

संदर्भ/जा.क./शिवाजी वि./अ.मं./२२१

दि. १५/०४/२०२५

प्रति,

मा. अधिविभाग प्रमुख, शिक्षणशास्त्र अधिविभाग., शिवाजी विद्यापीठ, कोल्हापूर.

विषय :- B. Sc. B.Ed. Part I (Integrated 4 Years degree Programme) अभ्यासक्रमाबाबत.

संदर्भ : या कार्यालयाचे पत्र क्र. 663 दि. 18/12/2024 रोजीचे पत्र.

महोदय,

उपरोक्त संदर्भिय विषयास अनुसरून आपणास आदेशान्वये कळविण्यात येते की, राष्ट्रीय शैक्षणिक धोरण—2020 (NEP 2.0) नुसार शैक्षणिक वर्ष 2024—2025 पासून लागू करण्यात आलेल्या B. Sc. B.Ed. Part I (Integrated 4 Years degree Programme) या अभ्यासक्रमामध्ये **किरकोळ दुरूस्ती** करण्यात आलेली आहेत.

सोबत सदर अभ्यासक्रमाची प्रत जोडली आहे. तसेच विद्यापीठाच्या <u>www.unishivaji.ac.in.(NEP 2020@suk/Online</u> <u>Syllabus)</u> या संकेतस्थळावर ठेवण्यात आला आहे.

सदर अभ्यासक्रम सर्व संबधित विद्यार्थी व शिक्षकांच्या निदर्शनास आणून द्यावेत ही विनंती.

कळावे,

आपला विश्वास एस. एम. कुबल) उपकूलसचिव अंभ्यास मंडळे विभाग

सोबतः अभ्यासक्रमाची प्रत.

प्रत. माहितीसाठी व पूढील योग्यत्या कार्यवाहीसाठी.

1	अधिष्ठाता, आंतर विद्याशाखीय अभ्यास विद्याशाखा	7	संलग्नता टी. 1 व टी. 2 विभागास
2	अध्यक्ष, Education अभ्यास मंडळ	8	पी. जी. प्रवेश विभागास
3	संचालक, परीक्षा व मुल्यमापन मंडळ कार्यालयास	9	परिक्षक नियुक्ती ए व बी विभागास
4	इतर परीक्षा 02, विभागास	10	पी. जी. सेमिनार विभागास
5	पात्रता विभागास	11	नॅक विभागास
6	आय. टी. सेल विभागास		

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Under the Faculty of Interdisciplinary Studies

(As per NCTE -ITEP Amendment Regulations, 2019)

Introduced from Academic Year 2024-2025 Onwards

(Subject to the modifications made from time to time)



"A++" Reaccredited by NAAC (2021) with CGPA 3.52

SHIVAJI UNIVERSITY, KOLHAPUR

Proposal for New programme B.Sc.B.Ed (Integrated) Four year Programme

Executive summary of the Programme

National Council for Teacher Education (NCTE) has launched Integrated Teacher Education Programme (ITEP), which its flagship programme of NCTE under NEP-2020.

As per the NEP 2020 there are four stages in new school structure i.e. Foundational Preparatory, Middle and Secondary (5+3+3+4). Therefore B.Sc. B.Ed. is a Four-year dual-major holistic undergraduate degree programme is introduced for the students who choose teaching as a profession after Secondary school level, by choice. This integrated course will be benefit students since they will save one year by completing the course in 4 year rather than the customary 5 years required by the present B.Ed. programme.

This course will not only impart cutting – edge pedagogy but will also establish, a foundation in Early Childhood Care and Education (ECCE), Foundational literacy and Numeracy (FLN), Inclusive education and an understanding of India and its values /ethos/art/tradition among others. The course contributes substantially to the whole Teacher education sector. The irrespective teachers passing out of this course through a multi-disciplinary environment, grounded Indian values and traditions will be instilled with the needs at 21st century global standards hence, will be harbingers in shaping the future of new India. This programme will be four academic years with 8 semesters and students have to complete the programme with all 8 semesters. However as per the ITEP Multiple entry and Exit points and reentry options with appropriate certifications are available for this programme. As shown in Table No.1. (after Notification Government Maharashtra's NCTE and of

Sr. No.	Duration	Description	Certification received by Students
1	After completion of 1 year (2 semesters)	Award of UG certificate with 44 credits	Certificate in Physics/Chemistry/Mathematics
2	After completion of 2 years (4 semesters)	Award of UG diploma with 88 credits	Under Graduate Diploma in Physics/Chemistry/Mathematics
3	After completion of 3 years (6 semesters)	Award of UG Bachelor Degree in Major with 132 credits	B.Sc. Degree Physics/Chemistry/Mathematics
4	After completion of 4 years (8 semesters)	Dual-major Bachelor's Degree with 176 credits	B.ScB.Ed. Dual Major Holistic Bachelor Degree in Education and Science (Physics/Chemistry/Mathematics)

Table No. 1. As per NCTE B.Sc.B.Ed (ITEP) Multiple Entry and Exit Points:

Programme Need:

This is flagship programme under the NEP 2020 and according to its recommendations all Teacher Education programs will be covered into Integrated Teacher programmers by 2030.

Student Demand for Programme:

In present situation the students spend 5 years to complete B.Ed. programme after completing under-graduations. So if they enroll for this B.Sc. B.Ed. programme after 12th Standard they will save one year and get dual Major Holistic Bachelor's Degree in Education & Science.

Institutional Capacity: 50 students

Eligibility/Entry Requirements:

- Successful completion of Science Grade 12 (or equivalent stage of education such as Pre-University, Intermediate etc.) with a minimum of 50% marks in aggregate or an equivalent grade from a recognized Board / University.
- 2. Students also have to appear and able to eligible in National Level Entrance Test, which is conducted by National Testing Agency (NTA).

Programme Characteristics:

B.Sc. B.Ed. Integrated Four Years Programme aims at integrating general studies comprising Science subject, professional studies, foundations of education, pedagogy of school subject and practicum related to the task and functions of school teacher. It maintains a balance between theory and practice and coherence and integration among the components of the programme, representing a wide knowledge base of a Secondary school teacher. The programme aim at preparing teachers for secondary stages of education. On successful completion of the four-year integrated B.Sc. B.Ed. programme, student teachers will be able to develop:

1. Teaching Competency: Know, select and use of learner centered teaching methods, understanding of paradigm shift in conceptualizing disciplinary knowledge in school curriculum, necessary competencies for organizing learning experiences.

2. Pedagogical Skills: Applying teaching skills and dealing with classroom select and use of appropriate assessment strategies for facilitating learning problems.

3. Teaching through Nonconventional Modes: Evolving a system of education which enhances the potential of every learner to acquire, retain and transform knowledge leading to wisdom society through creative, experiential and joyful modes of learning.

4. Integration of Artificial Intelligence in Education: Transform the educational landscape by providing open access to quality, value based and socially relevant education to all by harnessing the disruptive potential of Artificial Intelligence.

5. Critical Thinking: Analysis of Curriculum, selecting appropriate teaching strategies according to needs of students and enhancing their critical thinking.

6. Effective Communication: Presenting seminar before peer students and teachers and practicing communication skills through various linguistic activities and applying it for better classroom communication.

7. Sensitivity Towards Inclusion: Identifying the diversities and dealing it in inclusive classrooms environment, guidance and counseling programmes for disabled students.

8. Content Analysis: Analyze the text-books and syllabus.

9. Effective Citizen Ethics: Understand different values, morality, and social service and accept responsibility for the society.

10. Self-directed Learning: Preparing scripts for seminars, lesson plans and with the help of synchronous and asynchronous learning.

11. Social Resilience: Understand about social entities and enable to tolerate absorb, cope up with adverse conditions of life.

12. Physical Development: Practice yoga, self-defense, sports and scouting-guiding.

13. Team Work: Enable to work as a member or leader in diverse teams and in multidisciplinary settings by following the principles of collaborative learning, cooperative learning and team teaching.

Program Goals and Assessment:

The four year integrated Teacher Education Programme (ITEP) is offered after Secondary level and aims at preparing committed, responsible and professional teachers through Continuous and Comprehensive evaluations.

Programme Outcomes:

PSO1: Enable to comprehend the development in physical, cognitive, social and emotional areas, contemporary issues and educational policies of education system in India, teaching-learning methods, strategies, epistemological basis of education, school management, professional ethics and observation of school activities by school internship.

PSO2: Understand the individual differences among students, measuring the programmes and administering Psychological tools, ICT based communication attainment, evaluating progress, and assessing learning abilities, guidance and teaching and lesson planning.

PSO3: Practice teaching in Schools, inculcate the real experiences of classroom teaching and online teaching for remote areas' students by using ICT and its different tools and software.

PSO4: Understand the classroom diversities and enable them to deal with diverse learners in inclusive classroom setup, education for human rights and women empowerment, environmental education and developing online content.

PSO5: Enhance discipline specific knowledge of students specifically required for science teachers while teaching at secondary school stages.

Student Preparation:

Student teachers will learn key concepts and principles of education related to different aspects of pedagogical knowledge of secondary school teachers which are necessary for effective teaching and reflective practices in schools

Regulations:

R.1 Admission

R.1.1 Admission to B.Sc. B.Ed. (Integrated) four years' programs at Shivaji University, Kolhapur, based on guidelines periodically provided by the Government of India's Ministry of Education (MoE). According to guidelines from the MoE, GoI, the number of seats in each Major Subject for the B.Sc.B.Ed program will be determined. Seats for different categories will be reserved in accordance with MoE, GoI guidelines as they become available.

R.1.2 The requirements set forth by the admission authority, which is periodically assigned by the MoE, GoI, must be met in order to be eligible for admission.

R.1.3 The chosen applicants cannot be admitted to the B.Sc. B.Ed. program unless they have fulfilled all entrance requirements set forth by Shivaji University, Kolhapur, and have paid the necessary fees.

R.1.4 In all cases pertaining to admission to the B.Sc.B.Ed. Program, the University will make the final decision as per the MoE and GOI rules.

R.1.5 Even after a candidate has been admitted, the Head of the Department of Education at Shivaji University may cancel the candidate's admission and report the incident to the appropriate authorities if it is discovered that the candidate has not met any of the requirements set forth by the University or any other body or organization that the MoE/the Institute has entrusted with the admission process.

R.1.6 Shivaji University sets its own fees based on periodic orders from the Ministry of Education, Government of India.

R.1.7 At the time of admission, the student must select the Dual-Major subjects for the B.Sc. B.Ed. program from the available options in accordance with the eligibility requirements.

Registration and Enrollment

R.2.1 A student's selection of courses to be credited in the following semester in accordance with the applicable curriculum using the University's Admission Management System (AMS) within the time frame allotted by the Academic Section is referred to as registration. The act of physically reporting pupils to the Admission committee on the day designated by the academic section just before to the start of the semester is known as enrollment.

R. 2.2 A B.Sc.B.Ed. student may register a maximum of the regular credits for that semester, as specified by the applicable curriculum, excluding the eighth semester. However, students may overload one subject in addition to the customary credit for the semester if they are repeating failed courses or crediting dropped courses together with regular courses.

R.2.3 According to R.10, a student who receives a W/F for a core course is required to retake it. According to R.10, a student who receives a W/F in an elective course may choose to retake the course or, with the HoD's recommendation, enroll in a different elective.

R.2.4 Subject to the maximum number of courses allowed in R.5.2, registration for higher-semester courses is only allowed after registering for all pending core courses from lower semesters that are being offered at the moment.

R.2.5 Registration for courses in a higher semester is only allowed until all outstanding core courses from lower semesters that are currently being offered have been completed, up to the maximum number of courses allowed under R.5.2.

R.2.6 A student shall be eligible for registration and enrolment only if the minimum requirement to continue the programme as per regulation R.3 is satisfied cleared all the dues in the department, hostel, and library up to the end of the previous semester not debarred from enrolment by disciplinary action of the University completed the course feedback on the courses registered in the previous semester, as notified by the Academic Section paid all the tuition fees and all other relevant fees, if any, prescribed by the University.

R. 2.7 If it is discovered that any of the requirements in R.2.6 were broken at the time of registration, the Institute retains the right to cancel the student's registration for a semester that follows, barring the case where the initial registration was made with the express consent required by University regulations.

R. 3 Minimum Requirement to Continue the Programme

R.3.1 A student admitted to B.Sc.B.Ed. programme in the first semester can continue up to the 8th semester, in ascending order, subject to the following conditions: Successfully maintained registration for all the semesters.

Registration to the fourth-level courses shall be permitted only after successfully completing all courses up to and including the second-level courses.

R.4 Maximum Duration for Completion of the Programme

The B.Sc.B.Ed. Curriculum typically lasts eight semesters, or four years. A student may, nonetheless, take longer to finish the program at a slower pace; however, this should not exceed sixteen semesters (eight years), without including withdrawn semesters (temporary discontinuance per R.5 for medical reasons). However, in order to avoid the processes associated with registration cancellation, students must satisfy R.3.

R.5 Temporary Discontinuation

5.1 On the permission of the HoD, a student may be allowed to temporarily withdraw from the program for a maximum of two semesters due to illness or other medical conditions. When a student takes a leave from school due to illness, they must provide the required medical records and certifications from the treating physician, along with a clear justification for the break's duration. The Institute's Medical Officer should properly endorse the medical certificate. A fitness certificate from the student's treating physician, endorsed by the Institute's Medical Officer, is required before the student can return. Only two of these brief stops will be permitted for the duration of the event.

5.2 When a student is permitted to resume the program after the period of discontinuation, they must register for the approved equivalent courses (meeting the credits) as per the curriculum/syllabi, following the HoD's advice in the event that the curriculum or syllabus changes during the period of discontinuation.

5.3 In order to keep their program registration active until they resume their regular academic activities, students who are requesting a temporary cessation must pay the appropriate fees. The costs for regular students must be paid after they re-enroll following a brief break.

R. 6 Attendance and Leave

R.6.1 It is expected of students to attend every session of the courses for which they have signed up. As per the usual policy of the Institute, students who have completed 90% of their practicum and at least 80% of their classes are qualified to write the end-semester examinations for any course. The HoD may, however, set the attendance requirement for their courses in a way that does not go above the 80% threshold for theory. Students will be informed of the course's attendance rules during the first class. It needs to be submitted later and approved at the initial meeting. If a student cannot attend classes due to medical issues or other compelling reasons, a leave application as detailed below, must be submitted to the HoD. Application for any leave shall be submitted within five instructional days after returning from leave or on or before the last instructional day of the semester, whichever is earlier. Application for leave applied for. The student is expected to inform the course faculty before proceeding on medical leave under normal circumstances.

R.6.2 A student is not entitled to appear for the end-semester test for a course in which their attendance for any registered course throughout a semester falls below 80% or the limit set by the HoD, unless the absence is excused in accordance with the regulations. With the exception of first semester students, the percentage of attendance will be determined by counting the number of classes held starting on the day the semester officially began, in accordance with the academic calendar. For first-semester students, the count begins on the date of the student's admittance to the department or the first day of classes, whichever comes first.

R.6.3 On or before the last day of instruction, students whose attendance falls below 80% or the cap set by the course faculty for any course registered in a semester must notify their instructor of the attendance shortfall.

R.6.4 Students who register for any course in a semester and have attendance below 80% or the cap set by the course faculty may be eligible to have their lack of attendance excused and therefore take the course exam at the end of the semester, provided they meet the requirements below. The attendance in that semester for the course concerned, without applying any condonation, is not less than 50% of the total classes handled for that course.

Attendance after applying for a medical exemption, which is greater than 80% of the cap set by the relevant authorities, and for co-curricular and extracurricular activities, which is based on permission from the appropriate authorities (maximum limit: 10% of classes taught by the course faculty).

R. 6.5 Should a course have a set attendance requirement, all requests for the HoD to be consulted regarding the excused absences must be made. Before the date of the course's end-of-semester exam, the HoD will review these requests and any accompanying documentation and determine whether or not the absence is excused. Students may file an application with the university's Grievance Committee if they have a grievance against a decision.

R. 6.6 Duty leave for on-the-job training placement activities is available to students who have enrolled in the University's Center for Career Development (CCD) for internship or placement-related activities, subject to the actual absence from class for these activities, for a maximum of ten days per semester. To validate the claims made by the pupils, CCD will furnish the relevant departments and schools with the attendance statistics on a day-by-day and company-by-company basis.

Exam	Nature	Marks
Theory Exam	Theory Exam 50 Marks Course	(40+10(Internal) = 50 Marks)
	Theory Exam 100 Marks Course	(80+20 (Internal) = 100 Marks)
Practical Exam	I Year : Internal Exam (Two Practical= 03+03 hrs = 06 hrs)	(50+50 = 100 Marks)
		(50+50 = 100 Marks)
	II Year: External & Internal Both (Two Practical= 03+03 hrs = 06 hrs)	(50+50 = 100 Marks)
	III Year: External & Internal Both (Two Practical= 03+03 hrs = 06 hrs)	(50+50 = 100 Marks)

7. Examination

Semester Examination has following nature of Question paper and Practicum

Nature of Question Paper Education/Science (Major Subject)

Theory	40
Internal Exam/ Assignment	10
Total	50

Q.1 Fill in the blanks by selecting correct alternative - (Multiple Choice) (4 Marks)

1)	
2)	
3)	
4)	
Q.2 Short Questions	(4 Marks)
1)	(2 Marks)
2)	(2 Marks)
Q.3 Attempt two out of three	(8 Marks)
1)	(4Marks)
2)	(4Marks)
3)	(4Marks)
Q. 4 Attempt three out of four	(24 Marks)
1.	(8 Marks)
2.	(8 Marks)
3.	(8 Marks)
4.	(8 Marks)

Nature of Question Paper Education/Science

Theory	80
Internal Exam/ Assignment	20
Total	100

Q.1 Fill in the blanks by selecting correct alternative - (Multiple Choice) (8 Marks)

1)	
2)	
3)	
4)	
5)	
6)	
7)	
8)	
Q.2 Short Questions	(8 Marks)
1)	(2 Marks)
2)	(2 Marks)
3)	(2 Marks)
4)	(2 Marks)
Q.3 Attempt two out of three	(16 Marks)
1)	(8 Marks)
2)	(8 Marks)
3)	(8 Marks)
Q. 4 Attempt three out of four	(48 Marks)
1.	(16 Marks)
2.	(16 Marks)
3.	(16 Marks)
4.	(16 Marks)

Nature of Question Paper Environment Studies

Theory	25
Internal Exam/ Assignment/ Project	25
Total	50

Q.1 Fill in the blanks by selecting correct alternative - (Multiple Choice)	(5 Marks)
1)	
2)	
3)	
4)	
5)	
Q.2 Write short notes on(Any 2)	(10 Marks)
1)	
2)	
3)	
4)	
Q.3 Long answer question	(10 Marks)
OR	

Long answer question

(10 Marks)

Method of Grading

R. **8.1** Based on the each semester performance, every student will be awarded a final letter grade for each course, where the letter grades will correspond to the grade points as shown below.

Aggregate of Total marks	Letter Grade	Grade points
75-100	0	10
60-74	А	9
55-59	B+	8
50-54	В	7
40-49	С	6
40 and less	F (Failure to credit the course)	0
below of 80% in Theory 90%	W (Insufficient attendance)	0
Practicum		
Not Submitted Practicum or Give	I (Incomplete assessment)	0
Theory Paper		

A student is said to have credited a course or earned credits in respect of a course when a grade other than F, W, or I is secured for that course.

R. 9 Grade Point Average

R. 9.1 The performance of a student in a semester is indicated by the Semester Grade Point Average (SGPA), which is given as

 $SGPA = \frac{\Sigma(C^*GP)}{\Sigma C}$

where C is the number of credits for a course, GP is the grade point scored by the student for that course, and the summation is for all courses registered by the student in the relevant semester.

R.9.2 The performance of a student up to and including a particular semester is indicated by the

Cumulative Grade Point Average (CGPA), which is given as

$$CGPA = \frac{\Sigma(C^*GP)}{\Sigma C}$$

where C is the number of credits for a course, GP is the grade point scored by the student for that course, and the summation is for all courses registered by the student up to and including the relevant semester.

R.9.3 The CGPA is not convertible to a percentage. However, notionally, the CGPA may be

multiplied by a factor of 10 to obtain a numerical percentage.

R. 10 Class/Division

R.10.1 At the end of the programme, the Class/ Division awarded by the Institute shall be based on

CGPA as follows. First Class with Distinction: CGPA \geq 7.5 First Class: 7.5> CGPA \geq 6 and Second Class: 6 > CGPA \geq 5

R. 11 Transfer of Credits

R.11.1 Within the broad framework of these regulations, university authorities may permit students to earn part of the credit requirements in other approved institutes of repute and status in the country or abroad. The appropriate credit mapping in the above cases will be done based on the recommendations from authorities.

R. 12 Eligibility for the Award of B.Sc./B.Sc.B.Ed. Degree

A student becomes eligible for the award of the B.Sc./B.Sc.B.Ed. Degree when

- (i) credited all the courses in the respective levels as per the curriculum within the stipulated time
- (ii) acquired the Major-wise minimum credits in the relevant B.Sc.B.Ed. curriculum
- (iii) no dues to any Departments/Sections of the University, including hostels
- (iv) no disciplinary action is pending

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"A++" Reaccredited by NAAC (2021) with CGPA 3.52 SHIVAJI UNIVERSITY, KOLHAPUR B.Sc.B.Ed. Four Year Integrated Programme Introduced from Academic Year 2024-2025 Onwards

Structure of Semester-I						
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week
Student Induction Programme					80	40 (2 Weeks)
		Educati	on Major			
Foundations of Education	F-I	Evolution of Indian Education	100 (T 80+P 20)	04	60	06
		Discipli	ne Major			
		A-Physics-I ; Mechanics	50			
Disciplinary		B-Chemistry- I ; Inorganic Chemistry-I C-Mathematics- I; Basic Algebra	(40+10)	02	30	04
/ Inter-	D-I	A-Physics-II ; Electricity & Magnetism-I	50			
disciplinary Courses		B-Chemistry- II ; Organic Chemistry -I C-Mathematics- II; Calculus	(40+10)	02	30	04
	Practicum	Laboratory work-I	100	04	120	08
		(Physics/ Chemistry/ Mathematics)				
	AEVC-I	Language-I (as per the 8th schedule of constitution of India)	100 (T 80+P 20)	04	60	06
Ability Enhancement	AEVC -II	Art Education (Performing and Visual)-I	50 (I 25+ E 25)	02	30	04
& Value- Added Courses	AEVC -III	Understanding India (Indian Ethos and Knowledge Systems)-I	50 (T 40+P 10)	02	30	04
	AEVC -IV	Personality Development and Yoga	50 (I 25+ E 25)	02	30	04
Self-Study	SS-I	Good Governance	Student	t required to	qualify the inte	ernal exam.
	Total = 550 22 390 40					

Structure of Semester-II						
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week
		A-Physics-III ; Properties of Matter B-Chemistry- III ; Physical Chemistry-I C-Mathematics- III; Differential Equations-I	50 (40+10)	02	30	04
Disciplinary / Inter-		A-Physics-IV ; Electricity and Magnetism II B-Chemistry-IV ; Analytical Chemistry-I C-Mathematics-IV ; Differential Equations-II	50 (40+10)	02	30	04
disciplinary Courses	D-II	A-Physics-V; Thermal Physics and Statistical Mechanics–I B-Chemistry- V ; Physical Chemistry-II C-Mathematics-V; Discrete Mathematics	50 (40+10)	02	30	04
		A-Physics-VI; Thermal Physics and Statistical Mechanics–II B-Chemistry- VI ; Industrial Chemistry C-Mathematics-VI; Differential Calculus	50 (40+10)	02	30	04
	Practicum	Laboratory work-II (Physics/Chemistry/Mathematics)	100	04	120	08
Stage-Specific Content- cum- Pedagogy	AEVC-V	Language-II (Other than Language-I)	100 (T80+P20)	04	60	04
Ability	AEVC-VI	Understanding India (Indian Ethos and Knowledge Systems)	50 (T40+P10)	02	30	04
Enhancement & Value-	AEVC-VII	Teacher and Society	50 (T40+P10)	02	30	04
Added Courses	AEVC-VIII	Event Management	50	02	30	04
Self-Study	SS-II	Constitution of India	Student required to qualify the internal example			ernal exam.
		Total =	550	22	390	40

Structure of Semester-III							
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week	
Foundations of Education	F-III	Child Development & Educational Psychology	100 (T80+P20)	04	60	06	
		A-Physics-VII ;Waves and Optics – I B-Chemistry-VII ;Physical Chemistry C-Mathematics-VII ;Numerical Methods	50 (40+10)	02	30	04	
Disciplinary	D-III	A-Physics-VIII ; Waves and Optics – II B-Chemistry-VIII ;Analytical Chemistry C-Mathematics-VIII ;Linear Algebra	50 (40+10)	02	30	04	
/ Inter- disciplinary Courses		A-Physics-IX ;Mathematical Physics and Classical Electrodynamics B-Chemistry-IX ;Inorganic Chemistry C-Mathematics-IX ;Modern Algebra	50 (40+10)	02	30	04	
		Laboratory work-III (Physics/Chemistry/Mathematics)	50	02	60	04	
	Practicum	Laboratory work-IV (Physics/Chemistry/Mathematics)	100	04	120	08	
Stage-Specific Content-cum- Pedagogy	SSCCP-I	Stage-Specific Content-cum- Pedagogy Courses-I	100 (T80+P20)	04	60	06	
Ability Enhancement & Value-Added Courses	AEVC-IX	Environmental Studies-I	50 (I 25+ E25)	02	30	04	
Total = 550 22 420 40							

Structure of Semester-IV						
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week
Foundations of Education	F-IV	Philosophical & Sociological Perspectives of Education-I	100 (T80+P20)	04	60	06
		A-Physics-X ; Quantum Mechanics B-Chemistry-X ; Organic Chemistry C-Mathematics-X ; Real Analysis	50 (40+10)	02	30	04
Disciplinary / Inter- disciplinary Courses	D-IV	A-Physics- XI ; Classical Mechanics B-Chemistry- XI ; Inorganic Chemistry C-Mathematics- XI ; Integral Calculus	50 (40+10)	02	30	04
		A-Physics-XII ; Digital and Analog Electronics B-Chemistry- XII ; Physical Chemistry C-Mathematics- XII; Integral Transform	50 (40+10)	02	30	04
	Practicum	Laboratory work-V (Physics/Chemistry/Mathematics)	50	02	60	04
		Laboratory work-VI (Physics/Chemistry/Mathematics)	100	04	120	08
Stage-Specific Content- cum- Pedagogy	SSCCP-II	Stage-Specific Content-cum- Pedagogy Courses-II	100 (T80+P20)	04	60	06
Ability Enhancement & Value- Added	AEVC-X	Environmental Studies-II	50 (I 25+ E25)	02	30	04
Courses						
	Total = 550 22 420 40					

Structure of Semester-V						
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week
		Physics/Chemistry/ Mathematics -XIII	50 (40+10)	02	30	04
		Physics/Chemistry/ Mathematics -XIV	50 (40+10)	02	30	04
	D-V	Physics/Chemistry/ Mathematics -XV	50	02	30	04
Disciplinary / Inter- Disciplinary Courses		Physics/Chemistry/ Mathematics -XVI	50 (40+10)	02	30	04
Courses	Practicum	Laboratory work-VII Physics/Chemistry/ Mathematics	100	04	120	08
Stage- Specific Content- cum- Pedagogy	SSCCP - III	Stage-Specific Content- Cum- Pedagogy Courses-II	100 (T 80+P 20)	04	60	04
Ability Enhancement &	AEVC - XI	ICT in Education	50 (I 25+ E 25)	02	30	04
Value- Added Courses	AEVC - XII	On Job Training-	50 (I 25+ E 25)	02	30	04
School Experience	SE-I	Pre-Internship Practical (Demonstration lessons, Peer teaching)	50	02	30	04
	То	tal=	550	22	390	40

Structure of Semester-VI						
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week
Foundations of	F-V	Assessment & Evaluation	50 (T 40+P 10)	02	30	04
Education	F-VI	Inclusive Education	50 (T 40+P 10)	02	30	04
Dissinlingw	D-VI	Physics/ Chemistry/ Mathematics -XVII	50 (40+10)	02	30	04
/ Inter- disciplinary Courses		Physics/ Chemistry/ Mathematics -XVIII	50 (40+10)	02	30	04
	Practicum	Laboratory work- VIII (Physics/ Chemistry/ Mathematics)	100	04	120	08
Stage- Specific Content- cum- Pedagogy	SSCCP -IV	Stage-Specific Content-cum- Pedagogy Courses-IV	100 (T 80+P 20)	04	60	04
Ability Enhancement &	AEVC - XIII	Mathematical & Quantitative Reasoning	50 (T 40+P 10)	02	30	04
Value- Added Courses	AEVC –XIV	Instructional Aids Workshop	50	02	30	04
School Experience	SE-II	School Observation (Field Practice)	50	02	30	04
		Total=	550	22	390	40

	Structure of Semester-VII						
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week	
	F-VII	Perspectives on School Leadership and Management	50 (T 40+P 10)	02	30	02	
Foundations of Education	F-VIII	Curriculum Planning & Development (textbooks , material development, etc.) - (Stage Specific)	50 (T 40+P 10)	02	30	02	
Ability Enhancement & Value- Added	AEVC –XV	Art Education (Performing and Visual)	50 (I 25+ E 25)	02	30	04	
Courses	AEVC -XVI	Sports, Nutrition and Fitness	50 (I 25+ E 25)	02	30	04	
	AEVC – XVII	STEM Pedagogy	50 (I 25+ E 25)	02	30	04	
School	SE-III	School-based Research Project	50	02	60	06	
Experience	SE-IV	Internship in Teaching	250	10	180	18	
	Total=		550	22	390	40	

		Structure	of Semester-VI	II		
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week
	F- IX	Philosophical & Sociological Perspectives of Education -II	(T 80+P 20)	04	60	06
	F- IX	Education Policy Analysis	50 (T 40+ P 10)	02	30	04
Foundations of Education	OE-I	One Elective from the offered courses as per the choice of student-teachers a)Education for Sustainable Development b)Guidance and Counselling	100 (T 80+P 20)	04	60	06
		c)Economics of Education				
Ability	AEVC - XVIII	Yoga and Understanding Self	50 (I 25+ E 25)	02	30	06
Enhancement &	AEVC -XIX	Citizenship Education, Sustainability and Environment Education	50	02	30	04
lue- Added Courses			(T 40+P 10)			
	AEVC - XX	Experiential Learning	50 (T40 + P 10)	02	30	04
		Interview Skills				
	SE-V	Post Internship (Review and Analysis)	50	02	30	02
School Experience	SE-VI	Creating Teaching Learning Material/Work Experience (Educational Toy making, local/traditional vocations, etc)	50	02	30	02
Community Engagement and Service	CE-I	Community Engagement and Service (Participation in NSS- related activities, New India Literacy Programme etc.)	50	02	90	06
		Total=	550	22	390	40

B.Sc. B.Ed. Four Year Integrated Programme Introduced from Academic Year 2024-2025 Onwards

	Structure of Semester-I							
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week		
Student Induction Programme					80	40 (2 Weeks)		
		Education	Major					
Foundations of Education	F-I	Evolution of Indian Education	100 (T 80+P 20)	04	60	06		
		Discipline	Major					
		A-Physics-I ; Mechanics	50					
	D.L	B-Chemistry- I ; Inorganic Chemistry-I	(40,10)	02	30	04		
Disciplinary		C-Mathematics- I; Basic Algebra	(40+10)					
/ Inter-	D-I	A-Physics-II ; Electricity & Magnetism-I	50					
disciplinary		B-Chemistry- II ; Organic Chemistry -I	(40 ± 10)	02	30	04		
Courses		C-Mathematics- II; Calculus	(40+10)					
	Practicum	Laboratory Work- I	100	04	120	08		
	Tucucum	(Physics/ Chemistry/ Mathematics)	100	04	120	00		
	AEVC-I	Language-I (as per the 8th schedule of constitution of India)	100 (T 80+P 20)	04	60	06		
		Art Education (Performing and Visual)-I	50					
Ability Enhancement &	AEVC -II		(I 25+ E 25)	02	30	04		
Value- Added Courses	AEVC -III	Understanding India (Indian Ethos and Knowledge Systems)-I	50 (T 40+P 10)	02	30	04		
		Personality Development and Yoga	50					
	AEVC -		(I 25+ E 25)	02	30	04		
Self-Study	SS-I	Good Governance	Stu	dent require	d to qualify the	internal exam.		
	Total = 550 22 390 40							

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I

Total Marks	100	Credits	4
Total Hours	60	Hours Per Week	6
Internal Exam Marks	20	External Exam Marks	80
		Duration of External	3 Hour
		Examination	

Title of the Paper: (F-I) Evolution of Indian Education

Learning Outcomes:-

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

a. Discuss genesis, vision and evolution of education in ancient India special reference to Vedic period with its silent features, Teaching and Learning Process, Finances and Management, Educational institutions, Guru-Shishya to the contemporary India.

b. Discuss genesis, vision and evolution of education in ancient India special reference to Buddhist and Jain Period with its silent features, Teaching and Learning Process, Finances and Management, Educational institutions, Guru-Shishya to the contemporary India.

c. Discuss genesis, vision and evolution of education in ancient India special reference to Post-Gupta Period to Colonial Period with its silent features, Teaching and Learning Process, Finances and Management, Educational institutions, Guru-Shishya to the contemporary India.

d. Discuss genesis, vision and evolution of education in ancient India special reference to

Post- Modern Indian Education with its Colonial Education.

e. Examine the Shiksha ka Bhartiyakaran special reference to Swadeshi and Nationalist attempts of educational reforms.

f. Describe the Education in Independent India

b. Enable them to shape their educational perspective to act as an effective teacher.

Course Content:

UNIT:I- Ancient Indian Education: Vedic Period

- a. Vision, objectives and salient features of Vedic Education System.
- b. Teaching and Learning Process.
- c. Development of educational institutions: Finances and Management.
- d. Famous Educational institutions and Guru-Shishya.
- e. Education at the time of Epics: Ramayana and Mahabharata.

UNIT:II -Ancient Indian Education: Buddhist and Jain Period

a. Vision, objectives and salient features of Buddhist and Jain Education System.

- b. Teaching and Learning Process.
- c. Finance and Management of Educational Institutions.
- d. Educational Institutions: Nalanda, Taxila, Vikramshila, Vallabhi, Nadia.
- e. Famous Guru-Shishya.

UNIT:III- Post-Gupta Period to Colonial Period

a.Vision, objectives, brief historical development perspective as well as salient features of Education in India.

b. Teaching and Learning Process.

c.Finance and Management of educational institutions.

UNIT: IV- Modern Indian Education

a. Colonial Education in India-

• Woods Despatch, Macaulay Minutes and Westernization of Indian Education

b. Shiksha ka Bhartiyakaran (Indigenous Interventions in Education)-

(Bird's eye view of their contribution)

- Swadeshi and Nationalist attempts of educational reforms with special reference to

general contribution of Indian thinkers –Savitribai and Jyotiba Phule, Rabindranath Tagore, Swami Vivekananda, Mahatma Gandhi, Sri Aurobindo, Gijubhai Badheka, Pt. Madanmohan Malaviya, Jiddu Krishnamurti and Dr. Bhima Rao Ambedkar others – to the education systems of India.

c. Education in Independent India-

- Overview of Constitutional values and educational provisions.
- Citizenship Education:
 - Qualities of a good citizen.
 - Education for fundamental rights and duties.
- Overview of 20th Century Committees, Commissions and Policies.
- UEE, RMSA, RTE Act 2009: Overview and impact.

- NEP 2020: vision and implementation for a vibrant India.

SESSIONAL / PRACTICUM WORK: (ANY TWO)

1. Prepare a report highlighting educational reforms with special reference to school education in the light of NEP 2020.

2. Critically analyze the concept of good citizen from the perspective of education for democratic citizenship.

3. Compare vision, objectives, and salient features of education during different periods.

4. Working out a plan to develop awareness, attitude and practices related to Fundamental Rights or fundamental duties or democratic citizenship qualities,

execute it in the class and write the details in form of a report. 5. Sharing of student experiences (in groups) related to Indian constitutional

values, help them to reshape their concept and enable them to develop vision, mission and objectives for a school and their plan to accomplish the objectives in form of a group report.

6. Analyses of current educational strengths and weaknesses of one's own locality and work out a critical report.

7. Visit to places of educational significance and value centers and develop a project report.

8. Observation of unity and diversity in a social locality and matching it with unity and diversity in the class and work out a plan for awareness for nationalemotional integration for class to develop awareness, attitudes, skills, and participatory values, execute it in the class and report the details.

TRANSACTIONAL MODE:

The course content transaction will include the following:

• Planned lectures infused with multimedia /power-point presentations.

• Small group discussion, panel interactions, small theme-based seminars, group discussions, cooperative teaching and team teaching, selections from theoretical readings, case studies, analyses of educational statistics and personal field engagement with educationally marginalized communities and groups, through focus group discussion, surveys, short term project work etc.

• Hands on experience of engaging with diverse communities, children and schools.

ESSENTIAL READINGS :

- 1. Altekar A.S. (1975). Education in Ancient India (7 th Ed.). Varanasi : Monohar Prakashan.
- 2. Ambedkar, B.R., (1956). Goutam Buddha and His Dhamma. Delhi : Government Press.
- 3. Bhuvanbhansoorishwarji, Acharyadeo (1987) A Handbook of Jainology. Gujrat: Shri Vishvakalyan Prakashan Trust
- 4. Bruner, J.S.(1996), The Culture of Education .Cambridge, M.A.: Harward University

Press.

- 5. Das S. K. (Ed.)(1996) English Writtings of Rabindranath Tagore.New Delhi: Sahitya Academy
- 6. Dearden R.F. (1984). Theory and practice in Education. United Kingdom :Routledge.
- Dewey, John (1930) Democracy and Education : An introduction to the Philosophy of Education. New York: Macmillan. Dewey, John. (1929) Human Nature and Conduct. New York: Modern Library
- 8. Dupuis Adrian and Bordberg Robert (1968) Philosophy and Education Milwauikee : The Bruce Publishing Company.
- 9. Gandhi M. K.(1983) An Autobiography Or The Story of My Experiments With Truth Ahemadabad: Navjeevan Pub. House Narayan Shriman (Ed.) The Selected Works of Mahatma Gandhi. Ahemadabad:Navajeevan Publ.
- 10. Palmer, Joy A (2001). Fifty Modern thinkers on Education: From Piaget to the Present London: Routledge
- 11. Perters, R.S. (ed), (1975). The Philosophy of Education. London: Oxford University Press
- 12. Perters R.S. (1967), The Concept of Education, United Kingdom: Routledge.
- 13. Sharif Ja'far (1972) Islam in India Delhi: Oriental Books
- 14. Tagore Rabindranath (1972) Sadhana.Madras: Macmiilan ISSD Press 18
- 15. Weber Christian (1960) Basic Philosophies of Education. New York : Holt, Rinehart & Winston Inc. Wilds Elmer & Lottich Kenneth (4 th Ed) (1970) The Foundations of Modern Education. New York: Holt, Rinehart & Winston Inc.

REFERENCES:

- Banrs, J.A.(1996) Cultural Diversity and Education: Foundations Curriculum and Teaching (4th Ed.) Boston: Alynand, Becon. Beyer, L.E.(ed.) (1996) Creating Democratic Classrooms: The Struggle of Integrate Theory and Practice. New York: Teachers College Press.
- 2. Bruubacher, John S.; (1969) Modern Philosophies of Education. New Delhi: Tata McGraw- Hill, Publishing Company Pvt. Ltd.,
- 3. Butchvarov, P.(1970) The Concept of Knowledge. Evanston, Illinois, North Western University Press.
- 4. Debra Heyes, Martin Hills, Pam Chistie and Bob Lingard (2007) Teachers and schooling; Making a Difference.Australia: Allen and Unwin.
- 5. Dewey, John. (1962) Reconstruction in Philosophy . Boaston: Beaon Press
- 6. Hamilto E. AndCairns (1961)The Collected Dialogues of Plato. New York:Bollingen Foundation
- 7. Kriplani K. (1960) Men are Brothers: Life and Thoughts of Mahatma Gandhi as Told in His Own Words. Ahemadabad: Navjeevan Pub. House
- 8. Matheson, David (2004) An Introduction to the study of Education (2 nd eddition). David Fulton Publish.
- 9. Sangave Vilas(1959) Jain Community; A Social Survey Bombay: Popular Book
- 10. Sri Aurobindo (1971) The Synthesis of Yoga .Pondechery:Sri Aurobindo Ashram Trust Sri Ramkrishna Math ((2004) Inspired Talks. Chennai: Sri Ramkrishna Math
- 11. Winch, C. (1 st Editon) (1996). Key Concepts in the philosophy of education London:. Routledge.
- 12. Winch, C. (1986). Philosophy of HumanLlearning, London: Routledege.

Mode of Assessment

The assessment will be based on the seminar, tests and assignments.

B.Sc. B.Ed.(Integrated) Four Years Programme Semester-I Title of the Paper: (D-I: PHYSICS PAPER-I) Mechanics

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes: After going through the course, the student should be able to

- Understand and identify scalar and vector physical quantities in mechanics
- Understand and apply vector algebraic methods to elementary exercises in mechanics
- Apply Kepler's law to describe the motion of planets and satellites in circular orbit, through the study of the law of Gravitation.
- understand simple concepts like weightlessness, Geosynchronous satellites and GPS
- Understand the conceptual evolution of conservation laws of momentum and energy for both single and system of particles
- Understand and apply concepts of rotational motion
- Write the expression for the moment of inertia about the given axis of symmetry for
- Different uniform mass distributions.

Unit No.	Topics	Total Lectures
Unit I	1. Vector Algebra Revision - (Vector Algebra: Components of vectors and unit vector, Addition and subtraction of vectors), Scalar product, Vector product and their properties, Scalar triple product and its physical significance,	15

	Properties of scalar triple product. Vector triple product. Properties of	
	vector triple product	
	vector triple product.	
	2. Gravitation Newton's law of gravitation, Motion of a particle in a central force field (motion in a plane, angular momentum is conserved), Kepler's laws (statement only), Satellite in circular orbit and applications, Geosynchronous orbits, Weightlessness, Basic idea of global positioning system (GPS).	
Unit II	 Momentum and energy Conservation of linear and angular momentum, work and energy theorem, conservation of energy (Single particle), Dynamics of a system of particles (linear momentum, angular momentum and energy), Center of mass, Motion of rockets (qualitative treatment only). Prototional motion 	15
	2. Rotational motion Angular velocity, Angular momentum and torque, Kinetic energy of rotation and moment of inertia, Moment of inertia of a spherical shell and solid cylinder (only about axis of symmetry), Motion of spherical shell and solid cylinder rolling down an inclined plane.	

REFRENCES:

- Rajput B. S., (2013, 25th edition). Mathematical Physics. Pragati Prakashan,: Meerut.
- Gupta, B. D. (2009, 3rd edition) Mathematical Physics., Vikas Publishing House Pvt. Ltd., New Delhi.
- Gupta, P. P., Yadav, R. P. Malik S. G. S., (1983-84, 4th edition,). Mathematical Physics. Kedar Nath Ram Nath, Meerut, Delhi.
- Edward M. Purcell, (1986) Electricity and Magnetism. McGraw-Hill Education.
- Fewkes J.H. & Yarwood, J. (1991). Electricity and Magnetism, Vol.I, . Oxford University Press.
- Tayal, D. C. (1988). Electricity and Magnetism. Himalaya Publishing House.
- Ronald Lane Reese (2003). University Physics. Thomson Brooks/Cole.
- Khare and Shrivastav (1976). Electricity and Magnetism ,. Atma Ram & Sons, Delhi.
- Young and Freedman (9th Edition). University Physics.

B.Sc. B.Ed.(Integrated) Four Years Programme Semester-I Title of the Paper: (D-I: PHYSICS PAPER-II) Electricity and Magnetism I

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes: After going through the course, the student should be able to

- Understand the physical significance of gradient, divergence and curl
- Apply concepts in vector calculus such as gradient, divergence and curl related to vector
- apply concepts in vector calculus such as gradient, divergence and curl related to vector and scalar fields using Gauss, Stokes and Green's theorem
- Understand and apply concepts of the electrostatic field, potential to point charges, electric dipole and geometrically regular charged bodies
- Understand and apply the concept of energy density in an electric field
- Students are capable of applying the above concepts to solve numerical exercises in electrostatics and magnetostatics

Unit No.	Topics	Total Lectures
Unit I	1. Vector algebra Del operator, Gradient of a scalar field and its physical significance, Divergence of vector field and its physical significance, Curl of vector field, Line, surface and volume integral (definitions only), Gauss divergence theorem and Stoke's theorem (statements only).	15

	2. Electrostatics Coulomb's law, Electrostatic field, electric flux, Gauss's theorem of electrostatics, electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere, calculation of electric field from potential.	
Unit II	1. Dielectrics Dielectric medium, Polarisation vector, Displacement vector, Electric vector, Relation between E, P and D vectors, Electric susceptibility of dielectrics.	
	2. Magnetostatics Introduction to magnetization and intensity of Magnetization, Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current, Divergence and curl of magnetic field, Magnetic vector potential, Ampere's circuital law.	15

Reference Books:

- Rajput, B. S. (2013, 25th edition). Mathematical Physics. Pragati Prakashan, Meerut.
- Gupta, B. D. (2009, 3rd edition). Mathematical Physics. Vikas Publishing House Pvt. Ltd., New Delhi.
- Gupta, P. P. Yadav, R. P. S. Malik, G. S. (1983-84). 4th edition, Mathematical Physics. Kedar Nath Ram Nath, Meerut, Delhi.
- Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education. 5. Electricity and Magnetism, J.H. Fewkes & J. Yarwood. Vol.I, 1991, Oxford University Press.
- Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
- Electricity and Magnetism ,Khare and Shrivastav. Atma Ram & Sons, Delhi, 1976
- University Physics 9th Edition , Young and Freedman

B.Sc. B.Ed.(Integrated) Four Years Programme Semester- I Title of the Paper: (PHYSICS, PRACTICAL-I) Laboratory Course-I

Total Marks	100	Credits	4
Total Hours	120	Hours Per Week	8
Internal Exam	-	External Exam	100
Marks		Marks	
		Duration of External	4 + 4 Hours
		Examination	

Learning Outcomes: After going through the course, the student should be able to

- Acquire skills in setting up experiments.
- Develop practical skills and techniques for accurate measurements.
- Acquire observational skills
- Determine the least counts of different measuring instrument

C.		
Sr.	Name of experiment	
No.		
1	To determine MI of disc using annular ring	
2	To determine g' by Bar Pendulum.	
	To study the motion of a spring and calculate (a) spring constant (b) value of	
3	g.	
4	To determine _g' by Kater's Pendulum.	
5	Exponential decay of amplitude of simple pendulum.	
6	To study different types of resistors and capacitors.	
7	To determine the resistance of galvanometer using PO box.	
8	Measurement of field strength B and its variation in a solenoid (Determine	
	$d\mathbf{B}/d\mathbf{x}$).	
9	To determine frequency of A. C. mains by sonometer (magnetic material of	
	wire).	
10	To determine frequency of A. C. mains by sonometer (non-magnetic material)	

Part I

Part -	-II
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Sr. No.	Name of experiment
1	To determine coefficient of viscosity by Poiseuille's method.
2	To determine Y by method of bending
3	Surface tension by Jaeger's method.
4	To determine Poisson's ratio of rubber (rubber tube).
5	Young's modulus of material of bar by vibration.
6	To determine impedance of series LCR circuit.
7	To study the series LCR circuit.
8	To study a parallel LCR circuit.
9	To determine constants of B. G.
10	Study of transformers

Reference Books:

- Advanced Practical Physics for students, B.L.Flint & H. T. Worsnop, 1971, Asia Publishing House.
- A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- College Practical Physics Khanna and Gulati (S. Chand and Co. Ltd, Delhi).
- Practical Physics Gupta and Kumar (PragatiPrakationMeerat)
- Advanced Level Practical Physics J.M. Nelcon, J.M. Ogloom (EIBS).
- Engineering Practical Physics- S. Panigrahi & B.Mallick, 2015, Cengage Learning India Pvt. Ltd.
- B.Sc. Practical Physics Harnam Singh and P S Hemne, S Chand publications.
- Advanced Practical Physics for students, B.L.Flint & H. T. Worsnop, 1971, Asia Publishing House.
- A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011,Kitab Mahal, New Delhi.

- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- College Practical Physics Khanna and Gulati (S. Chand and Co. Ltd, Delhi).
- Practical Physics Gupta and Kumar (PragatiPrakationMeerat)
- Advanced Level Practical Physics J.M. Nelcon, J.M. Ogloom (EIBS).
- Engineering Practical Physics- S. Panigrahi & B.Mallick, 2015, Cengage Learning India Pvt. Ltd.
- B.Sc. Practical Physics Harnam Singh and P S Hemne, S Chand publications

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I Title of the Paper: (D-I: CHEMISTRY PAPER-I) Inorganic Chemistry-I

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes:

a. To learn and understand introductory inorganic chemistry. To understand size, shape and electron distribution in shells and sub- shells of an atom.

b. To learn different types of bonds and nature of bonding in inorganic compounds. Calculations

of different energies associated with ionic bonding.

c. Knowledge of nature of bonding, geometry, stability, and magnetic characters of covalent compounds by applying VBT.

d. Understanding of role of acids and bases in chemistry. The study is useful in all chemical areas. To learn and understand the properties and uses of the compounds of p-block elements.

UNIT: I -Atomic Structure and Periodicity of Elements (8 hours)

- a. Bohr's theory of hydrogen atom and its limitations, Wave particle duality, Heisenberg uncertainty principle, Quantum numbers and their significance, Shapes of s, p and d atomic orbitals
- b. Electrons filling rules in various orbitals: a) Aufbau's principle b) Hund's rule of maximum multiplicity c) Pauli's exclusion principle
- c. Electronic configuration of elements, Stability of empty, half-filled and completely filled orbitals
- d. Periodicity of the elements: General discussion of the following properties of the elements with reference to s block elements: a) electronic configuration b) atomic radii c) ionic radii d) ionization energy e) electron affinity f) electronegativity g) metallic characters h) reactivity i) oxidation state j) melting and boiling points k) chemical properties

UNIT: II - Chemical Bonding and Molecular Structure: Ionic Bonding (6 hours)

- a. Types of Chemical Bonds: a) Ionic Bond b) Covalent Bond c) Co-ordinate bond d) metallic bond e) Hydrogen Bond f) Van-der walls force.
- b. Definition and formation of ionic bond. General characteristics of ionic bonding, Energetic in Ionic bond formation.
- c. Born-Haber cycle for NaCl and its applications.
- d. Fajan's Rule, Applications of Fajan's rule for, i) Polarizing power and polarizability ii) Ionic character in covalent compounds iii) Bond moment, dipole moment and percentage ionic character.

UNIT: III- Chemical Bonding and Molecular structure: Valence bond theory (VBT). (5 hours)

- a. VSEPR Theory.
- b. Concept of hybridization
- c. Different types of hybridization and geometry of following molecules, i) Linear geometry- BeCl₂ (sp hybridization) ii) Planer trigonal geometry- BF₃ (sp₂ hybridization) iii) Tetrahedral geometry- SiCl₄ (sp₃ hybridization)
- d. Trigonal bipyramidal geometry- PCl₅ (sp₃d hybridization) v) Octahedral geometry- SF₆ (sp₃d₂ hybridization) vi) Pentagonal bipyramidal geometry –IF7 (sp₃d₃ hybridization)

UNIT: IV- Acids and Bases and P -block elements

- (11 hours) a. Theories of Acids and Bases - Arrhenius concept, Bronsted -Lowry concept, Lewis concept, Lux-Flood concept (Definition and examples only)
- b. Hard and Soft Acids and Bases (HSAB concept), Classification of Acids and Bases as hard soft and borderline, Pearson's HSAB concept, Acid -Base strength and hardnesssoftness, Application and limitations of HSAB concept.
- c. P-Block Elements: Position of elements in periodic table, Characteristics of group 13th, 14th and 15th elements with special reference to electronic configuration and periodic properties
- d. Compounds of group 13th, 14th and 15th elements, Boron –diborane (only structure), Allotropes of carbon and phosphorus, Oxyacids of Nitrogen (HNO₂, HNO₃).
REFRENCES:

- Lee, J. D. Concise Inorganic Chemistry ELBS, 1991.
- Cotton, F.A., Wilkinson, G. & Gaus, P.L. Basic Inorganic Chemistry, 3rd ed., Wiley.
- Douglas, B. E., McDaniel, D. H. & Alexander, J. J. Concepts and Models in Inorganic Chemistry, John Wiley & Sons.
- Huheey, J. E., Keiter, E. A., Keiter, R. L. & Medhi, O. K. Inorganic Chemistry.
- Principles of Structure and Reactivity, Pearson Education India, 2006.
- Puri, Sharma, Kalia. Principles of Inorganic Chemistry
- Madan R. L. Chemistry for Degree Students (B. Sc. First year), S. Chand.

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I Title of the Paper: (D-I: CHEMISTRY PAPER-II) Organic Chemistry-I

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes :

a. The students are expected to understand the fundamentals and basic principles involved in organic chemistry.

b. Understanding the spatial arrangement of atoms of organic molecule and types of stereoisomers.

c. Knowledge of general properties and fundamental reactions of aromatic compounds.

d. To understand the basic knowledge of heterocyclic compounds. To get knowledge of methods

to preparation, physical and chemical properties of some heterocyclic compounds with five and six membered heterocycles containing N as the hetero atom (Pyrrole and Pyridine).

UNIT I: Fundamentals of Organic Chemistry (9 hours)

- a. Introduction, Curved arrow notations, Cleavage of Bonds: Homolysis and Heterolysis.
- b. Organic molecular species: Nucleophiles and electrophiles.
- **c.** Electronic Displacements: Inductive Effect, Electrometric Effect, Resonance and Hyper conjugation effect
- **d.** Reactive Intermediates: Generation, Structure, Stability and Reactions of Carbocations, Carbanions, Carbon free radicals, Carbene and Nitrene

UNIT II: Stereochemistry (9 hours)

- a. Introduction, Types of Stereoisomerism, Representation of organic molecules using Wedge, Fischer, Sawhorse and Newman formula
- b. Optical Isomerism: Concept of Chirality, Elements of Symmetry, Optical Isomerism in tartaric acid, 2, 3 Dihydroxybutanoic acid, Enantiomerism, Diastereomerism and Meso compounds
- c. Geometrical isomerism in C=C, C=N and alicyclic compounds

d. Nomenclature of stereoisomers: D and L, Erythro and Threo, R and S, E and Z

UNIT III: Aromaticity (6 hours)

- a. Introduction, Characteristics properties of aromatic compounds
- **b.** Meaning of terms: Aromatic, Non aromatic, Antiaromatic, Pseudoaromatic, Classification of aromatic compounds
- **c.** Structure of Benzene: Kekule structure, Resonance structure, M.O. picture, Modern theory of Aromaticity
- **d.** Mechanism of Electrophilic substitution reactions: Nitration, Sulphonation, Halogenation and Friedel Crafts reaction

UNIT IV: Heterocyclic Compounds (6 hours)

- a. Introduction
- b. Classification and Nomenclature of heterocyclic compounds
- **c.** Nitrogen Heterocycles: a) Pyrrole: Introduction, Synthesis, Physical and chemical properties
- d. Pyridine:- Introduction, Synthesis, Physical and chemical properties.

REFRENCES:

• Graham Solomon, T. W., Fryhle, C. B. & Snyder, S. A. Organic Chemistry, John Wiley & Sons (2014).

• McMurry, J. E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Pvt Ltd, Edition, 2013.

• Sykes, P. A Guidebook to Mechanism in Organic Chemistry, Orient Longman, New Delhi (1988)

- Eliel, E. L. Stereochemistry of Carbon Compounds, Tata McGraw Hill education, 2000.
- Finar, I. L. Organic Chemistry (Vol. I & II), E.L.B.S.
- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Pearson, 2010.
- Bahl, A. & Bahl, B. S. Advanced Organic Chemistry, S. Chand, 2010.
- Nasipuri, D. Stereochemistry of Organic compounds: Principles and Applications.
- Madan, R. L. Chemistry for Degree Students (B. Sc. First Year), S. Chand Publication.
- Heterocyclic chemistry, J.A. Joule and K. Mills, 4th ed., Blackwell Publishing 2000

• John A. Joule, Keith Mills.; Heterocyclic Chemistry, 5th Edition, April 2010, ©2010, Wiley Blackwell

• Gilchrist, T. L. Heterocyclic chemistry; 3rd ed.; Addison Wesley Longman: Edinburgh Gate, 1997.

Joule, J. A.; Mills, K.; Heterocyclic chemistry; 4th ed.; Blackwell Science: Oxford, 2000

B.Sc. B.Ed.(Integrated) Four Years Programme Semester- I Title of the Paper: (CHEMISTRY, PRACTICAL -I) Laboratory Course-I

Total Marks	100	Credits	4
Total Hours	120	Hours Per Week	8
Internal Exam	-	External Exam	100
Marks		Marks	
		Duration of External	4 + 4 Hours
		Examination	

Part –I			
Sr. No.	Name of experiment		
1	Estimation of amount of Acetic acid from the given vinegar sample by titrimetric method		
2	To standardize supplied EDTA solution by titrating with 0.01 M ZnSO ₄ solution and to estimate amount of calcium from given solution by using Erio- T as an indicator.		
3	Quality control-To determine percentage purity of the given sample of soda ash (Na ₂ CO ₃) by titrimetric method.		
4	Organic Qualitative Analysis: Detection of physical constant, type, elements, functional group, and Confirmatory test. Identification of Organic Compounds (at least eight) (four containing at least one extra element- N, S, Cl) Acids: Oxalic acid, Benzoic acid, Cinnamic acid		
5	Organic Qualitative Analysis: Detection of physical constant, type, elements, functional group, and Confirmatory test. Identification of Organic Compounds (at least eight) (four containing at least one extra element- N, S, Cl) Phenols: Beta-Naphthol, p-Nitrophenol		
6	Organic Qualitative Analysis: Detection of physical constant, type, elements, functional group, and Confirmatory test. Identification of Organic Compounds (at least eight) (four containing at least one extra element- N, S, Cl) Base: Aniline, p-Nitroaniline		
7	Determination of Surface tension of the given liquids by Stalagmometer.		
8	Determination of equivalent weight of Mg by eudiometer.		
9	Determination of Cell constant of given conductivity cell using KCl solution.		
10	Preparation and standardization of HCl/H ₂ SO ₄ solution from the bulk.		

Part II			
1	To determine quantity of Fe (II) ions from the given solutions by titrating it with $0.1N \ K_2Cr_2O_7$ solution by using internal indicator.		
2	To estimate amount of Cu (II) ions by Iodometric titration by using $Na_2S_2O_3$ solution.		
3	To prepare standard 0.1 N KMnO ₄ solution and to determine the strength of given oxalic acid solution.		
4	Estimation of Aniline. (by Bromination method)		
5	Estimation of Acetamide.		
6	Estimation of Aspirin tablet.		
7	Determination of viscosity of given liquids A and B (Density data of liquids, viscosity of water to be given) [Any two liquids from Acetone, Carbon tetra chloride, Chloroform, Ethyl alcohol, Benzyl alcohol, Ethylene glycol and n- propyl alcohol		
8	To study the velocity constant of hydrolysis of methyl acetate in presence HCl/ H_2SO_4 .		
9	To study the reaction between Potassium persulphate and Potassium iodide kinetically (equal concentration).		
10	Determination of heat of ionization of weak acid by using polythene bottle.		

References:

- Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education, 2012.
- Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2009
- Vogel's Text Book of Quantitative Chemical Analysis. (Longmann) ELBS Edition.
- Vogel's Text Book of Qualitative Chemical Analysis. (Longmann) ELBS Edition.
- Hand book of Organic Qualitative Analysis: Clarke.
- Comprehensive Practical Organic Chemistry Qualitative Analysis by V. K. Ahluwalia, Sunita Dhingra. University Press. Distributor Orient Longman Ltd.
- Comprehensive Practical Organic Chemistry preparation and Quantitative Analysis: V. K. Ahluwalia, Renu Aggarwal. University Press. Distributor Orient Longman Ltd.
- A Laboratory Hand Book of Organic Qualitative Analysis and Separation: V. S. Kulkarni. Dastane Ramchandra & Co. Pune
- Practical book of Physical Chemistry: Nadkarni, Kothari & Lawande.
- Experimental Physical Chemistry: A.Findlay.
- Systematic Experimental Physical Chemistry: S. W. Rajbhoj, Chondhekar. (Anjali Publication.)
- Experiments in Physical Chemistry: R. C. Das and B. Behra. (Tata McGrawHill)
- Advanced Practical Physical Chemistry: J. B. Yadav (Goel PublishingHouse.)
- Practical Physical Chemistry: B. D. Khosala. (R. Chand & Sons)
- Experiments in Chemistry: D. V. Jahagirdar.
- A Text Book of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis: A.I. Vogel (Third Ed.)(ELBS)

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I Title of the Paper: (D-I: MATHEMATICS PAPER-I) Basic Algebra

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes: Upon successful completion of the course students will able to:

- CO 1. Apply De-Moivre's theorem.
- CO 2. Find rank, eigen values, eigen vectors of the matrix.
- CO 3. Solve system of linear homogeneous and non-homogeneous equations. CO 4. Understand Hermitian and Skew Hermitian matrices

UNIT – 1: ALGEBRA OF COMPLEX NUMBERS

1.1. Sums and Products, Moduli, Polar form, Geometrical representation of Complex Numbers, Exponential form, arguments of Products and Quotients.

- 1.2. De-Moivre's Theorem and examples
- 1.3 Applications of De-Moivre's Theorem
- 1.3.1 nth roots of unity.
- 1.3.2 Expansion of $\cos n\theta$, $\sin n\theta$
- 1.3.3 Circular functions and hyperbolic functions.
- 1.3.4 Relations between circular and hyperbolic functions.
- 1.3.5 Inverse circular and hyperbolic functions.

UNIT – 2: MATRICES

- 2.1. Introduction
- 2.2 Definitions of Hermitian and Skew Hermitian matrices.
- 2.3. Properties of Hermitian and Skew Hermitian matrices.
- 2.4. Rank of a Matrix, Row-echelon form and reduced row echelon form, normal form.
- 2.5. System of linear homogeneous and non-homogeneous equations.
- 2.5.1. Condition for consistency.
- 2.5.2. Nature of the general solution.
- 2.5.3. Gaussian elimination and Gauss Jordon method (Using row-echelon form and reduced row echelon form).
- 2.5.4. Examples based on 2.4.1, 2.4.2 and 2.4.3.
- 2.6. Characteristic equation, eigen values and eigen vectors of a matrix and examples
- 2.7. Cayley Hamilton theorem and examples

Recommended Books:

1. Applied Mathematics by Ch.V. Ramana Murthy, N. C. Shrinivas, S. Chand and Company Ltd., 1st Edition, 2001.

Scope: Unit-I: Chapter No. 1: Art.1.2 to Art.1.13, Art. 1.15, Art. 1.17 to Art. 1.19, Art.1.23 2. Higher Engineering Mathematics by H. K. Dass, Er. Rajnish Verma, S. Chand and Company Pvt. Ltd. 3rd Revised Edition 2014.

Scope: Unit-II: Art. 19.1 to Art. 19.3, Art. 21.1 to Art. 21.6, Art. 21.27 to Art. 21.30, Art. 20.1 to Art. 20.4

(15 hrs.)

(15 hrs.)

Reference Books:

1. Elementary Linear Algebra (Application Version), Howard Anton and Chris Rorres, 10th Edition, 2010.

2. Complex Variables and Applications, James Ward Brown and Ruel V. Churchill, Mc-Graw Hill, 8th Edition, 2009.

3. Modern Algebra, A. R. Vasishtha, Krishna Prakashan, Meerut 1994.

4. A Text Book of Matrices - Shanti Narayan (Revised by P. K. Mittal), S. Chand and Co., 11th Edition, reprint 2007.

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I Title of the Paper: (D-I: MATHEMATICS PAPER-II) Calculus

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Course Learning Outcomes: Upon successful completion of the course students will able to:

CO 1. find higher derivatives of product two differentiable functions using Leibnitz theorem. CO 2. learn conceptual variations while advancing from one variable to several variables in calculus.

CO 3. understand the consequences of mean value theorems for differentiable functions.

CO 4. apply L' Hôpital's rule to various indeterminate forms.

Unit – 1: Differentiation

- 1.1. Successive Differentiation
- 1.1.1. Higher order derivatives: notations.
- 1.1.2. Calculation of nth derivative: Standard results
- 1.1.3. Determination of nth derivative of rational functions: Examples.
- 1.1.4. The nth derivative of product of the powers of sine and cosines: Examples.
- 1.1.5. Leibnitz's Theorem. The nth derivative of product of two functions.
- 1.1.6. Examples on Leibnitz's Theorem.
- 1.2. Partial differentiation
- 1.2.1. Introduction to functions of two and more variables
- 1.2.2. Partial derivative: first order and higher order examples.
- 1.2.3. Geometrical interpretation of partial derivatives of first order.

Unit – 2: Mean Value Theorems and Indeterminate forms (15 hrs.)

- 2.1. Mean Value Theorems
- 2.1.1. Rolle's Mean Value Theorem, Geometrical interpretation.
- 2.1.2. Lagrange's Mean Value Theorem, Geometrical interpretation.
- 2.1.3. Meaning of sign of derivative
- 2.1.4. Cauchy's Mean Value Theorem.
- 2.1.5. Examples on 2.1.1, 2.1.2, 2.1.3 and 2.1.4
- 2.2. Indeterminate forms
- 2.2.1. Indeterminate forms: L'Hôpital's rule for 0/0 and ∞/∞ form (Statement only).
- 2.2.2. The indeterminate forms $0 \times \infty, \infty -\infty, 0^0, 1^{\infty}, \infty^0$
- 2.3. Expansion of functions
- 2.3.1. Maclaurin's theorem (statement only): Examples.
- 2.3.2. Taylor's theorem (statement only): Examples.

(15 hrs.)

Recommended Books:

1. Differential Calculus, Shanti Narayan and P.K. Mittal, S. Chand publishing, 15th edition (2016). Scope: Unit 1 – 1.1: Chapter 5: 5.1 to 5.5 1.2: Chapter 11: 11.6, 11.6.1, 11.7.1 Unit 2 – 2.1: Chapter 8: 8.1, 8.2, 8.3, 8.5 2.2: Chapter 10: 10.1 to 10.6 2.3: Chapter 6: 6.1, 6.2

Reference Books:

- 1. Differential Calculus, Gorakh Prasad, Pothishala Pvt. Ltd., 19th edition (2016)
- 2. Aspects of Calculus, Gabriel Klambauer, Springer-Verlag (1986).
- 3. Differential Calculus, Hari Kishan, Atlantic Publishers & Dist. (2007).
- 4. Calculus, George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir, Pearson Education, 14th edition (2018).

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I (D-I: Practicum MATHEMATICS) PRACTICUM-: Basic Algebra and Calculus Laboratory work-I

Total Marks	100	Credits	04
Total Hours	120	Hours Per Week	08
Internal Exam Marks	_	External Exam Marks	100
		Duration of External Examination	4 + 4 Hours

	Part I				
Pr. No	Title of the Practical	No. of Practicals			
1.	Examples on Product and division of Complex Numbers	1			
2.	Examples on finding Modulus and Argument of Complex numbers	1			
3.	Examples on De-Moivre's Theorem	2			
4.	n th roots of unity	1			
5.	Expansion of $\cos n\theta$, $\sin n\theta$	1			
6.	Circular and Hyperbolic functions	1			
7.	Inverse Circular and Hyperbolic functions	1			
8.	Row Echelon form and and Rank of Matrix	1			
9.	Solution of system of linear homogeneous equations.	2			
10.	Solution of system of linear non-homogeneous equations.	2			
11.	Eigen values and Eigen vectors of matrix	1			
12.	Cayley Hamilton Theorem (Verification and finding inverse of matrix)	1			
	Total Practicals	15			

	Part II				
Pr. No	Title of the Practical	No. of Practicals			
1.	Properties of Tracing of Cartesian curves	1			
2.	Tracing of Cartesian curve	2			
3	Examples of n th derivative	1			
4	Examples on Leibnitz's Theorem.	2			
5	Examples on partial differentiation	2			
6	Rolle's Mean Value Theorem	1			
7	Lagrange's Mean Value Theorems.	1			
8	Cauchy's Mean Value Theorems.	1			
9.	L' Hospital's rule for $0 \times \infty$ and $\infty - \infty$ form.	1			
10.	$0 \propto 0$ L' Hospital's rule for 0 , 1 , ∞ form.	1			
11.	Examples on expansion of functions	2			
	Total Practicals	15			

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I

Title of the Paper: (AEVC-I) Language-	I (Other than Language-I)- Hindi
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Total Marks	100	Credits	4
Total Hours	60	Hours Per Week	6
Internal Exam Marks	20	External Exam Marks	80
		Duration of External	3 Hour
		Examination	

अध्ययन ननष्पत्तीः

इस पाठ्यक्रम को पूरा करने के बाद, छात्र शिक्षक सक्षम होोोो गे। एक। सो चार की भाषा और अनुभूशि को समझेंगे। बी। आज िदन के सो चार के दौरान सही अोो ख़ेजी भाषा व्याकरणका उपयोग करेंगे। सी। िहो दी भाषा सुनने और बोलने का कौशोल हािसल करेंगे। डी। िहो दी भाषा पड़ने और िलखने का कौशोल हािसल करेंगे।

इकाई I: मैं- भाषा, संचार और अनुभूनन को समझना ।

- a. भाषा, सोचार और अनुभूशिशोंों भाषाकी पररभाषाएँ एवक्रायय, सोचारके प्रकार भाषा, सोस्कृ शि और समाज, भारर में शि- बहुभाषावाद, भाषा सीखना, अनुवाद, औपचाररक और अनौपचाररक सोचार, मौखखकऔर गैर-मौखखकसोचार, शइारोोोोो की भाषा कौशोल (बोलना, पढ़ना और िलखना), और नए जमाने की प्रौद्योिगिकए । सो चार के साधन के रूप में भाषा और अनुभूशि के माध्यम के रूप में भाषा
- b. सो चार की प्रकृ शि एवप्रिक्रयाशो**ो: िसद्ो**ोोो शो, पररभाषा और प्रकार, भाषाशोो: पररभाषा, िशवेशषाएँ , कायय।
- c. भाषा और समाशज: भाषा िभशना, भाषा और बोली, भाषा नीशि और भाषा योजना, भाषा मानवीकरण, भाररीय सो दभय में बहुभाषावाद, सो चार के साधन के रूप में भाषा और अनुभूशि के माध्यम के रूप में भाषा।
- d. सो चार की प्रिंक्रयाशो ो सो चार में बाधाएँ , िलखखख और मौखखक सो चार, प्रारो िभक समय से नए युग शोक मानव सो चार की कहानीशो ो: भाषा िभशना, बहुभाषावाद ।
- e. सो चार का प्रसो शग: कूट वाचक की भूिमका, आमने-सामने बाशोचीशो, बाशोचीशो की बारी लेना। बाशोचीशो शिशटा िसद्ोाोोोो शो, आरोभ और समापन, क्षेत्रीय िभशना, सामािजक िविवशधा और मानक भाषा।

यूननट II: व्याकरण को समझना ।

- a. वाक् ध्विनयोोोोो और अक्षरोोोो का वगीकरशण शोनाव, िपच, स्वर, स्वर और सोिध, भाषणके भाग, रूपकी पहचान, शोब्द िनमायण प्रिक्रयाएँ ।
- b. वाखयः सरल, जिटल और यौिगक, शोब्दायय और व्यावहाररक, शोोाखब्दकशोब्दायय और भाषणकायय।
- c. भाषाओो में भाषणध्विनयोोोो का उत्पादन सुपरसेगमेंशट शोनाव,िपच, टोन, स्वर-शोौैली, शोब्द िनमायणप्रिक्रयाएँ ; वाय िनमायण, शोब्दायय और व्यावहाररशका।
- d. रुप/वाय िनमायशण: रुप की पहचान, शोब्द िनमायण प्रिक्रयाएँ, वाय िनमायण, शोब्दावली.
 गठन; व्यावहाररशका और भाषण कायय ।
- e. भाषा में ध्विन उत्पादशन: नए शोब्द गढ़ना और भाषण िक्रयाएँ।

यूननट 🎞: श्रवणका कौशल और बोलने का कौशल ।

a. श्रवणयोोोोमेहत्वपूणयहै; सुनने के प्रकार, सुनने की काययिनशियाँ. अच्छे सुनने के व्यवहार, पूरे पाठ्यक्रम में सुनने और नोट लेने के मॉडल की आवश्यशका।

- b. श्रवण की समझ और ररकॉडय िकए गए भाषण/पाशठ: िविभन उच्चारणोोोोो की समझ ।
- c. सीखने के िलए बोलना और बोलना सीखनाशोो: खथशियजन्य बाशोचीशो और भूिमका िनभाना; बोलने के िवकास के िलए कायय/गशििविधयाँ (भाषण, भाषण, - चचाय, बहस, कहानी सुनना,

िचत्रण)।

- d. बोलने, भूिमकािनभानेके िवकासके िलएगशििविधयोोोोोोोोशाओः बोलने पर सोस्कृ शि का प्रभाव।
- e. प्रस्तुशिकरण और बोलने का कौशोशल: कर्ोा कौशोल का अभ्यास करना; शोेारीररक भाषा, आवाज़ और उच्चारण; शदयकोोोोमें रुिचपैदा करना और उनके सार् सोबोध थर्ोािशपकरना।

यूननट IV: पढ़ने का कौशल और लेखन कौशल ।

- a. समझबूझकर पढ़नाशो जे पढ़ने के प्रकार पाठ, अययौर सो दभय एक सोवादात्मक प्रिक्रया के रूप में पढ़ना; छात्रो ो ो को सिक्रय पाठक बनाने और आलोचनात्मक पठन कौ शोल िवकि शसकरने की रणनीशियाँ, साोो के शिक और साोो के शिक पहलुओे को समझना एक पाठ का, शोब्दावली िवकास के माध्यम से पढ़ना।
- b. िशवेशषाएँ जो पाठ को जिटल बनाशोोोी हैं, एक सो वादात्मक प्रिक्रया के रूप में पढ़ना; िकसी पाठ के साोोके शिक और साोोके शिक पहलुओो को समझना, पढ़ने के माध्यम से शोब्दावर्ली विकाशसखस्किमोग औरस्कैिनोग।
- c. अनुशोोासन-आधारररपाठ पढ़ना; शोब्दावलीिवकाशस: पढ़ने के माध्यम से । भाषण बनाम लेखन; लेखन के प्रकार; िवशिट उद्देश्योोोोोक् िलए लेखन (िनबोध, पत्र और विवरण लेखन की भाषा और शोोैली; नए शोब्दोोोोे से िनपटना (शोोैक्षिणक शोब्दावलीिनमायण) साराोोेग्रो और व्याख्या शोकनीक।
- d. अकादिमक लेखन घटशक. शोोैक्षिणक भाषा का िवकाशस शोौैक्षिणक लेखन कौशोल िवकिशस करने के िलए गशििविधयाँ। आलोचनात्मक, िवश्लेषणात्मक और व्याख्यात्मक सोच कौशोल िवकिशस करना।िवश्लेषण करना सीखना।
- e. महत्वपूणय सोशचः आलोचनात्मक सोच क्षशमाओो को बढ़ानाशोो आलोचनात्मक व्याख्या, आपके िवश्वासोोोोो और मूल्ोोोोो पर सवाल उठाना और उन्हें चुनौशोोी देना; िवचारोोोो को

िवकिशस करना और

शोकय का मूल्ोाोोो कन करना। िकसी समस्या का अवलोकन करना, समस्या का वणयन करना, समस्या का िनधायरण करना, शोोुलना करना और समस्या का मूल्ोाोोो कन करना।

प्रैक्टिकम (कोई दो-10 अंक कु ल 20 अंक)

- a. ररेकॉर्डेय िकए गए वैिडियों का आवाज और उच्चारण के नजररए से िवश्लेषण करें और एक ररपोटय िलरखें।
- b. िकसी समस्या का अवलोकन करना, वणयन करना और उसकी रूपरेखा शोेैयार करना और उसका मूल्ोाोोेकन करना।
- c. अोोग्रेजि सोंचार कौशोलसीखने के संबोधमें एक िचोशोशनीलडायरीबनाएरखें और एक ररपोटय िलखें।

आदान- प्रदान का न रीका

शिक्षण वाशोोगयलाप गशिविध इस पाठ्यक्रम को पढ़ाने में आकषयण व्याख्यान, शिक्षण और चचाय, वाशोोगयलाप गशिविध पररयोजना पररयोजनरिसमुलेशोन, कायशयालाऐो और भाषा-जागरुशका गशिविधयोोोोो जैसे व्यावहाररक िमश्रण शोोािमल होोोो गे। शिक्षण में कक्षा में चचाय को शोोािमल कररे हुए सीखने के िलए गहन दटिकोण का इरादा है, छात्रोोोो के बीच महत्वपूणय सोच/समस्या समाधान क्षशमाओं को िवकिशस करना है, और उन खथशिययोोोोोपर भी ध्यान केंशिशो िकया जाएगाजहाोोो हमारे दैिनक जीवनमें कोई ऐसे कायय कर रहा होगा िजसमें भाषा कौशोल का प्राकृ शिक एकीकरणशोोािमलहै। छात्रोोोो से अपेक्षा की जाशोोीहै िक वे सत्र से पहले िनिदयट अध्याय/लेख पढ़ें और पाठ्यक्रम में छात्रोोोो की सिक्रय भागीदारीकी आवश्यशका है।

सुझावात्मक पठन सामग्ी ी :

मुंखजी श्रीधरनार् (1965). राटर भाषा की शिक्षा आचायय बुक डेपो बडौदा। बास्कर आन्द्रेऔर वास्कर पुष्पा (1993). िहो दी शआययुक्त अध्यापन पध्वत्ती, मेशहा पखखशोग हाऊस वास्कर पुष्पा आनो द (2002). शिक्षण प्रशिक्षण और िहो दी अध्यापन् िनत्य नुशोन प्रकाशोन, पुणे वास्कर आन्द्रेबास्कर पुष्पा (2009). भाषा शिक्षण L1L2 िनत्य नुशोन प्रकाशोन, पुणे। शिवारी भोलानार् (1988). िहो दी भाषा शिक्षण साहित्य सहकार, नई िदल्ली। पाण्डे राय शोकल(1991). िहो दी शिक्षण, मुशोणालय आगरा।पेिशड द्वीब. (1991) िहो दी अध्यापन नूशोन प्रकाशोन, सदाशिवपेठ पुणे। साठे ग.नो. (1962). राटर भाषाका अध्यापन महाराव्य राटर भाषासभाप्रकाशोन पुणे।

िसोहसािवत्री(1986). िहोदी शिक्षणमेरठइोटरनेशोनलाखखशिग हाऊसमेरठ

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I

Title of the Paper: (AEVC-I) Language-I (Other than Language-I) (English)

Total Marks	100	Credits	4
Total Hours	60	Hours Per Week	6
Internal Exam Marks	20	External Exam Marks	80
		Duration of External	3 Hour
		Examination	

Learning Outcomes:

After completing this course, the student teachers will be able to:

- a. understand language and cognition of communication.
- b. use correct English language grammar during day today communication.
- c. acquire English language listening and speaking skills.
- d. acquire English language reading and writing skills.

UNIT: I- Understanding Language, Communication and Cognition

- a. Language, communication, and cognition: Definitions and functions of language. Types of communication, Language, culture and society, Bi-/Multilingualism in India, Language learning, translation, formal and informal communication, verbal and non-verbal communication, gestures language skills (listening, speaking, reading, & writing), and the new-age technologies. Language as a means of communication and language as a medium of cognition.
- **b.** Nature and process of communication: principles, Definition, and types; Language: Definition, characteristics, functions.
- **c.** Language and society: language variation, language and dialect, language policy and language planning, language standardization; Multilingualism in the Indian context, Language as a means of communication and language as a medium of cognition.
- **d.** The process of communication: barriers to communication, written and oral communication, the story of human communication from early times to new age: Language variation, Multilingualism.
- e. Context of communication: the role of decoder, face-to-face interaction, turn taking. conversation, politeness principles, opening and closing, regional variation, social variation, and the standard language.

UNIT-II - Understanding Grammar

- a. **Classification of speech sounds and letters:** stress, pitch, tone, intonation and juncture, parts of speech, identification of morphemes, word formation processes.
- b. **Sentences**: simple, complex, and compound, semantics and pragmatics, lexical semantics, and speech acts.
- c. **Production of speech sounds in languages; Suprasegments:** stress, pitch, tone, intonation; Word formation processes; Sentence formation, semantics, and pragmatics.
- d. **Morphemes/Sentence Formations:** Identification of morphemes, word formation processes; Sentence formation, vocabulary. formation; Pragmatics and speech acts.
- e. Sound production in the language: Coining new words and speech acts.

UNIT-III- Listening Skills & Speaking Skills

- a. Why listening is important; kinds of listening; Listening strategies. Need for modeling good listening behavior, Listening across the curriculum, and note-taking.
- b. Listening comprehension and Recorded speeches/texts: Understanding of various

accents.

- c. **Speaking to learn and learning to speak:** situational conversations and role plays; tasks/activities for developing speaking (speech, elocution, discussion, debate, storytelling, illustrations).
- d. Activities for developing speaking, role play: The impact of culture on speaking.
- e. **Presentation and speaking skills:** Practicing narrative skills; Body language, voice, and pronunciation; Creating interest and establishing a relationship with the audience.

UNIT – IV - Reading Skills & Writing Skills

- a. Reading comprehension: types of reading, text, meaning and context, reading as an interactive process; strategies for making students active readers and developing critical reading skills; Understanding denotative and connotative aspects of a text, Vocabulary development through reading.
- **b.** Features that make texts complex, reading as an interactive process; Understanding denotative and connotative aspects of a text, Vocabulary development through reading: Skimming and Scanning.
- c. Reading discipline-based texts; Vocabulary development: through reading. Speech versus writing; Types of writing; writing for specific purposes (essays, letters, and reports). Language and style of Writing; Dealing with New Words (Academic Vocabulary Building) Summarizing and Paraphrasing techniques.
- **d.** Academic writing components: development of academic language; Activities to develop academic writing skills. Developing Critical, analytical, and interpretive thinking skills. Learning to analyze.
- e. Critical thinking: Enhancing Critical thinking abilities; Critical Interpretation, Questioning and Challenging your Beliefs and Values; developing ideas and evaluating an argument. Observing a problem, describing the problem, framing the problem, comparing, and evaluating a problem.

Practicum (Any two-10 Marks for each=Total 20 Marks)

- a. Analyze a recorded video from the perspective of voice and pronunciation and write a report.
- b. Observing, describing, and framing a problem and evaluating it.
- c. Maintain a reflective diary regarding Learning English Communication \Skills and write a report.

Mode of Transaction

Teaching this course will involve a mix of interactive lectures, tutorials, and practical involves such as discussion, role plays, projects, simulations, workshops, and language-awareness activities. The teaching intends deeper approaches to learning involving in-classroom discussion, developing the critical thinking/problem-solving abilities among the students, and will also focus on situations where in our daily lives one would be performing tasks that involve a natural integration of language skills. The students are expected to read assigned chapters/ articles before the session and the course requires active participation from the students.

Suggestive Reading Materials:

- Brown, C. (2019). The Power of Listening. HarperCollins
- Johnson, A. (2018). Mastering Public Speaking. Penguin Books.
- Smith, J. (2020). The Art of Reading. Random House.
- Williams, M. (2021). Essential Grammar Rules. Oxford University Press.
- "Fluent Forever: How to Learn Any Language Fast and Never Forget It" by Gabriel Wyner

- "The Language Instinct: How the Mind Creates Language" by Steven Pinker
- "How Languages Are Learned" by Nina Spada and Patsy M. Lightbown
- Speaking:
- "Talk Like TED: The 9 Public-Speaking Secrets of the World's Top Minds" by Carmine Gallo
- "Speak with Impact: How to Command the Room and Influence Others" by Allison Shapira
- "The Art of Public Speaking" by Dale Carnegie
- Listening:
- "Active Listening 1 Student's Book with Self-study Audio CD" by Steven Brown and Dorolyn Smith
- "Listen Like a Dog: And Make Your Mark on the World" by Jeff Lazarus "Listening Myths: Applying Second Language Research to Classroom Teaching" by Steven Brown

LII B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I

Title of the Paper: (AEVC-II) Art Education (Performing and Visual)- I

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	25	External Exam Marks	25
		Duration of External	45 Minutes
		Examination	

Learning Outcomes:

After completion of this course, student will be able to -

a. Get basic knowledge of visual and performing art through its definitions and basic concepts.

b. Understand basic knowledge of various types of visual arts.

c. Get an insight into various forms of performing arts.

d. Learn practically basic outline of Swar, Alankar, Tal, Raga & Sugam.

UNIT - I

Importance of Aesthetics and Art education (2 Sessions)

In this unit the basic idea of aesthetics and art, and ways in which the aesthetic dimension manifests itself in human life will be discussed. Using various examples of art, students will engage in identifying aesthetic aspects of daily life, develop aesthetic judgment, and gain familiarity with the role of art in education. Students will also be introduced to three aspects of art in education: The value of art itself and its use as an instrument in education; moral dimensions of works of art and the controversial distinction between the value of Popular art andHigh art.

UNIT - II

Introduction to Theatre, and Beginning with the body (3 Sessions)

We will discuss some core essentials in the aesthetics of theatre like the performance, the makers, the audience, and the context and how we relate this to the world around us, in everyday lives. In this unit, we will discuss examples of how theatre was used in social movements that have contributed to educating the larger population about important social issues. Additionally, we will also learn from practices and approaches of theatre groups like Budhan Theatre who work with denotified tribes, and Manalmagudi who work closely with physical nonverbal theatre. Exposing students to these approaches will lead to rich discussions on the role of theatre in pedagogy and practice.

In this unit, students will learn certain principles and awareness on how to use their body and voice in a given space and time, with respect to other bodies. There will be several games, exercises that will familiarise them with certain basics of movement, voice, acting and thereby create improvisations and images in a given context. The activities and tasks will be both in individuals and groups.

UNIT - III

Arriving at a script (3 Sessions)

We will engage in some theatre making processes to arrive at a script by the end of this unit. How to adapt or devise a script with actors? How can we borrow from everyday experiences of memory, sound and visuals, without a written text or spoken word? Plays, stories, poems, newspapers articles, will be shared to read, reflect, analyse, and re-create like —Why, why Girll by Mahashweta Devi, —Ratna Pakshil by K Ramaiah, —Beyond the land of Hattamala and Scandal in Fairyland by Baadal Sircar, and songs of Kabir etc. The texts chosen will have a direct relation with topics from social studies, moral and political education.

LIII

Students will use their skills of improvisation they learned in Unit 2 to explore, ideate, create, and finally arrive at a script. What kind of stories, narratives, and characters they choose toperform will lead back to the discussion of aesthetics. Students will mostly work in groups to choose or create a text, concept, or an idea which they want to perform. Students will be encouraged to use their perspectives on the education system, in converting the text into a script.

UNIT - IV Performing the script

This unit will engage in the actual making of the final piece they choose to make. Students will have to visualise the final text on stage and start rehearsing in their groups. Apart from using their bodies to play characters, the students will also have to think about design and other aesthetic elements like sets, props, costumes, lights, music and sounds they want to use in the performance.

Students will have to practice beyond the six classes as the class time will be utilised to discuss and provide feedback as the work progresses. The last two classes in this unit will be utilised for the final rehearsals and assessments. The final performance will take place in front of a small audience followed by a brief post-performance discussion. Students will engage in discussing and reflecting on the views, questions and comments shared by the audience.

Pedagogy

The pedagogy is basically hands-on training. More emphasis is given to experiential learning. They do things and through doing, they learn about art and its connection to education. The process takes you through different forms of art- fine arts, playing with colours, costume designing, facial make -up, script writing, music, and performance.

References:

- Lowenfield, V. and W. Lambert .1987- Creative and Mental Growth. Malmillan. London.
- Prasad, D. 1998. Art, the basis of education, National Book Trust. New Dellhi.
- National Council for Educational Research And Training . New Dellhi. Source Book an Assessment for Classes I-V : Art Education. 2008.
- Dewey, J. (1934). Art as Experience. New York : Capricorn Books
- Uhrmacher, P.B. (2009). Toward a Theory of Aesthetic Learning Experience. Curriculum Inquiry, 39(5), 613-636
- Greene, M.(2001). Variations an a Blue Guitar: The Lincoln Center institute lectures an thetic education. New York: Teachers College Press.
- A Practical Guide for Teaching K-12 visual Arts Edited by John A. Michael, 1993
- Educational Theatre Association (ETA). http://www.edta.org
- Local Arts Education Partmership grant Program. http://www.cac.ca.gov Teaching Arts .org .http:// www.teachingarts.org

LIV

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I

Title of the Paper: (AEVC-III) Understanding India (Indian Ethos and knowledge system)-I

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes :

After the completion of the course, students will be able to:

a. Understand the Ancient Indian Education System recognize the vast corpus of knowledge traditions of India, while developing an appreciation for it, apply their acquired research and critical thinking skills in multidisciplinary themes, and summarize and pass on their learnings to their students of different Indian traditions in an easily digestible manner.

b. Discuss genesis, vision, and evolution of education in ancient India

c. Enable themselves to shape their educational perspectives to act as an effective teacher.

d. . To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the importance of the roots of the Indian Knowledge System.

e. To make students acquaint with the facets of traditional knowledge& their relevance and help them be able to apply it to their day-to-day life.

UNIT: I - Introduction to the Knowledge of India

A. Definition & scope; Relevance of this knowledge.

B. Need to revisit our ancient knowledge, traditions, and culture.

UNIT – II - Culture - Art and Literature

A. Fine arts (traditional art forms, contemporary arts, arts & spirituality, arts and Identity, and art and globalization);

B. Performing Arts (Indian dance systems, traditional Indian pieces of music, visual arts, folk arts, etc.,).

C. Literature (Sanskrit literature, religious literature, Indian poetry, folk literature, Indian fiction Sangam literature, Kannada, Malayalam literature, Bengali literature, etc.

UNIT-III - Polity and Law

A. Kingship & types of government (oligarchies, republics); Local administration (village administration);

B. Basis of Law: Dharma & its sources; Criminal Justice: police, jails, and punishments; Lessons from Chanakyaniti; Lessons for modern-day India: Towards a tradition-driven equitable and just polity and law system.

UNIT-IV- Economy

A. Overview of the Indian Economy from the Stone Age to the Guptas: The New Culture of Urbanization (including castes, guilds, and other economic institutions; Harappan civilization economy; growth of agriculture and proliferation of new occupations; growth of writing); **B.** Internal & external trade and commerce, including trade routes, Indo-roman contacts, and maritime trade of South India; Temple economy.

C. Land ownership - land grants & property rights, land revenue systems.

LV

D. Understanding Arthashastra: Ideas & Criticism; Locating relevance of ancient Indian economic thought in modern-day Indian Economy.

UNIT-V- Environment & Health

A. Understanding Equilibrium between Society & Environment: Society's perceptions of natural resources like forests, land, water, and animals.

B. Sustainable architecture & urban planning; Solving today's environmental challenges (best practices from indigenous knowledge, community-led efforts, etc.)

C. India's Health Tradition: Ayurveda, Siddha, Ashtavaidya, Unani, and other schools of thought; Lessons from Sushruta Samhita and Charaka Samhita;

D. Mental health in ancient India: towards time-tested concepts of mental wellness (concept of mind, dhyana, mind-body relationship, Ayurveda, yoga darshan, atman, etc.)

Practicum

• It will include the organization of day trips that help student teachers watch events relating to visual and performing art; activities that enable student teachers to identify and record through photos, videos, etc. the elements of ancient architecture still existing in the city around them; organization of Individual and group presentations based on themes such as Polity, Law and Economy etc., organization of a 'Knowledge of India' day in the institution to celebrate the culture (food, clothes, etc.) that they would have been explored in lectures and tutorials; interactions with family members, elders, neighbors, and other members of society about the evolution of local systems and economy etc.

Mode of Transaction

• Lectures will include learner-driven participatory sessions, and Guest lectures through experts and practitioners, such as fine arts and performing arts practitioners along with contemporary poets & writers of Indian literature.

Tutorials will include a Screening of documentaries and films followed by a discussion; Learnerdriven discussions in the form of focus group discussions (FGDs), Socratic Discussions, etc.; Debate/discussion can be organized to explain India's Vaad tradition; discussion on how some of the ancient methods of teaching are relevant in today's time; discussions that help Identify ethical dilemmas in daily lives and understanding the importance of ancient ethics and values to resolve them.

Reading Materials

- Altekar, A.S., Education in Ancient India, (5th edition), 1957, Varanasi: Nand Kishore and Bros. Chaube, S.P. History and Problems of Indian Education, Agra: Vinod Pustak Mandir.
- Dash M. (2000), Education in India: Problems and Perspectives, Eastern Book Corporation
- Ghosh S. C. (2007), History of Education in India, Eastern Book Corporation.
- Harshananda Swami, An Introduction to Hindu Culture: Ancient & Medieval, 2007.
- Jain M. (2003) History in the New NCERT Textbooks Fallacies in the IIIC Report, Delhi NCERT.
- Lall M. (2005) The Challenges for India_s Education System, Chatham House: London
- Mookerji R. K. (1990) Ancient Indian Education: Brahmanical and Buddhist Delhi, Motilal Banasidass Publishers.
- Mukherjee, R.K., Hindu Civilization Longman, Green and Co. London, p. 111 1936
- Mahajan, V. D. Ancient India, p. 197 Motwani Kewal, India: A synthesis of cultures, p 133 Rawat, P.L. History of Indian Education, Agra: Ram Prasad & Sons, 199
- Ramchandra P. and Ramkumar V. (2005), Education in India. Eastern Book Corporation.

LVI

- Rawat, P. L. (1956) History of Indian Education: Ancient to Modern, Delhi Bharat Publication.
- Reyhner J.(2004)History of Indian Education,Vohra Publishers. Sharma R(2006)History of Indian Education, Shubhi Publishers. Vashist R. (2005), History of Education in India. Eastern Book Corporation.

LVII

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-I

Title of the Paper: (AEVC-IV) Personality Development and Yoga

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	25	External Exam Marks	25
		Duration of External	45 Minutes
		Examination	

Learning Outcomes: On completion of this course students will be able to:

- 1) Relate why Yoga education is significant in one's life
- 2) Yogic principles of healthy living or life style prescription
- 3) Practice Yogic techniques to maintain eye sight and have a sweet and clear voice, which is indicative of a tranquil personality.
- 4) Write official letters
- 5) Follow Mannerisms, etiquette and netiquettes.
- 6) Face and conduct interviews.
- 7) Conduct official programme.

Course Content:

- a) Concept of Yoga
- **b**) Sit in a meditative posture and meditate for 30 minutes to one hour. (15hrs) Record your experiences briefly.
- c) Concept of health according to WHO (World Health Organization) (2hrs)
- d) Write five attributes of Sattvaguna. (2hrs)
- e) Different categories of food according to Yoga (2hrs)
- f) Yoga techniques for eye sight improvement (20hrs)i)Trāțakas

Preparatory eye exercises for Trātaka

Try the following movements of the eyes without moving the neck:

- 1) Move your eyes upward.
- 2) Move your eyes downwards towards the nose
- 3) Move your eyes towards right side
- 4) Move your eyes towards left side
- 5) Now try rotating your eyes right, up, left down and right All these movements are possible because of these six eye muscles.
- The eye exercises which we will be learning will help us to strengthen these eye muscles and improving the eye sight

ii) Jyoti trātaka (in four stages)

Step I: Effortless Gazing or Focusing at low flame

Step II: Intensive focusing at the tip of the wick of the flame

Step III: De-focusing

Step IV: Silence

iii) Special practices Reading

LVIII

- Reading in relaxation: 15 minutes to 30 minutes
- Special reading: 5 minutes
- Small print reading: 5 minutes
- g) Certain Yogic practices for voice-culture (15hrs)
- Tongue Massaging
- Tongue In and Out
 - Tongue Rotation
 - Lip stretch Laughter
 - Mouth twisting
 - -Tongue twisting
 - Head rolling

* Perform activity (f) and (g) in school and submit its record in the form of feedback Communication Skills

1. Writing Official Letters- English and Marathi (2 hrs)

Leave application to H.O.D. / Principal

Request for Bonafide Certificate to the Registrar, SUK.

- 2. Interview Skills Download Interview Video and write a reflective note, Conduct interview, Face interview
- 3. Proposing Vote of Thanks (After Programme)
- e.g. Guest Lecture/Conference/Event (2 hrs)
- 4. Reporting an activity after the Event (3 hrs)
- e.g. Educational Tour Report
- 5. Writing 'Thank You' letters after a visit to an institution. (2 hrs)
- 6. Mannerisms, Etiquettes and Netiquettes (3 hrs)
- 7. On-line Communication: e-mail (official), e-mail (personal) (4 hrs)
- e. g. Placement, Classmates

Transactional Modes:

The paper would be transacted through participatory approach, including group discussion, self study, presentation, etc by students during the lecture hours or through workshops.

LIX

B.Sc.B.Ed. (Integrated) Four Years Programme

Part-I, Sem-I

Self Study

SS-I: Good Governance Students have to do Self –Study and Qualify the internal Exam

Unit: I Democracy in India

a: Dimensions of Democracy: Social, Economic and Political – Decentralisation: Grassroots Level Democracy – Challenges before Democracy: women and marginalised sections of the society

Unit: II Election to Local Self Government Bodies

73rd and 74th Constitutional Amendment Acts: Institutions at the local level and Role of State Election commission – Local Body Elections: Urban & Rural – Duties of an Individual towards electoral process **Unit: III Good Governance**

Meaning and concept – Government and Governance – Good Governance initiatives in India

LX

		Structure of Semester -II				
Component	Code	Title	Marks	Credits	Total Hours	Hours Per Week
		A-Physics-III; Properties of Matter	50	02	•	04
		B-Chemistry- III ; Physical Chemistry-I	(40+10)		30	
		C-Mathematics- III; Differential Equations-I				
		A-Physics-IV; Electricity and Magnetism II	50	02	20	04
		B-Chemistry-IV ; Analytical Chemistry-I	(40+10)	02	30	
Disciplinary / Inter- disciplinary		C-Mathematics-IV ; Differential Equations-II				
Courses	лш	A-Physics-V; Thermal Physics and Statistical Mechanics–I		02		
	D-III	B-Chemistry- V ; Physical Chemistry-II	50		30	0.4
		C-Mathematics-V; Discrete Mathematics	(40+10)			04
		A-Physics-VI; Thermal Physics and Statistical Mechanics–II				
		B-Chemistry- VI ; Industrial Chemistry	50 (40+10)	02	30	0.4
		C-Mathematics-VI; Differential Calculus				04
	Practicum	Laboratory work-II (Physics/Chemistry/Mathematics)	100	04	120	08
Stage-Specific Content- cum- Pedagogy	AEVC-V	Language-II (Other than Language-I)	100 (T80+P20)	04	60	04
Ability	AEVC-VI	Understanding India (Indian Ethos and Knowledge Systems)	50 (T40+P10)	02	30	04
Enhancement & Value- Added	AEVC-VII	Teacher and Society	50 (T40+P10)	02	30	04
Courses	AEVC-VIII	Event Management	50	02	30	04
Self-Study	SS-II	Constitution of India	Students h	ave to Qualif	y the interna	ıl Exam
		Total =	550	22	390	40

LXI

B.Sc. B.Ed.(Integrated) Four Years Programme Semester-II Title of the Paper: (D-II: PHYSICS PAPER-III) Properties of Matter

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes: After going through the course, the students should be able to:

- Revise basic concepts such as stress, strain and elastic constants of elasticity.
- Derive elastic constants for beams supported at both ends and at one end.
- Derive elastic constant (eta) of a wire under torsional oscillations (Searle's Method).
- Explain the phenomenon of surface tension based on molecular forces.
- Derive the relation between surface tension and excess pressure.
- Discuss and state the factors affecting the ST.
- In general, students are capable of correlating the above concepts and methods to both theoretical and experimental domains revealing analytical as well as numerical skills.

Unit No.	Topics	Total Lectures
Unit I	1. Elasticity Introduction (Hooke's law, Elastic moduli-Relation between elastic constants), Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants, Bending of beam, Bending moment, Cantilever (without considering weight of cantilever),Beam supported at both the ends(without considering weight of beam). Torsional oscillation, Determination of Rigidity modulus and moment of inertia -q, η and σ by Searle's method 2. Surface tension Surface tension (definition), Angle of contact and wettability, Relation between surface tension, excess of pressure and radius of curvature, Experimental determination of surface tension by Jaeger's method, Applications of surface tension.	15
Unit II	1. Fluid dynamics Introduction, Concept of viscous force and viscosity, Coefficient of viscosity, Steady and Turbulent flow, Reynolds number, Equation of continuity, Bernoulli's Theorem, practical applications: (i) Law of hydrostatic pressure (ii) Filter pump (iii) Speed of efflux (iv) Venturytube 2. Viscosity Introduction, Ideal and viscous fluids, Flow of liquid through capillary tube, Poiseuille's equation, Experimental determination of coefficient of viscosity of liquid by Poiseuille's method, effect of temperature and pressure on viscosity of liquid.	15

LXII

Reference Books:

- Physics–S. G. Starling and Woodal Longmams and Green Co. Ltd.
- Elements of properties of matter –D. S. Mathur, Shamlal Charitable trust New Delhi.
- A text Book of properties of matter–N. S. Khare and S. Kumar. Atmaramandsons New Delhi.
- Physics Vol. I and Vol. II–David Halliday and Robert Resnik, Willey eastern Ltd, New Delhi. Concepts of Physics- H. C. Varma-Bharati Bhavan Publishers

LXIII

B.Sc. B.Ed.(Integrated) Four Years Programme Semester-II

Title of the Paper: (D-II: PHYSICS PAPER-IV) Electricity and Magnetism II

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes: After going through the course, the student should be able to:

- Understand the importance of complex numbers in the analysis of AC Circuits containing Inductance (L), Capacitor (C), and Resistance (R) and their various configurations.
- Define and apply the concepts in AC circuits such as Impedance (Z), reactance (XC and XL), Admittance, Susceptance, and Quality Factor (Q).
- Understand and design AC bridge: Owen's Bridge.
- Reveal mastery in basic terminology in network analysis for further studies.
- State and apply Network theorems to simple circuits.
- Understand the basic working principle of a Ballistic Galvanometer, and define constants of a ballistic galvanometer.
- Understand simple elementary concepts such as magnetization and intensity of magnetization.
- State Biot-Savart's law and are capable of applying it to straight, circular wires, and solenoid.
- Understand the concept of magnetic vector potential along with Ampere's circuital law.
- Understand and explain the phenomenon of hysteresis in magnetism.
- Able to discriminate different magnetic materials based on their characteristic properties.

Unit No.	Topics	Total Lectures
Unit I	 1. A. C. circuits Complex numbers and their application in solving a. c. series LCR circuit using j operator and phasor diagram, Resonance in LCR series circuit, Sharpness of resonance (qualitative treatment only), Resonance in LCR Parallel circuit, complex Impedance, Reactance, Admittance, and Susceptance, Examples of series and parallel resonance, A.C. Bridge - Owen's Bridge Q-factor (definition only). 2. Electromagnetic induction Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils, Energy stored in magnetic field.	15
Unit II	 1. Ballistic galvanometer Construction and working of B. G., expression for charge flowing through ballistic galvanometer, Correction for damping in galvanometer, Constants of ballistic galvanometer. 2. Magnetic materials and their properties Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Diamagnetic, paramagnetic, ferromagnetic: Hysteresis and hysteresis curve, ferromagnetic and anti ferromagnetic materials. 	15

Reference Books:

- Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education.
- Electricity and Magnetism, J.H. Fewkes & J. Yarwood, Vol. I, 1991, Oxford University Press.
- Electricity and Magnetism, D.C. Tayal, 1988, Himalaya Publishing House.
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
- Electricity and Magnetism, Khare and Shrivastav, Atma Ram & Sons, Delhi, 1976.
- University Physics, 9th Edition, Young and Freedman.
- Foundations of Electromagnetic Theory, R. Ritz and Milford, Pearson Publication.
- Electricity and Magnetism, Gupta, Kumar, and Singal.
- Basic Electronics and Linear Circuits, N.N. Bhargava, D.C. Kulshrestha, and S.S. Gupta, Tata McGraw-Hill.
- Electronic Fundamentals and Applications, J.D. Ryder, Prentice-Hall of India Pvt. Ltd.
- Network Theory and Filter Design, V.K. Aatre, New Age International Publisher.
- Principles of Electronics, V.K. Mehta, S. Chand.

LXV B.Sc. B.Ed.(Integrated) Four Years Programme Semester-II

Title of the Paper: (D-II: PHYSICS PAPER-V) Thermal Physics and Statistical Mechanics-I

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes: After going through the course, the students should be able to:

- Develop conceptual clarity of thermodynamic functions and Clausius-Clapeyron equation.
- Appreciate the problem associated with the black body radiation spectrum.
- Know how the problems can be solved by using Planck's law of radiation.
- Acquire preliminary knowledge of classical and quantum statistical mechanics.

Unit No.	Topics	Total
		Lectures
Unit I	1. Thermodynamic Potentials	
	Enthalpy, Gibbs function, Helmholtz function, Internal Energy, Maxwell's	
	thermodynamical relations, Joule-Thomson effect, Clausius- Clapeyron	
	equation, Expression for (CP – CV), CP/CV, TdS equations.	
	2. Theory of Radiation	15
	Blackbody radiation and its importance, Experimental study of black body	
	radiation spectrum, Concept of energy density, Derivation of Planck's law,	
	Deduction of Wien's displacement law, Rayleigh-Jeans Law, Stefan	
	Boltzmann Law and Wien's displacement law from Planck's law.	
Unit II	1. Classical Statistics	
	Phase space, Microstate and Macro state, Accessible microstates, apriori	
	probability, thermodynamic probability, probability distribution, Maxwell-	
	Boltzmann (MB) distribution law, evaluation of constants α and β , Entropy	15
	and Thermodynamic probability, Distribution of molecular speeds.	15
	2. Quantum Statistics	
	Bose-Einstein (BE) distribution law, Fermi-Dirac (FD) distribution law,	
	comparison of M.B., B.E., and F.D. statistics.	

Reference Books:

- Heat and Thermodynamics M.W. Zemansky and R. Dittman, McGraw Hill.
- Physics for Degree Students B.Sc. Second Year Arora, Hemne, S. Chand.
- Concepts of Modern Physics Arthur Beiser, McGraw-Hill.
- Thermal Physics S. Garg, R. Bansal, and C. Ghosh, 1993, Tata McGraw-Hill.
- Thermodynamics, Kinetic Theory & Statistical Thermodynamics F.W. Sears, G.L. Salinger, 1988, Narosa.
- University Physics Ronald Lane Reese, Thomson Brooks/Cole.
- Heat, Thermodynamics and Statistical Physics N. Subramanyam, Brij Lal, P. Hemne, 2008, S. Chand.

LXVII

B.Sc. B.Ed.(Integrated) Four Years Programme Semester-II

Title of the Paper: (D-II: PHYSICS PAPER-VI) Thermal Physics and Statistical Mechanics–II

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes: After going through the course, the students should be able to:

- Develop conceptual clarity of thermodynamic functions and Clausius-Clapeyron equation.
- Appreciate the problem associated with the black body radiation spectrum.
- Know how the problems can be solved by using Planck's law of radiation.
- Acquire preliminary knowledge of classical and quantum statistical mechanics.

Unit No.	Topics	Total
		Lectures
Unit I	3. Thermodynamic Potentials	
	Enthalpy, Gibbs function, Helmholtz function, Internal Energy, Maxwell's	
	thermodynamical relations, Joule-Thomson effect, Clausius- Clapeyron	
	equation, Expression for $(CP - CV)$, CP/CV, TdS equations.	
	4. Theory of Radiation	15
	Blackbody radiation and its importance, Experimental study of black body	
	radiation spectrum, Concept of energy density, Derivation of Planck's law,	
	Deduction of Wien's displacement law, Rayleigh-Jeans Law, Stefan	
	Boltzmann Law and Wien's displacement law from Planck's law.	
Unit II	3. Classical Statistics	
	Phase space, Microstate and Macro state, Accessible microstates, apriori	
	probability, thermodynamic probability, probability distribution, Maxwell-	
	Boltzmann (MB) distribution law, evaluation of constants α and β , Entropy	15
	and Thermodynamic probability, Distribution of molecular speeds.	15
	4. Quantum Statistics	
	Bose-Einstein (BE) distribution law, Fermi-Dirac (FD) distribution law,	
	comparison of M.B., B.E., and F.D. statistics.	

LXVIII

Reference Books:

- Heat and Thermodynamics M.W. Zemansky and R. Dittman, McGraw Hill.
- Physics for Degree Students B.Sc. Second Year Arora, Hemne, S. Chand.
- Concepts of Modern Physics Arthur Beiser, McGraw-Hill.
- Thermal Physics S. Garg, R. Bansal, and C. Ghosh, 1993, Tata McGraw-Hill.
- Thermodynamics, Kinetic Theory & Statistical Thermodynamics F.W. Sears, G.L. Salinger, 1988, Narosa.
- University Physics Ronald Lane Reese, Thomson Brooks/Cole.
- Heat, Thermodynamics and Statistical Physics N. Subramanyam, Brij Lal, P. Hemne, 2008, S. Chand.

LXIX

B.Sc. B.Ed.(Integrated) Four Years Programme Semester- II Title of the Paper: (PHYSICS, PRACTICAL-II) Laboratory Course-II

Total Marks	100	Credits	4
Total Hours	120	Hours Per Week	8
Internal Exam	-	External Exam	100
Marks		Marks	
		Duration of External	4 + 4 Hours
		Examination	

Learning Outcomes: After going through the course, the students should be able to:

- Acquire skills in setting up experiments.
- Develop practical skills and techniques for accurate measurements.
- Acquire observational skills.
- Determine the least counts of different measuring instruments.

Part-I

Sr. No.	Name of experiment
1	To determine the value of Stefan's constant.
2	To determine the coefficient of thermal conductivity of copper by Searle's apparatus.
3	To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method.
4	To determine the temperature co-efficient of resistance by platinum resistance thermometer.
5	To study the variation of thermo e. m. f. across two junctions of a thermocouple with temperature. / To determine the surface tension of water by ripple method.
6	To record and analyze the cooling temperature of hot object as a function of time using a thermocouple.
7	To calibrate Resistance Temperature Device (RTD) using Null Method /Off-Balance Bridge.
8	To determine the surface tension of mercury by Quincke's method.

LXX

Part –II

Sr. No.	Name of experiment
1	To determine the temperature coefficient of resistance using post office box.
2	To verify the Stefan's fourth power law.
3	To determine the specific heat of graphite.
4	To determine the ratio of specific heat of air by Kundt's tube.
5	To determine Joules constant (J) by electrical method.
6	To determine the thermal coefficient of linear expansion of a metal rod.
7	To determine Mechanical equivalent of heat J by Callender and Barne's constant flow method.
8	To determine the constants of Ballistic Galvanometer(B.G.)

Reference Books:

- Advanced Practical Physics for Students B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
- A Textbook of Practical Physics Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
- Advanced Level Physics Practicals Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
- College Practical Physics Khanna and Gulati (S. Chand and Co. Ltd, Delhi).
- Practical Physics Gupta and Kumar (Pragati Prakation Meerut).
- Advanced Level Practical Physics J.M. Nelcon, J.M. Ogloom (EIBS).
- Engineering Practical Physics S. Panigrahi & B. Mallick, 2015, Cengage Learning India Pvt. Ltd.
- B.Sc. Practical Physics Harnam Singh and P.S. Hemne, S. Chand Publications.
- Advanced Practical Physics for Students B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
- A Textbook of Practical Physics Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
- Advanced Level Physics Practicals Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
- College Practical Physics Khanna and Gulati (S. Chand and Co. Ltd, Delhi).
- Practical Physics Gupta and Kumar (Pragati Prakation Meerut).
- Advanced Level Practical Physics J.M. Nelcon, J.M. Ogloom (EIBS).
- Engineering Practical Physics S. Panigrahi & B. Mallick, 2015, Cengage Learning India Pvt. Ltd.
- B.Sc. Practical Physics Harnam Singh and P.S. Hemne, S. Chand Publications.
LXXI

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II Title of the Paper: (D-II: CHEMISTRY PAPER-III) Physical Chemistry-I

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes

- **a.** Learning and coherent understanding of basic concepts and rules of logarithms, graphs, derivative and integrations. Knowledge and coherent understanding of basic concepts in thermodynamics will be gained by the student.
- **b.** Learning and understanding the knowledge about basic concepts in kinetics and first order, second order reactions with characteristics and suitable examples.
- **c.** Learning and coherent understanding of surface tension, viscosity and refractive index with suitable examples.
- **d.** Learning and coherent understanding of basic concepts in electrochemistry, conductors and conductivity cells, measurement of conductance with suitable examples and numerical problems.

UNIT I: Basic Mathematical Concepts and Thermodynamics, Chemical Kinetics (16 hours)

- **a.** Basic Mathematical Concepts and Thermodynamics: Logarithm: Basic rules and calculations.
 Graph Quadrants, drawing of linear graph, Slopes and Intercept, Derivative and Integration:
 Basic rules. Thermodynamics: Introduction, Basic terms used in thermodynamics, zeroth law of thermodynamics
- b. First law of thermodynamics: Mathematical equation, sign conventions, statements of first law and its limitations, Spontaneous and non-spontaneous processes. Second law of thermodynamics, Heat engine, Carnot's Cycle and efficiency of heat engine, Numerical Problems.
- c. Chemical Kinetics: Introduction, rate of reaction, definition, and units of rate constant, Factors affecting rate of reaction, Order and Molecularity of reaction. First order reaction: Derivation of rate constant, Characteristics of the first order reaction, Pseudo- first order reactions –i) Hydrolysis of methyl acetate in presence of acid, ii) Inversion of cane sugar
- d. Second order reaction: Derivation of rate constant for equal and unequal concentration of the reactants, Examples of Second order reaction: i) Reaction between K2S2O8 and KI and ii) Saponification of ethyl acetate, Characteristics of Second order reactions. Numerical problems.

Unit II: Physical properties of liquids and Electrochemistry (14 hours)

a. Physical properties of liquids: Introduction to states of matter, qualitative description of intermolecular forces in liquids, structure of liquids, classification of physical properties. Surface tension and its determination using stalagmometer and differential rise method

LXXII

- b. Viscosity and its determination using Ostwald's viscometer, Refractive index (Snell's law) specific and molecular refractivity's and its determination using Abbe's refractometer. Numerical Problems.
- **c. Electrochemistry**: Introduction, types of cell, phenomenon of electrolysis, Faradays Laws of electrolysis, Types of conductors, Explanations of Conductance, specific conductance, equivalence and molecular conductance. Variation of specific conductance, equivalence and molecular conductance with dilution, equivalent conductance at infinite dilution.
- **d.** Dipping type of conductivity cell, modifications in the technique used before measurement of conductance w.r.to use of alternating current, use of conductivity water, conductivity cell and temperature control. Measurement of conductance by Wheatstone bridge, Cell constant and its determination, Numerical problems.

- Barrow, G.M. Physical Chemistry Tata McGraw-Hill (2007).
- Castellan G.W. Physical Chemistry 4th ed. Narosa(2004).
- Kotz, J.C. Treichel, P.M.& Townsend, J. R. General Chemistry, Cengage Learning India Pvt Ltd: New Delhi(2009).
- Mahan, B.H. University Chemistry, 3rd Ed. Narosa (1998).
- Petrucci, R.H. General Chemistry, 5th Ed., Macmillan Publishing Co,: New York(1985).
- Elements of Physical Chemistry S., Glasstone, D. Lewis.(2010)
- Principles of physical Chemistry Marron and Prutton. (2007).
- Elements of Physical Chemistry P.W. Atkins (2017-18)
- Essentials of Physical Chemistry Bahl and Tuli. S. Chand, 2010.
- Physical Chemistry Danials and Alberty (2016)
- University General Chemistry C. N. R.Rao(2016)
- Priniples of Physical Chemistry, Puri, Sharma and Pathania 47th Edison, Vishal Publishing Co.
- Physical Chemistry, A. J.Mee
- Advanced Physical Chemistry, GurudeepRaj
- Physical Chemistry, R. A. Alberty 16) General Chemistry, 5th Edition, Macmillan Publishing Co., New York (1985)

LXXIII

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Title of the Paper: (D-II: CHEMISTRY PAPER -IV) Analytical Chemistry-I

Learning Outcomes

- **a.** Learning various analytical procedures and importance also sampling, accuracy and precision. Distinguish between classical and industrial chemistry. Learning and understanding basic concepts and concentration terms Knowledge of IPR.
- **b.** Knowledge of chromatographic separation technique and terms involved in it. Learning paper chromatography and thin layer chromatography.
- c. Knowledge of various type of titrations, neutralization curves, indicators used in various titrations
- d. Knowledge about the chemical nature and cleansing action of soap.

UNIT I: Introduction to analytical Chemistry and Fundamentals of Industrial Chemistry and

IPR, Chromatography (18 hours)

- **a. Introduction:** Importance of analysis, Analytical processes (Qualitative and Quantitative), Methods of analysis (Only classification), Sampling of solids, liquids and gases. Errors, types of errors (determinate and indeterminate), methods of expressing accuracy (Absolute and relative error), Significant figures, mean, median, standard deviation (Numerical problems expected).
- **b.** Fundamentals of Industrial Chemistry and IPR: Difference between classical and industrial chemistry, Raw materials for chemical industry, Material safety data sheets (MSDS), Definition and Explanation of terms Molecular weight, Equivalent weight, Molarity, Normality, Molality, Molarity of mixed solution, Acidity of base, Basicity of acid, ppt, ppm, ppb solutions, Mole Fraction. Weight fraction, Percentage composition by W/W, W/V, V/V, Problems based on Normality, Molarity, mole fraction, mixed solution, etc. IPR- Introduction to IPR and its significance in presence scenario.
- **c.** Chromatography: Introduction, Basic Principle of Chromatography, Basic terms, Classification of Chromatography, Paper Chromatography- Principle, Methodology-types of papers and treatment, sample loading, choice of solvent. Development-ascending, descending, circular, location of spots, determination of Rf value, Applications, advantages and disadvantages.
- **d.** Thin layer chromatography- Principle, Solvent system, stationary phases, preparation of TLC plate, Detecting reagents, methodology-sample loading. Detection of spot, Rf value, Applications, advantages and disadvantages, Comparison of paper chromatography and TLC.

UNIT II: Theory of titrimetric Analysis, Soaps and Detergents (12 hours)

- **a.** Introduction, Acid-base indicators, Theory of indicators w.r.t. Ostwald's ionization theory and quinoid theory. Neutralization curves and choice of indicators for a. Strong acid-strong base b. Strong acid-weak base c. Strong base-weak acid
- **b.** Complexometric titrations a. Introduction b. Types EDTA titrations c. Metallochromic indicators-Eriochrome black- T d. Indicator Action of Eriochrome black- T.

LXXIV

- **c.** Soaps and Detergents: Introduction, Soaps Raw materials, Types of soaps, Cleansing action of soap. Manufacture of soap Boiled or Hot Process, Cold process.
- **d.** Detergents Types of Detergents: Anionic, cationic and amphoteric (with example), Preparation of Teepol and Deriphat. Preparation of Shampoos, Comparisons between soaps and detergents.

Reference Books:

1) Principles of Physical Chemistry by Puri, Sharma and Pathania, Vishal Publishing company Jalindhar.

2) Essential of Physical Chemistry by Bahl B.S., TuliG.D. and BahlArun, S. Chand and Company Ltd. New Delhi

3) Modern Analytical Chemistry by David Harvey, McGRAW-Hill International Edition, 2000

4) Industrial chemistry by B. K. Sharma, Goel Publishing Housing, 16th edition2011

5) Advanced Inorganic Chemistry, Vol.No.1, by Gurudeep Raj, Krishna Prakashan Media Ltd, Goel Publication, Meerut

6) Analytical chemistry by B.K. Sharma, Krishna Prakashan Media Ltd, Meerut, edition 3rd 2011

7) Principles of electroplating and electroforming by Blum and Hogaboom

8) Chemical Process Industries by Shreve and Brink

9) Industrial Chemistry by Loutfy Madkor and Helen Njenga

10) Elementary Principles of Chemical Processes by Richard Felder and Ronald Rousseau, John Wiley and Sons

LXXV

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Title of the Paper: (D-II: CHEMISTRY PAPER -V) Physical Chemistry-II

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes

a. Learning and understanding conductivity and transport number of the aqueous solutions with different applications.

b. Knowledge about surface tension, viscosity and refractive index will be gained by the student.

c. Learning and understanding surface phenomena at heterogeneous surfaces.

d. Learning the various nuclear phenomena and measurement of nuclear radiations.

UNIT I: Electrolytic Conductivity and Physical Properties of Liquids

(20 hours)

a. Introduction, Types of conductors, Conductivity, Equivalent and Molar conductivity and their variation with dilution for weak and strong electrolytes in aqueous solution. Equivalent conductivity at infinite dilution, Measurement of conductance by using Wheatstone bridge. Kolharausch law of independent migration of ions and its applications such as Ionic mobility, determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of salt.

b. Conductometric titrations (only acid base titrations). Advantages of conductometric titrations. Transference number, Hittorf's rule, determination of transport number using Moving boundary method, factors affecting transport numbers. Numerical problems.

c. Physical Properties of Liquids: Introduction, Classification of physical properties, Surface tension and its determination using Stalagmometeric and differential capillary rise methods.

d. Viscosity and its determination using Ostwald's viscometer, Refractive index (Snell's law), Specific and Molecular refractivity and its determination using Abbe's refractometer.

UNIT II: Surface Chemistry and Nuclear Chemistry

(10 hours)

- **a.** Surface Chemistry: Introduction, Adsorption as a surface phenomenon, Definition of adsorption, adsorbent, adsorbent. Factors affecting adsorption, Types of adsorptions.
- **b.** Distinction between physical and chemical adsorption, Adsorption isotherms: Freundlich adsorption isotherm, Langmuir adsorption isotherm. Types of physical adsorption isotherms, applications of adsorption.
- **c.**Nuclear Chemistry: Introduction, Types of Nuclear radiation, properties of α , β and γ radiations, Detection and measurement of nuclear radiations by Scintillation and Geiger muller counter methods.
- **d.** Radioactive equilibrium and range of α particles, Geiger Nuttal relations, determination of radioactive constant (decay constant).

LXXVI

- Barrow, G.M. Physical Chemistry Tata McGraw-Hill (2007).
- Castellan G.W. Physical Chemistry 4 th Ed. Narosa (2004).
- Kotz, J.C. Treichel, P.M.& Townsend, J.R.General Chemistry, Cengage Learning India Pvt Ltd: New
- Delhi (2009).
- Mahan, B.H. University Chemistry, 3rd Ed. Narosa (1998).
- Petrucci, R.H. General Chemistry, 5th Ed., Macmillan Publishing Co,: New York (1985).
- Elements of Physical Chemistry S., Glasstone, D. Lewis.(2010)
- Principles of physical Chemistry Marron and Prutton. (2007).
- Elements of Physical Chemistry P.W.Atkins (2017)
- Essentials of Physical Chemistry Bahl and Tuli. S. Chand, 2010.
- Physical Chemistry Danials and Alberty (2016)
- University General Chemistry C.N.R.Rao (2016)
- Principals of Physical Chemistry Puri, Sharma and Pathania 47Th Edison,
- Vishal Publishing Co. Daryaganj Delhi. 110002 (2017)
- Physical Chemistry A.J.Mee.(2015)
- Advanced Physical Chemistry Gurudeep Raj (2017)
- Physical Chemistry R.A.Aleberty.(2017-18)
- Petrucci, R.H. General Chemistry 5th Ed. Macmillan Publishing Co.: New York (1985).

LXXVII

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Title of the Paper: (D-II: Chemistry PAPER-VI) Industrial Chemistry

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes

a. Learning and Understanding basic concepts and concentration terms. Distinguish between classical and industrial chemistry. Distinguish between unit operations and unit processes.

b. Knowledge of some unit operations.

c. Understanding the process of corrosion and knowledge of prevention from corrosion.

d. Knowledge of Indian paper industry.

Unit I Basic Concepts in Industrial Chemistry and Unit Operations

a. The difference between classical chemistry and industrial chemistry, Raw material for the Chemical Industry, Material Safety data sheets. Units that make up a chemical process-unit operation and unit processes, Flow Diagrams, Block Diagram, Process flow diagram / flow sheets

(16)

(15)

- **b.** Material Balances-The purpose of mass balance calculations, Material Balance Equations, Mass balance calculation procedure and simple example. Definition and Explanation of terms -Normality, Equivalent weight, Molality, Molecular weight, Molarity, Molarity of mixed solution, Acidity of base, Basicity of acid, ppt, ppm, ppb solutions, Mole Fraction, Weight fraction, Percentage composition by W/W, W/V, V/V, Problems based on Normality, Molarity, mole fraction, mixed solution, etc.
- **c.Unit Operations:** Size reduction- Principle, Jaw crusher, ball mill, Size Enlargement –Principle, Pellet mill, tumbling agglomerators.
- **d.** Separation Magnetic separation, Froth flotation, Distillation-Distillation of liquid mixtures, Types of distillation, Types of columns and packaging, Condensers, Vacuum distillation, Spinning-band distillation, Steam distillation.

Unit II. Corrosion and Electroplating and Paper Industry

a. Introduction of corrosion, Electrochemical theory of corrosion, Factors affecting on corrosion -i. Position of metals in the electrochemical series based on standard reduction potential ii. Purity of metal iii. Effect of moisture iv. Effect of oxygen (differential aeration principle) v. Hydrogen overvoltage

LXXVIII

b. Methods of protections of metals from corrosion, Electroplating: Electrolysis, Faraday's laws, Cathode current Efficiency. Basic principles of electroplating, cleaning of articles, Electroplating of chromium, Anodising

c. Paper Industry: Manufacturing of Pulp. Types of pulp-Sulphate and soda.

d. Manufacturing of paper, calendaring, ecological problems of Indian Paper industry, Features of good paper industry

- Principles of Physical Chemistry by Puri, Sharma and Pathania, Vishal Publishing company Jalindhar
- Essential of Physical Chemistry by Bahl B.S., TuliG.D. and BahlArun, S. Chand and Company Ltd. New Delhi
- Modern Analytical Chemistry By David Harvey, McGRAW-Hill International Edition, 2000
- Industrial chemistry by B. K. Sharma, Goel Publishing Housing, 16th edition2011
- Advanced Inorganic Chemistry, Vol.No.1, by Gurudeep Raj, Krishna Prakashan Media Ltd, Goel Publication, Meerut
- Analytical chemistry by B.K.Sharma, Krishna Prakashan Media Ltd, Meerut, edition 3rd 2011
- Principles of electroplating and electroforming by Blum and Hogaboom
- Chemical Process Industries by Shreve and Brink
- Indusrial Chemistry by LoutfyMadkor and Helen Njenga
- Elementary Principles of Chemical Processes by Richard Felder and Rousseau, John Wiley and Sons

LXXIX

B.Sc. B.Ed.(Integrated) Four Years Programme Semester- II Title of the Paper: (CHEMISTRY, PRACTICAL- II) Laboratory Course-II

Total Marks	100	Credits	4
Total Hours	120	Hours Per Week	8
Internal Exam	-	External Exam	100
Marks		Marks	
		Duration of External	4 + 4 Hours
		Examination	

Part I

Sr. No.	Name of experiment
1	Chromatography: Separation and identification of cations by Paper Chromatography technique from the following mixtures: a) $Ni2+ + Cu2+ b$ $Ni2+ + Co2+ b$
2	Spot Test: Identify the following metal ions by spot test method. Cu2+, Ni2+, Co2+, Fe3+, Al3+,Pb2+, Zn2+, Hg+2, Mg+2, Mn+2
3	Purification of organic compounds by crystallization (from water and alcohol) and distillation.
4	Estimation of Ester
5	Estimation of Acetone.
6	Estimation of Vitamin C.
	To study the hydrolysis of methyl acetate in presence of HCl and H2SO4 and
7	to determine the relative strength of acids.
8	To study the effect of acid strength on hydrolysis of an ester by using 0.5M
0	HCl and 0.25MHCl
9	To study the reaction between potassium persulphate and potassium iodide in solution with equal concentration of the reactants.
10	To study the reaction between potassium persulphate and potassium iodide in solution with unequal concentration of the reactants

Part –II	
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Sr. No.				Name o	of expe	eri	ment			
1	Gravimetric estimation	of iron	as	Fe2O3	from	a	solution	containing	Ferrous	ammonium
	sulphate and free sulphu	ric acid.								

2	Gravimetric estimation of barium as BaSO4 from a solution containing barium chloride and free hydrochloric acid.
3	Gravimetric estimation of nickel as Ni(DMG)2 from a solution containing NiSO4.7H2O and free sulphuric acid
	Identification of at least Eight Organic compounds with reactions including two from acids, two from phenols, two from bases and two from neutrals.
4	Acids – Succinic acid, Phthalic acid, Salicylic acid, Aspirin.
4, 5, 6	Phenols – Alpha-Naphthol, o-nitrophenol, p-nitrophenol.Bases – o-,m- and p-nitroanilines, Diphenyl amine.
	Neutrals – Urea, Acetanilide, Carbon tetrachloride, Bromobenzene, Methyl acetate, Nitrobenzene, Naphthalene, Anthracene, Acetophenone, Ethyl methyl ketone.
7	To determine the degree of dissociation and dissociation constant of acetic acid at various dilutions and to verify Ostwald's dilution law conductmetrically.
8	To determine the normality of the given strong acid by titrating it against the strong alkali conduct metrically
9	To determine the normality of the given weak acid by titrating it against the strong alkali conductometrically.
10	To determine the percentage composition of a given liquid mixture by viscosity method (Density data to be given).

References:

- Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education, 2012.
- Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2009
- Vogel's Text Book of Quantitative Chemical Analysis. (Longmann) ELBS Edition.
- Vogel's Text Book of Qualitative Chemical Analysis. (Longmann) ELBS Edition.
- Hand book of Organic Qualitative Analysis: Clarke.
- Comprehensive Practical Organic Chemistry Qualitative Analysis by V. K. Ahluwalia, Sunita Dhingra. University Press. Distributor Orient Longman Ltd.
- Comprehensive Practical Organic Chemistry preparation and Quantitative Analysis: V. K. Ahluwalia, Renu Aggarwal. University Press. Distributor Orient Longman Ltd.
- A Laboratory Hand Book of Organic Qualitative Analysis and Separation: V. S. Kulkarni. DastaneRamchandra& Co. Pune
- Practical book of Physical Chemistry: Nadkarni, Kothari & Lawande.
- Experimental Physical Chemistry: A.Findlay.
- Systematic Experimental Physical Chemistry: S. W. Rajbhoj, Chondhekar. (Anjali Publication.)
- Experiments in Physical Chemistry: R. C. Das and B. Behra. (Tata McGrawHill)
- Advanced Practical Physical Chemistry: J. B. Yadav (GoelPublishingHouse.)
- Practical Physical Chemistry: B. D. Khosala. (R. Chand & Sons)
- Experiments in Chemistry: D. V. Jahagirdar.
- A Text Book of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis: A.I. Vogel (Third Ed.)(ELBS)

LXXX

LXXXI

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Title of the Paper: (D-II: MATHEMATICS PAPER-III) Differential Equations I

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Course Learning Outcomes: Upon successful completion of the course students will able to:

- CO 1. Classify differential equations.
- CO 2. Solve different types of differential equations.
- CO3: Find orthogonal trajectories.

CO4: Apply the knowledge of differential equations to tackle problems occurring in physics and engineering.

Unit 1. Ordinary differential equations of first order and first degree (15 hrs.)

- 1.1 Introduction.
- 1.2 Exact differential equations.
- 1.2.1 Necessary and sufficient condition for exactness.
- 1.2.2 Differential equations reducible to exact, integrating factors with rules.
- 1.3 Linear differential equations.
- 1.4 Differential equations reducible to linear.
- 1.5 Applications of differential equations of first order and first degree:
- 1.5.1 Law of growth.
- 1.5.2 Law of decay.
- 1.5.3 Newton's law of cooling.
- 1.5.4 Orthogonal trajectories to Cartesian and Polar curves.
- 1.6 Examples based on 1.1 to 1.5.

Unit 2. Linear differential equations with constant coefficients

- 2.1 Introduction.
- 2.2 Auxiliary equation, Complementary function.
- 2.3 Types of complementary functions:
- 2.3.1 Distinct real roots, repeated real roots, complex roots, repeated complex roots,
- 2.4 Particular integrals for various functions
- 2.5 Applications to Electrical circuits.
- 2.6 Examples based on 2.1 to 2.5.

Recommended Book:

M. D. Raisinghania, Ordinary and Partial Differential Equations, 20th Revised Edition 2022; S.Chand and Company Pvt. Ltd. New Delhi.

(15 hrs.)

Scope: Part 1 : Unit 2: 2.12 to 2.32, Unit 3: 3.1 to 3.8, Unit 5 : 5.1 to 5.25.

LXXXII

- 1. Dr. A. B. Mathur and V. P. Jaggi, Advanced Engineering Mathematics, Khanna Publishers, 2nd edition, 2001.
- 2. R. K. Ghosh and K. C. Maity, An Introduction to Differential Equations, Book and Allied (P) Ltd., Seventh Edition, 2000.
- 3. D. A. Murray, Introductory Course in Differential Equations, Khosala Publishing House, Delhi.

LXXXIII

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Title of the Paper: (D-II: MATHEMATICS PAPER-IV) Differential Equations-II

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Course Learning Outcomes: Upon successful completion of the course students will able to:

CO1: Solve differential equations of the first order but not of the first degree.

- CO2: Identify types of higher order ordinary differential equations.
- CO3: Solve different types of higher order ordinary differential equations.
- CO4: Understand simultaneous differential equations.

Unit 1:

1.1 Equations of the first order but not of the first degree

- 1.1.1 Introduction
- 1.1.2 Method I: Equations solvable for p
- 1.1.3 Method II: Equations solvable for x
- 1.1.4 Method III: Equations solvable for y
- 1.1.5 Method IV: Equations in Clairaut's form
- 1.1.6 Method V: Equations reducible to Clairaut's form
- 1.1.7 Examples based on 1.1.2 to 1.1.6

1.2 Homogeneous linear equations or Cauchy-Euler equations

- 1.2.1 Homogeneous linear equation (Cauchy-Euler equation)
- 1.2.2 Method of solution of homogeneous linear differential equations
- 1.2.3 Working rule for solving linear homogeneous differential equations
- 1.2.4 Equations reducible to homogeneous linear form (Legendre's linear equations)
- 1.2.5 Working rule for solving Legendre's linear equations
- 1.2.6 Examples based on 1.2.3 and 1.2.5.

Unit 2:

2.1 Linear differential equations of second order

2.1.1 The general (standard) form of the linear differential equation of the second order.

2.1.2 Complete solution of y'' + Py' + Qy = Rin terms of one known integral belonging to the complementary function (C.F.).

2.1.3 Rules for getting an integral belonging to C.F. of y'' + Py' + Qy = R.

2.1.4 Working rule for finding complete primitive (solution) when an integral of C.F. is known or can be obtained.

- 2.1.5 Removal of first derivative (Reduction to normal form or changing the dependent variable).
- 2.1.6 Working rule for solving problems by changing the dependent variable.
- 2.1.7 Transformation of the equation by changing the independent variable.
- 2.1.8 Working rule for solving equations by changing the independent variable.
- 2.1.9 Examples based on 2.1.4, 2.1.6 and 2.1.8.

2.2 Simultaneous differential equations of the form (dx)/P = (dy)/Q = (dz)/R

(15 Hrs.)

(15 Hrs.)

LXXXIV

2.2.1 Introduction

- 2.2.2 The nature of solution of (dx)/P = (dy)/Q = (dz)/R
- 2.2.3 Geometrical interpretation of (dx)/P = (dy)/Q = (dz)/R
- 2.2.4 Rule I for solving (dx)/P = (dy)/Q = (dz)/R
- 2.2.5 Rule II for solving (dx)/P = (dy)/Q = (dz)/R
- 2.2.6 Rule III for solving (dx)/P = (dy)/Q = (dz)/R
- 2.2.7 Rule IV for solving (dx)/P = (dy)/Q = (dz)/R
- 2.2.8 Examples based on 2.2.4 to 2.2.7

Recommended Book:

1. M. D. Raisinghania, Ordinary and Partial Differential Equations, 20th Revised Edition 2022; S.Chand and Company Pvt. Ltd. New Delhi.

Scope:- Unit1: Part-I Chapter 4: 4.1 to 4.11; Part-I Chapter 6: 6.1 to 6.4 and 6.9 to 6.11; Unit 2: Part-I Chapter 10: 10.1 to 10.4 (excluding 10.4A and 10.4B),10.5 (excluding 10.5A), 10.6 to 10.11; Part-II Chapter 2: 2.1 to 2.11.

- 1. D. A. Murray, Introductory Course in Differential Equations, Khosala Publishing House, Delhi.
- 2. Zafar Ahasan, Differential Equations and Their Applications, Second Edition, PHI2004.
- 3. Differential Equations, Shepley L. Ross, Third Edition 1984; John Wiley and Sons, New York.
- 4. Elements of Partial Differential Equations, Ian Sneddon, Seventeenth Edition, 1982; Mc- Graw-Hill International Book Company, Auckland.

LXXXV

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Title of the Paper: (D-II: MATHEMATICS PAPER-V) Discrete Mathematics

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Course Learning Outcomes: Upon successful completion of the course students will able to:

- CO 1: Analyze the logical structure of statements symbolically, including the proper use of logical connectives, predicates, and quantifiers.
- CO 2: Construct truth tables, prove or disprove a hypothesis, and evaluate the truth of a statement using the principles of logic.
- CO 3: Understand and apply the fundamental concepts in graph theory.
- CO 4: Acquire the basic knowledge of graphs namely vertex, edge, special types of graph, isomorphic graphs, matrix representation of graphs.

Unit-1 Propositional Calculus

1.1 Revision

- 1.1.1 Propositional Logic.
- 1.1.2 Propositional equivalence.

1.2 Predicates and Quantifiers:

1.2.1 Pedicate, n-place Pedicate, n-aryPedicate.

1.2.2 Quantification and Quantifiers, Universal Quantifier, Existential Quantifier, Quantifiers with restricted domains.

1.2.3 Logical Equivalence involving Quantifiers.

1.3 Rules of Inference:

- 1.3.1 Argument in propositional Logic.
- 1.3.2 Validity Argument (Direct and Indirect methods)
- 1.3.3 Rules of Inference for Propositional Logic.
- 1.3.4 Building Arguments

1.4 Numerical Problems based on 1.2 to 1.3

Unit-2 Graph Theory

2.1 Graphs:

2.1.1 Basic Terminology

2.1.2 Special types of Graphs (Complete graph, Regular graph, Bipartite and complete Bipartite graph)

2.1.3 Isomorphism

(15 hrs.)

(15 hrs.)

LXXXVI

- 2.1.4 Adjacency and Incidence Matrix of Graph
- 2.1.5 Problems based on 2.1.2 to 2.1.4

2.2 Operations on Graph:

- 2.2.1 Subgraphs, vertex deletion, Edge addition.
- 2.2.2 Complement of a graph and self-complementary graphs.
- 2.2.3 Union, Intersection and Product of graphs.
- 2.2.4 Problems based on 2.1.1 to 2.1.3

Recommended Book:

1. Discrete Mathematics, S. R. Patil , M. D. Bhagat , R. S. Bhamare, S. M. Waingade, N. M. Phatangare and K. D. Masalkar, Nirali Prakashan, Pune.

- 1. Discrete Mathematics, D. S. Malik and M. K. Sen, Cengage Learning India Pvt. Ltd, New Delhi.
- 2. Discrete Mathematical Structures (sixth edition), Kolman, Busby, Ross, Pearson Education (Prentice Hall).
- 3. Introduction to Graph Theory, Mamta Chaudhary, Vani Sharma and Pooja Yadav, Sultan Chand & Sons, Educational Publishers, New Delhi.
- 4. Schums Outline of Discrete Mathematics, Seymour Lipschutz, Marc Lipson, Revised Third Edition-McGraw-Hill (2009).

LXXXVII

B.Sc. B.Ed.(Integrated) Four Years Programme Semester-II

Title of the Paper: (D-II: MATHEMATICS PAPER-VI) Differential Calculus

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Course Learning Outcomes: Upon successful completion of the course students will able to:

CO1: Learn conceptual variations while advancing from one variable to several variables in calculus.

- CO2: Set up and solve optimization problems involving several variables.
- CO3: Learn the concept of Jacobian of a transformation.

Unit – 1: Partial differentiation

Functions of two variables: domain, Neighborhood of a point, Continuity of functions of two variables (at a point), Limit of functions of two variables, Partial derivatives: first order partial derivatives, partial derivatives of higher order, Geometrical interpretation of partial derivatives, examples,

Homogeneous functions: definition, Euler's theorem on homogeneous functions (Case of two and three variables), examples using Euler's theorem. Total Differentials, Differentiation of composite functions, examples, Implicit function: first and second order derivative of implicit functions and its examples. Taylor's theorem for a function of two variables, its examples.

Unit – 2: Extreme values and Jacobian

Maxima and minima of functions of two variables: Condition for existence of maxima or minima, stationary and extreme points, Sign of quadratic expression, Lagrange's condition for maximum and minimum values of a function of two variables, examples, Lagrange's method of undetermined multipliers, examples using Lagrange's method.

Jacobian: Definition, examples. Jacobian of function of function (for the case of two and three variables, Jacobian of implicit functions, examples using these properties.

Recommended Books:

1. Differential Calculus, Shanti Narayan and P.K. Mittal, S. Chand publishing, 15th edition (2016).

Reference Books:

1. **Basic Multivariable Calculus**, J. E. Marsden , A. J Tromba & A. Weinstein; Springer Verlag, New York, 1993.

2. Calculus, Early Transcendental, H. Anton, I. Birens and Davis, John Wiley and Sons, 11th Edition (2015).

(15 lect.)

(15 lect.)

LXXXVIII

3. **Differential Calculus,** Maity and Ghosh, New Central Book Agency (P) limited, Kolkata, India. 2007.

4. Calculus: Early transcendental, James Stewart, Brooks/ Cole Cengage Learning, 7thedition (2012).

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

(D-II: Practicum MATHEMATICS)

PRACTICUM-: Differential Equations, Discrete Mathematics& Differential Calculus Laboratory work-II

Total Marks	100	Credits	04
Total Hours	120	Hours Per Week	08
Internal Exam Marks	_	External Exam Marks	100
		Duration of External Examination	4+4 Hours

Pr. No	Title of the Practical	No. of Practicals			
1.	Differential equations reducible to exact	1			
2.	Linear differential equations and Bernoulli's Differential equations	1			
3.	Law of growth & Law of decay	1			
4.	Newton's law of cooling	1			
5.	Orthogonal Trajectories to Cartesian Curves and Polar Curves	1			
6.	Linear differential equations with constant coefficients (examples on finding C. F.)	1			
7.	Particular integrals of the functions: sinax, cosax	1			
8.	Particular integrals of other functions	1			
9.	Equations solvable for p, x and y	1			
10.	Clairaut's equation & equations reducible to Clairaut's form	1			
11.	Homogeneous linear differential equations	1			
12.	Legendre's linear equations	1			
13.	Solution of linear differential equation of second order when one integral is known	1			
14.	Solution of linear differential equation of second order by the change of dependent variable	1			

Part	I
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LXXXIX

15.	Solution of linear differential equation of second order by the change of independent variable				
	Total Practicals	15			
	Part II				
Pr. No	Title of the Practical	No. of Practicals			
1.	Test the validity of the argument using truth table.	1			
2.	Show the implications without using truth table.	1			
3.	Special types of Graphs	1			
4.	Draw the graph represented by the given adjacency matrix.	1			
5.	Find the incidence matrix of the given graphs.	1			
6.	Operations on Graph	2			
7.	Examples using Euler's theorem for partial derivatives	2			
8.	Partial Differentiation for composite functions	1			
9.	Partial Differentiation for implicit functions	1			
10.	Extreme values of functions of two variables	1			
11.	Lagrange's method for undetermined multipliers	1			
12.	Jacobian	2			
	Total Practicals	15			

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Title of the Paper: (AEVC-V) Language-II (Other than Language-I)-English

Total Marks	100	Credits	4
Total Hours	60	Hours Per Week	4
Internal Exam Marks	20	External Exam Marks	80
		Duration of External	3 Hour
		Examination	

Learning Outcomes: After completing the course, the student teachers will be able to:

a. Demonstrate reading, writing, listening, speaking, and thinking abilities in L2.

b. Recognize the link between language and mental skills and demonstrate their knowledge and skills effectively for all purposes.

- c. Build inter-personal relationships and enhance social skills.
- d. Inculcate human values among the students through LRSW.
- e. Improve the language competence of the students.

UNIT I: Language, Society, and Learning

- a. Bi-/Multilingualism and scholastic achievements; need to promote multilingualism.
- b. Language variation and social variation: languages, dialects and varieties, cultural transmission of language, language and gender; language and identity; language and power.
- c. Constitutional provisions and National Education Policy 2020.
- d. Language acquisition and Language learning: language learning technologies.
- e. Language as a means of communication and language as a medium of cognition.

UNIT II: Speech and Writing

- a. Writing Systems: Speech and writing; arbitrariness in language.
- b. Types of writing systems.
- c. Classification sessions of speech sounds: vowels, consonants, and others.
- d. Suprasegmental: stress, pitch, tone, intonation, and juncture.
- e. Acoustic phonetics.

UNIT III: Understanding Grammar

- a. Word and meaning: parts of speech, grammatical categories, word formation.
- b. Affixation, compounding, reduplication, vocabulary building.
- c. Sentence and its constituents: simple, complex, and compound sentences.
- d. Semantics and pragmatics: lexical meaning, synonymy, antonymy, meronymy.
- e. Grammatical meaning, speech acts.

UNIT IV: Basic Communication Skills in L2, Critical Reading, and Thinking Skills

- a. Pronunciation and listening comprehension skills.
- b. Reading and reading comprehension skills.
- c. Effective writing, presentation, speaking skills; summarizing, and paraphrasing skills.
- d. Components of critical thinking and reading; high-order cognitive development.
- e. Critical thinking and problem-solving; rational inquiry, and problem-solving; rational inquiry.

Practicum

- 1. Listen to a recorded speech and classify it based on sounds: vowels, consonants, and others; suprasegmental: stress, pitch, tone, intonation, and juncture; Acoustic phonetics.
- 2. Analyze sentences and their constituents as simple, complex, and compound sentences from written work.

Mode of Transaction

Teaching this course will involve a mix of interactive lectures, tutorials, and practical involves such as discussion, role plays, projects, simulations, workshops, and language-awareness activities. The teaching intends deeper approaches to learning involving classroom discussion, developing the critical thinking/problem-solving abilities among the students, and will also focus on situations where in our daily lives one would be performing tasks that involve a natural integration of language skills. The students are expected to read assigned chapters/articles before the session, and the course requires active participation from the students.

Suggestive Reading Materials

- Smith, J. (2020). The Art of Reading. Random House.
- Williams, M. (2021). Essential Grammar Rules. Oxford University Press.

XCII

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Title of the Paper: (AEVC-VI) Understanding India (Indian Ethos and knowledge system)

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes: After completing the course, the student teachers will be able to:

- Recognize the vast corpus of knowledge traditions of India while developing an appreciation for it.
- Apply their acquired research and critical thinking skills in multidisciplinary themes.
- Summarize and pass on their learnings to their students of different Indian traditions in an easily digestible manner.

UNIT I: Introduction to the Knowledge of India

A. Definition & scope; Relevance of this knowledge.

B. Need to revisit our ancient knowledge, traditions, and culture.

UNIT II: Culture - Art and Literature

A. Fine arts (traditional art forms, contemporary arts, arts & spirituality, arts and identity, and art and globalization).

B. Performing Arts (Indian dance systems, traditional Indian pieces of music, visual, folk arts etc.).

C. Literature (Sanskrit literature, religious literature, Indian poetry, folk literature, Indian fiction,

Sangam literature, Kannada, Malayalam literature, Bengali literature, etc.).

UNIT III: Polity and Law

A. Kingship & types of government (oligarchies, republics); Local administration (village administration).

B. Basis of Law: Dharma & its sources; Criminal Justice: police, jails, and punishments; Lessons from Chanakya Niti; Lessons for modern-day India: Towards a tradition-driven equitable and just polity and law system.

UNIT IV: Economy

A. Overview of the Indian Economy from the Stone Age to the Guptas: The new culture of urbanization (including castes, guilds, and other economic institutions; Harappan civilization economy; growth of agriculture and proliferation of new occupations; growth of writing).

B. Internal & external trade and commerce, including trade routes, Indo-Roman contacts, and maritime trade of South India; Temple economy.

C. Land ownership - land grants & property rights, land revenue systems.

D. Understanding *Arthashastra:* Ideas & Criticism; Locating relevance of ancient Indian economic thought in modern-day Indian Economy.

UNIT V: Environment & Health

A. Understanding equilibrium between society & environment: Society's perceptions of natural resources like forests, land, water, and animals.

B. Sustainable architecture & urban planning; Solving today's environmental challenges (best practices from indigenous knowledge, community-led efforts, etc.).

C. India's Health Tradition: Ayurveda, Siddha, Ashtavaidya, Unani, and other schools of thought; Lessons from *Sushruta Samhita* and *Charaka Samhita*.

D. Mental health in ancient India: Towards time-tested concepts of mental wellness (concept of mind, dhyana, mind-body relationship, Ayurveda, yoga darshan, atman, etc.).

Suggestive Practicum

The modes of curriculum transaction will include lectures, tutorials, and practicum.

• Practicum will include organization of day trips that help student teachers watch events relating to visual and performing art; activities that enable student teachers to identify and record through photos, videos, etc., the elements of ancient architecture still existing in the city around them; organization of individual and group presentations based on themes such as polity, law, and economy, etc.; organization of a 'Knowledge of India' day in the institution to celebrate the culture (food, clothes, etc.) that they would have explored in lectures and tutorials; interactions with family members, elders, neighbors, and other members of society about the evolution of local systems and economy, etc.

Suggestive Mode of Transaction

• Lectures will include learner-driven participatory sessions and guest lecturers through experts and practitioners, such as fine arts and performing arts practitioners, along with contemporary poets & writers of Indian literature.

• Tutorials will include screening of documentaries and films followed by a discussion; learnerdriven discussions in the form of focus group discussions (FGDs), Socratic discussions, etc.; debate/discussion can be organized to explain India's *Vaad* tradition; discussions on how some of the ancient methods of teaching are relevant in today's time; discussions that help identify ethical dilemmas in daily lives and understanding the importance of ancient ethics and values to resolve them.

Suggestive Mode of Assessment

The approaches to learning assessment will include, for example:

- Supporting the curiosity and interest of student teachers in the selected themes through a multimodal approach, including regular assessments and actionable feedback that enable learners to outline and interpret the processes and events of the formation & evolution of knowledge of India through a multidisciplinary lens.
- Enabling the student teachers to demonstrate critical analysis and independent thinking of the processes and events in the formulation & evolution of different traditions that help student teachers evaluate the diverse traditions of India to distinguish its achievements and limitations.
- Use of first-hand or second-hand experiences that enable student teachers to develop and articulate an ethics-based education rooted in Indian thought to their students in the classroom context.

Suggestive Reading Materials

Teachers may suggest books/readings as per the need of the learners and learning content.

XCIV

B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Title of the Paper: (AEVC-VII) Teacher and Society

Learning Outcomes: After completion of the course, student teachers will be able to:

a. Examine the relationship between teacher beliefs, values, character, life history, social and cultural context, and teaching critically.

b. Explain the teacher roles and characteristics; the personal and professional self; the teacher as a communicator, the charismatic influencer, the reflective practitioner, competent learner, and much more, and their significant role in nurturing the posterity.

c. Differentiate between the narrow curricular aims of education and the broader educational aims and their role in shaping self, school, and society.

d. Demonstrate an ability to develop positive classrooms through engaging in the ethic of care.

e. Demonstrate an ability to critically reflect on personal and collective practices so as to improve learning and teaching.

f. Conceptualize teacher agency, its individual, contextual, and structural dimensions, and how it gets impacted and in turn shapes education.

Unit I: Understanding the Teacher: Exploring the Personal and Professional Teacher (8 hrs)

A. Exploring the wider personal and general social context of the teacher: Life history, teacher beliefs, values and aspirations, diverse identities, social contexts, and commitment to learning and education.

B. Changing profile, role, and responsibilities of a teacher.

C. Exploring the professional teacher: Qualifications, education in teaching, attitude, aptitude, experience, and exposure.

D. The Charismatic Teacher, the Communicator Teacher, The Missionary Teacher, The Competent Practitioner, The Reflective Practitioner, The Learning Teacher.

E. Reflexive practice: Nurturing the professional capital through collaborative and/or collective engagement with self, others, and the social context.

Unit II: Nurturing the Teacher: A Dialogue Beyond the Curricular Goals, for Life and Posterity (7 hrs)

A. Teaching: One profession, many roles.

- B. Teaching character: Nurturing teachers for human flourishing.
- C. Holistic teacher development: Nurturing the Panchakoshas.
- D. Teacher values, beliefs, and current philosophy of teaching: A reflective dialogue.

E. Developing an ethic of care in teacher education: Nurturing teachers towards a pedagogy of care.

Unit III: Understanding and Fostering Teacher Agency: Role in Shaping Education Systems of Tomorrow (7 hrs)

A. Teacher agency: What is it and why does it matter?

B. Individual, cultural, and structural dimensions of teacher agency.

C. Teacher discourses, philosophy, relationships, networks, and professional development: Shaping teacher agency and creative insubordination.

D. Challenges and issues in fostering teacher agency: Performativity, non-academic engagements,

XCV

systemic apathy, policy and practice gaps, and others.

E. Role of the teacher in shaping educational policy, practice, and reforms.

Unit IV: Teacher as an Architect of the New India: Shaping the Society of Tomorrow (8 hrs)

A. Engaging in critical education: Dialogues on power relations associated with gender, ethnicity, culture, disability, class, poverty, the reproduction of disadvantage and realizing true human potential.

B. Being a critical teacher: Raising debates around rapid technological advancement and its impact on individual, family, and social life; the growing isolation and impact on mental and social health and well-being.

C. Changing relationships between the 'state' and the 'market' and their impact on formal education. D. The conceptualization of teacher, teaching, and teacher roles, 'globalization' and the

reconstructed nationalism shaping the socio-political milieu and impact on social psyche, growing materialistic urge.

E. Sensory drives and the gradual deterioration of the individual and societal character.

TRANSACTIONAL MODE:

• **Teacher and Society** is a reformatory course that invites teachers to re-think teachers and teaching. It awakens and inspires teachers to realize broader educational aims through an action and reflection cycle. The approach, therefore, would include a blend of lectures, in-class seminars, thinking exercises, critical reflections, group work, case-based approaches, and enquiry-based learning.

• Learners would also be exposed to case studies featuring teachers from a representative crosssection of schools in India and critically analyze their exercise of agentic force in school improvement and the improvement of teaching practice.

• Situating themselves in the geo-political context, the learners will get to critically engage in some of the policy dialogues.

• Learners would reflect on their practice as pre-service interns, knowledge, skills, and understandings—and identify opportunities to apply course learning to their school context.

ESSENTIAL READINGS:

- National Curriculum Framework 2023
- National Education Policy 2020

REFERENCES: (APA Style)

- Caggart, G. L. (2005): Promoting Reflective Thinking in Teachers. Crowin Press.
- Irvine, J. J. (2003): Educating Teachers for Diversity: Seeing with a Cultural Eye. New York: Teachers College Press.
- Joyce, B., and Weal, M. (2003). Models of Teaching (7th Ed.). Boston: Allyn & Bacon.
- Lampert, M. (2001). Teaching Problems and the Problems of Teaching. New Haven: Yale University Press.
- Linda Darling Hammond & John Bransford (Ed.) (2005): Preparing Teachers for a Changing World.
- Martin, D. J. & Kimberly S. Loomis (2006): **Building Teachers: A Constructivist Approach to Introducing Education.** Wadsworth Publishing, USA.
- Ram, S. (1999): Current Issues in Teacher Education. Sarup & Sons Publications, New Delhi.
- Schon, D. (1987): Educating the Reflective Practitioner: Towards a New Design for Teaching and Learning in the Professions. New York: Basic Books.

XCVI B.Sc. B.Ed. (Integrated) Four Years Programme Semester-II

Title of the Paper: (AEVC-VIII) Event Management

Total Marks	50	Credits	2
Total Hours	30	Hours Per Week	4
Internal Exam Marks	10	External Exam Marks	40
		Duration of External	1 Hour, 30 Min.
		Examination	

Learning Outcomes: At the end of the course, student teachers will be able to:

- Know the historical context and theoretical foundations of Experiential Learning.
- Understand how to design Experiential Learning Activities.
- Integrate Experiential Learning activities with Technology.
- Assess and evaluate Experiential Learning Activities.

Unit 1: Principles of Event Management

a. Introduction to Event Management, Definition and scope of event management, Types of events (corporate, social, cultural, etc.).

- b. Event Planning Process, Conceptualization and feasibility.
- c. Setting objectives and goals.

d. Event Marketing and Promotion, Target audience analysis, Marketing strategies and tools, Sponsorship and partnerships.

e. Budgeting and Financial Management: Budget creation and management, Cost control and financial planning, Fundraising and revenue generation, Risk Management and Legal Issues, Identifying and assessing risks, Health and safety regulations.

Unit 2: Event Operations and Logistics

a. Site Selection and Venue Management, Criteria for selecting event venues, Venue logistics and operations.

b. Event Design and Production.

c. Designing event themes and concepts, Audio-visual and technical requirements.

d. Event Technology, Use of technology in event management, Event management software & tools.

e. Catering and Hospitality Management, Menu planning and catering services, Guest hospitality and service, Staffing and Volunteer Management.

SESSIONAL WORK: Project Proposal, Planning, and Execution of Educational Event (25 Marks)

- Students will form groups and select an event to plan and manage.
- Each group will submit a detailed event proposal including objectives, target audience, budget, and marketing plan.
- Event Execution: Students will execute their planned event, managing all aspects from logistics to marketing and operations.
- **Post-Event Evaluation:** Each group will conduct a thorough evaluation of their event, gather feedback, and prepare a final report.

TRANSACTIONAL MODE:

• Interactive discussions, group work, sharing of experiences, organizing various activities, analyzing various topics by using various charts, photographs, and other materials on aspects of health-related issues.

• Demonstrations, observations, visits to places, preparing workbooks, and models.

XCVII

• Projects and assignments for individual learners as well as for group work and their record of activities.

REFERENCES:

- Berridge, G. (2006) Events Design and Experience. Oxford: Butterworth-Heinemann.
- Bowdin, G. A. J. (2011) Events Management. 3rd ed. London: Butterworth-Heinemann.
- Columbus, G. and Goldblatt, J. J. (2010) The Complete Guide to Careers in Special Events: Step Toward Success! New York: Wiley.
- Davidson, R. and Rogers, T. (2006) Marketing Destinations and Venues for Conferences, Conventions and Business Events: A Convention and Event Perspective. Oxford: Butterworth-Heinemann.
- Ferdinand, N. and Kitchin, P. (2012) Events Management: An International Approach. Los Angeles, [Calif.]: Sage.
- Getz, D. (2016) Event Studies: Theory, Research and Policy for Planned Events. 3rd ed. London: Routledge.

XCVIII

B.Sc.B.Ed. (Integrated) Four Years Programme

Part-I, Sem-II

SS-II Constitution of India

Student have to do the self-study and required to qualify the internal exam.

Learning Outcomes:

- 1. The students will get knowledge about the making and philosophy of the Indian Constitution.
- 2. The students will become aware of Fundamental Rights, Directive Principles, and Duties.
- 3. The students will get knowledge about the procedure of constitutional amendment.

Module I: Historical Background, Making of Indian Constitution, and Salient Features

- A) Historical Background of Indian Constitution: Acts of 1909, 1919 & 1935.
- B) Making of Indian Constitution: Constituent Assembly.
- C) Salient Features of the Indian Constitution.

Module II: Philosophy, Fundamental Rights, Directive Principles, and Fundamental Duties A) Philosophy of the Indian Constitution: The Preamble.

- B) Fundamental Rights & Directive Principles of State Policy.
- C) Fundamental Duties.

- 1. Basu, D. D., Introduction to Constitution of India, Princeton, New Delhi, 1994.
- 2. M. Laxmikanth, *Indian Polity*, McGraw Hill Education, New Delhi, 6th edition, 2019.
- 3. Abbas H., Kumar, Indian Government & Politics, Pearson, New Delhi, 2011.
- 4. Awasthi, S. S., Indian Government and Politics, Haranand Publications Pvt. Ltd., 2009.
- 5. Fadia, B. L., *Indian Government and Politics*, Sahitya Bhavan, 16th Revised Edition, 2019.
- 6. Kashyap, Subhash, Our Constitution An Introduction to India's Constitution and Constitutional Law, National Book Trust, India, 2007.
- 7. Avasthi, A. P., *Indian Political System*, Lakshmi Narain Agarwal, Agra, 2004.
- 8. जोशी, प. ल. आणि दवे, भारतीय शासन आणि प्रशासन, नवद्या, नागपूर, 1991.
- 9. भोळे, भास्कर, भारतीय राज्याचे शासन आणि राजकारण, पिंपळापुरे, नागपूर, 2010.
- 10. जाधव, तुकाराम व शरपूरकर, महेश, भारतीय राज्यघटना व घटनात्मक प्रक्रिया, भाग 1 आणि भाग 2, क्रदयुणनक.