 Marks
(B): Answer any two out of three In 250 words	06 Marks
Question 3: Answer any 7 out of 10 questions (From All four Units)	07 Marks

Note: For two credit papers question 1 should be asked frem Unit 1 & question 2 should be asked from Unit 2.

Instructions about Examination

1. ASSESEMNT

1.1 There shall be two components for assesment of learners

1. Continuous and Comprehensive Evaluation (Internal Assessment)
2. Semester End Examination (External Examination)

1.2 The assessment carries any of the following modes, as per the requirement of the Papers as notified by the University.

(a) Written
(b) Practical
(c) Oral/Viva-voce
(d) ICT based Tests
(e) Open Book Examinations
(f) Submission of Project/Report

1.3 The semester end examination shall be mandatory for every student to appear in every examination conducted by the University. The examination shall be held according to the scheduled notified by the University from time to time. Any of the students who fail to present himself/herself at the examination as per schedule at the place notified and those who appear at the examination and leave the examination hall voluntarily or boycott the examination for any of the reasons or whatsoever deemed as forfeiting his/her rights to appear at the said examination. The University shall not hold fresh examination for any or all subjects for such students under any circumstances.

1.4 Practical, Oral (Viva-voce) Examination

1. The practical examination shall be organised by the respective Institute as per the instructions of the University. Principal / HoD of the Institute concerrned shall submit the time table including the names of the paper setters/ examiners to the Controller of Examination, IITE 15 days in advance.
2. The practical examination shall be conducted in presence of Examinerrs appointed by the University and to assist external examiner there shall be one internal examiner duly appointed by the University.
3. In event of assessment is to be carried out by reviewing the submissions of candidate, the examination shall be carried out jointly by internal as well as external evaluators by the University.

1.5 The Principal / HoD of the respective Institute shall send a list of students eligible and not eligible for the End-Term Examinations. Only those students will be allowed to appear in the End-Term Theory and Practical Examinations, whose names appear in the list of eligible students. It is the sole responsibility of the Institute/Institute to check the eligibility of the students before sending the list and Examination Form to the University.

Since the B.Ed. Course is governed by the rules and regulations stipulated by the NCTE, the 80% of the presence is required in theory classes and 90% of the presence is required in Practice Teaching/field based practicum/School Internship for qualifing in semester end examination.

1.6 Only those candidates who have passed the internal assessment of the particular course shall be permitted to appear in the examination. In case, the result of internal assessment is submitted during the examination, the external examination appeared shall be void for the further process.

1.7 Hall tickets shall be issued to each student by the Examination Department prior to the commencement of the examinations. No student shall be permitted to enter the Examination Hall without the Hall Ticket. The Students will be permitted to appear only in those examinations indicated in her / his Hall ticket. It is further clarified that the issuance of a Hall ticket is not an acknowledgement by the University that the student has fulfilled all the requirements which would entitle him/her to appear for the examination, such as, minimum attendance in any such case University may restrict the student to appear for the examination.

1.8 The result of the last semester shall not be declared (kept withheld) unless and until the candidate clears all the courses/papers of a program.

2. MARK SHEET

The Mark sheet would contain the performance of the student in terms of grades and it should contain photographs of the student, hologram of the IITE, QR Code, Name of the Institute where student studied in student Certificates and mode of Study.

3. ASSESSMENT AND EVALUATION:

CCE (Continuous and Comprehensive Evaluation):

There will be continuous and comprehensive evaluation for the Course. The learners will be evaluated internally as well as externally. As the university has adopted CCE module for the evaluation, the pattern scheme for evaluation will be as under:

3.1 SCHEME OF EVALUATION

INTERNAL EVALUATION (30 % of Marks)

Internal evaluation will include assignment/project/seminar/practical/MCQ test/Quiz/ VIVA/ written test. It is up to the department/ Institute to select any of these. The ratio of marks will be 1:1:1:3 for each. The detailed Marks statement shall be submitted to Examination Section on or before the last day of the respective semester. Plagiarism of any kind in assignment/project work/ seminar/ any submission etc. will be punishable by the concerned departments.

EXTERNAL EVALUATION (70 % of Marks)

External evaluation will be semester end examination, theoretically and/or practically as case may be, conducted by the university at the end of each semester.

3.2 ASSESSMENT

There are two categories for evaluation: The student is eligible for Total for that subject, if there are more than 40 % of marks in Internal and External Evaluation.

3.3 GRADING SYSTEM AS PER UGC 10 POINT SCALE SYSTEM.

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

i.e. CGPA = Σ(Ci x Si) / Σ Ci

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

Semester Grade Point Average (SGPA): It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

i.e SGPA (Si) = Σ(Ci x Gi) / ΣCi

where Ci is the number of credits of the ith course and Gi is the grade point scored by the Students.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters O+, O, A+, A, B+, B and F.

3.4 PROCEDURE OF AWARDING THE GRADES

Marks and Award of Grades:

The following TABLE gives the marks, numerically grades, letter grades and classification to indicate the performance of the candidate.

- **Grading Pattern Table**

  Conversion of Marks to Numerical Grade, Letter Grade & Course Performance

Sr. No.	% of Marks	Letter grade	Grade point	Remarks
1	90 and above	O+	10	Outstanding
2	80 to 89	O	9	Excellent
3	70 to 79	A+	8	Very Good
4	60 to 69	A	7	Good
5	50 to 59	B+	6	Above Average
6	40 to 49	B	5	Average
7	0 to 39	F	0	Fail

4. CONFERNMENT OF DEGREES

A student shall be awarded degree if he/she has registered himself/herself, undergone the course of studies, completed the project reports / dissertation specified in the curriculum of his/her programme and earned the minimum Credits required within the maximum period of Course Duration + 2 years

5. MERITORIOUS AWARDS

5.1 The Prizes and Medals, the award of which are instituted by the University shall be presented at the Convocation to the awardees, if they choose to remain present, immediately after the conferment of the degrees. In other cases the same will be delivered to them through the Principal / HoD of the concerned Institute.

5.2 Gold Medal(s) shall be awarded on the basis of Total Marks obtained by the student in all the semesters. Medal will only be awarded for the Courses in which minimum 5 Students are enrolled in last semester.

5.3 If two or more students have secured the same Marks, then the marks secured by the students in the external examination only shall be taken into consideration in awarding the Gold Medals.

5.4 If both students also secure the same external marks, then both the students should be awarded the Gold Medal

5.5 The Rank Holders on the basis of Marks shall be awarded the University Gold medal for being First. The Second and third Rank holders shall be given rank certificates by the university. The University shall also issue Certificates indicating the name of the Medal awarded to the students.

5.6 The University may also consider issuing other Certificates of Merit or overall conduct at any convocation organized by the University.

5.7 A student who has been fined or has been expelled from the Hostel / Institute/University for any act of indiscipline shall not be eligible for the award of gold medal(s). A student who has failed in any course and has cleared the course in a Repeat Examination shall not be eligible for award of Gold Medals.

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SEMESTER-V

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6	Dr. Snehal Bagthariya	Joint Director, Gujarat State Biotechnology Mission
7	Dr. Ketan Tatu	Senior Scientist, GEER Foundation

યુનિવર્સિટી ગીત

રાષ્ટ્રની ઉજળી આવતી કાલના અમે છીએ ઘડવૈયા
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॥ न हि ज्ञानेन सदृशं पवित्रमिह विद्यते ॥

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