1.0 Programme and Duration:
Integrated Programme of Teacher Education titled ‘Master of Science Education’ (Mathematics) leading to the post-graduate degree, M.Sc.Ed. (Mathematics). The programme will be of six year duration organized on the semester pattern with 2 semesters in a year. Each semester will consist of 16 weeks of instruction excluding examination.

1.1 Equivalence:
The course content in the subjects, Physics, Chemistry and Mathematics in the first four years are equivalent to course content in the relevant subjects in the B.Sc. (PCM) Programme of the University of Mysore. The course content of the fifth and sixth years are equivalent to the M.Sc. Programme in Mathematics offered by the University of Mysore.
The course content related to Professional education are equivalent to the B.Ed. of University of Mysore and are as per the NCTE Regulations (2014).
In addition, in the last two years of the Programme, Professional Education components required for teaching of Mathematics at senior secondary level are also included. The composite degree, M.Sc.Ed., is thereby equivalent to B.Sc., B.Ed. and M.Sc. degrees of University of Mysore.

2.0 Eligibility for admission to M.Sc.Ed.
2.1 Candidates seeking admission to the programme should have passed CBSE Senior Secondary examination/ Pre-University examination of Karnataka or an equivalent examination of any state or UT of the Republic of India with 45% marks in the aggregate. Relaxation up to 5% of marks is given to the SC/ST candidates.
2.2 Candidates should have passed the qualifying examination with the following combinations of subjects: Physics, Chemistry, Mathematics/Statistics.
2.3 Admission shall be made by selection on the basis of marks in the qualifying examination and performance in a specially designed national level test (Common Entrance Examination) conducted by the NCERT. It shall be governed by the admission policies of NCERT and the guidelines of the University of Mysore.
It will also be governed by the reservation policies of Govt. of India as prevalent at the time of admission.

3.0 Scheme of Instruction:
Details of courses, scheme of study, credit distribution pattern and method of evaluation, etc. are provided in Table 1.
From semesters I to VIII Courses of Study are organized under the following categories:
From semesters IX to XII, courses of study are classified under the following categories:

a) Core Courses
b) Ability Enhancement Courses
c) Discipline Specific Electives
d) Skill Enhancement Courses
e) Generic Courses
f) Professional Education Courses.

3.1 Core Courses:
The Programme offers three majors, Physics, Chemistry and Mathematics in the first six semesters. Each Major comprises of 6 core courses. The titles of courses in each major and their positions are given in Tables 2 & 3.

From semesters IX to XII the core courses comprises of Mathematics subjects of the Masters level.

3.2 Ability Enhancement Courses:
This is mandatory for all students. Comprises of 8 courses offered during I to IV Semesters, four each in a language of student’s choice and two in English

a) Language: Any one of the following: Hindi/ Kannada/ Malayalam/ Tamil / Telugu
b) English

3.3 Discipline Specific Elective:
Total of six advanced courses, two in each Major Subject are offered in the VII and VIII semesters of the Programme.

3.4 Skill Enhancement Course:
Two courses are offered in the third and fourth semesters of the Programme. Students can choose any two courses of their choice, cutting across disciplines, from a pool of courses that are being offered in each subject area.

3.5 Generic Course:
Two courses of inter-disciplinary nature are offered in the first and eighth semesters of the programme.

3.6 Professional Education Courses:
In accordance with the NCTE regulations 2014, the programme includes 23 courses which are positioned in the first 8 semesters. The requirements of the 20-week internship proposed by the NCTE, are met through five rigorous phases of School Attachment Programmes. The first three Phases are of 2-week duration each, which will be organized in the Demonstration School and selected schools in and around Mysuru. The fourth phase is of 3 weeks duration, i.e. 1 week exclusively for working with community. The final fifth phase is of longer duration of 11 weeks internship and it will be organized in selected schools of NVS of Hyderabad Region or other schools.
An additional School attachment Programme is organized in the XI semester for a duration of 4 weeks. This will be organized in selected higher secondary schools where the student trainees will have a specialized internship in teaching experience at the higher secondary level.

4.0 Attendance

Each student has to attend a minimum of 75% classes out of the classes conducted in each course. Failure to meet the minimum requirement renders disqualification from terminal examination and makes him/her ineligible for NCERT scholarship/ free ship. Such a student is deemed to have dropped the course and is not allowed to write the semester end examination (C₃) of that course. He has to re-register for the course/s as and when they are offered by the institute.

5.0 Medium of Instruction:
The medium of instruction and examination is English.

6.0 Course Structure

TABLE 1: Credit Break-up into B.Sc., M.Sc. and B.Ed. Components and Mode of Evaluation

<table>
<thead>
<tr>
<th>Semesters</th>
<th>Total Credits</th>
<th>Programme</th>
<th>Credits (Theor) (L)</th>
<th>Teaching hours per week (L)</th>
<th>Credits: Practicum /al (Lab/Field) (T/P)</th>
<th>Practicum /al Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
<th>Periodic Assessment (C₁+C₂)</th>
<th>Terminal Assessment (C₃)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>24</td>
<td>B.Sc.</td>
<td>13</td>
<td>13</td>
<td>5</td>
<td>10</td>
<td>23</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>B.Ed.</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>II</td>
<td>24</td>
<td>B.Sc.</td>
<td>13</td>
<td>13</td>
<td>5</td>
<td>10</td>
<td>23</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>B.Ed.</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>III</td>
<td>29</td>
<td>B.Sc.</td>
<td>15</td>
<td>15</td>
<td>6</td>
<td>12</td>
<td>27</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>B.Ed.</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8 + 2 Wks</td>
<td>12</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>IV</td>
<td>29</td>
<td>B.Sc.</td>
<td>15</td>
<td>15</td>
<td>6</td>
<td>12</td>
<td>27</td>
<td>50</td>
<td>50</td>
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<tr>
<td></td>
<td>8</td>
<td>B.Ed.</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8 + 2 Wks</td>
<td>12</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>V</td>
<td>26</td>
<td>B.Sc.</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>15</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>B.Ed.</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>10 + 2 Wks</td>
<td>17</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>VI</td>
<td>27</td>
<td>B.Sc.</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>15</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>B.Ed.</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>12 + 3 Wks</td>
<td>18</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>VII</td>
<td>29</td>
<td>B.Sc.</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>20**</td>
<td>B.Ed.</td>
<td>4</td>
<td>4</td>
<td>12**+4</td>
<td>8+11 Wks</td>
<td>12</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>VIII</td>
<td>21</td>
<td>B.Sc.</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>12</td>
<td>17</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>B.Ed.</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>14</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>IX</td>
<td>23</td>
<td>M.Sc.</td>
<td>16</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>24</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>PE</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>X</td>
<td>23</td>
<td>M.Sc.</td>
<td>16</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>24</td>
<td>50</td>
<td>50</td>
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<td>1</td>
<td>2</td>
<td>4</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>XI</td>
<td>20</td>
<td>M.Sc.</td>
<td>16</td>
<td>16</td>
<td>4</td>
<td>8</td>
<td>24</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>
### TABLE 2: Panorama Of Courses with credit break-up from Semester I to VIII

<table>
<thead>
<tr>
<th>SL.No.</th>
<th>COURSE</th>
<th>CREDIT BREAK-UP SEMESTERWISE (L+T+P)</th>
<th>Credits (L+T+P)</th>
<th>Total Credit s In Prog.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>CORE COURSES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Physics</td>
<td>3+0+1</td>
<td>3+0+1</td>
<td>3+0+1</td>
</tr>
<tr>
<td>2</td>
<td>Chemistry</td>
<td>3+0+1</td>
<td>3+0+1</td>
<td>3+0+1</td>
</tr>
<tr>
<td>3</td>
<td>Maths</td>
<td>3+1+0</td>
<td>3+1+0</td>
<td>3+1+0</td>
</tr>
<tr>
<td>ABILITY ENHANCEMENT COURSES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Language</td>
<td>2+1+0</td>
<td>2+1+0</td>
<td>2+1+0</td>
</tr>
<tr>
<td>2</td>
<td>English</td>
<td>2+1+0</td>
<td>2+1+0</td>
<td>2+1+0</td>
</tr>
<tr>
<td>SKILL ENHANCEMENT COURSES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Courses 1 &amp; 2</td>
<td>--</td>
<td>--</td>
<td>2+0+1</td>
</tr>
<tr>
<td>DISCIPLINE SPECIFIC ELECTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Physics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chemistry</td>
<td>1+1+1</td>
<td>1+1+1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Maths</td>
<td>1+1+1</td>
<td>1+1+1</td>
<td></td>
</tr>
<tr>
<td>GENERIC ELECTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Environmental Education</td>
<td>1+1+0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Indian Constitution &amp; Human Rights</td>
<td>1+1+0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROFESSIONAL EDUCATION COURSES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Language Across Curriculum</td>
<td>3+1+0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Contemporary Indian Education</td>
<td>3+1+0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Yoga Edu., self-understanding &amp; development</td>
<td>1+0+1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Understanding the Learner</td>
<td>3+1+0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gender School &amp; Society</td>
<td>1+1+0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6*</td>
<td>School Attachment Programme 1to 4</td>
<td>0+0+2</td>
<td>0+0+2</td>
<td>0+0+2</td>
</tr>
<tr>
<td>7</td>
<td>Learning &amp; Teaching</td>
<td>3+1+0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Drama &amp; Art Education</td>
<td>1+1+0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*internship  ** includes internship credits

L: Lectures: 1 credit = 1 hr/week x 16 weeks;  
T: Tutorial/  1 credit = 2 hr/week x 16 weeks  
P: Practicum/practical  1 credit =  2 hr/week x 16 weeks  
V: Credit value of a course is L+T+P
<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>COURSE</th>
<th>CREDITS (L+T+P)</th>
<th>TOTAL CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Core papers</strong></td>
<td>IX</td>
<td>X</td>
</tr>
<tr>
<td>1</td>
<td>Abstract Algebra</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Linear Algebra</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Analysis I</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Discrete Mathematics</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Analysis II</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Complex Analysis I</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Theory of Numbers</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Topology I</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>Elements of Functional Analysis</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Theory of Ordinary and Partial differential equations</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Complex Analysis II</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>Topology II</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>Commutative Algebra</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>Measure Theory</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>Algorithms And Computation</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>Differential Geometry</td>
<td>4 + 1 +0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td><strong>Sub-total</strong></td>
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<td></td>
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</table>
### Table 1: Professional Education

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Credits: Practicum/AL (Lab/Field) (T/P)</th>
<th>Practicum/AL Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>4</td>
<td>Foundations of higher secondary education</td>
<td>2 + 1+0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>4</td>
<td>Teaching of Mathematics</td>
<td>2 + 1+0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>4</td>
<td>Internship 2 (senior secondary level)</td>
<td>0+0+4</td>
<td></td>
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<tr>
<td>20</td>
<td>4</td>
<td>Research in Mathematics Education</td>
<td>2 + 1+0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>13</strong></td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>93</strong></td>
</tr>
</tbody>
</table>

L: Lectures: 1 credit = 1 hr/week x 16 weeks  
T: Tutorial: 1 credit = 2 hr/week x 16 weeks  
P: Practicum/practical 1 credit = 2 hr/week x 16 weeks  
V: Credit value of a course is L+T+P

### Tables 4 to 15: Detailed Course Structure for M.Sc.Ed.(Mathematics)

**Total Credits = 302**  
B.Sc. Component = 121; M.Sc. 80; B.Ed. + P.E. Component = 88 + 13

### Table 4: Semester I (Credits: B.Sc.12; AEC 6; B.Ed. 6; Total 24)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Credits: Practicum/AL (Lab/Field) (T/P)</th>
<th>Practicum/AL Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>Core Course 1A Physics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Core Course 2A Chemistry</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Core Course 3A Mathematics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>AEC 1A Language H/K/M/Tam/Tel</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>AEC 2A English</td>
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<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Language across the curriculum</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td></td>
<td><strong>17</strong></td>
<td><strong>17</strong></td>
<td><strong>7</strong></td>
<td><strong>14</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

Note:  
Core Courses 1A, 2A & 3A refer to the major subjects; A refers to the First course in each major; from Sem II to VI, papers in core courses are designated B, C, D, E & F.  
AEC Ability Enhancement Course; GE- Generic Elective  
Evaluation – C1 + C2 = 50%; C3 = 50%
### TABLE 5: Semester II (Credits: B.Sc. 12; AEC 6; B.Ed. 6; Total 24)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Credits: Practicum/al (Lab/Field) (T/P)</th>
<th>Practicum/al Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>Core Course 1B Physics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Core Course 2B Chemistry</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Core Course 3B Mathematics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>AEC 1B Language H/K/M/Tam/Tel</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>AEC 2 B English</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Contemporary Indian Education</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>Yoga Edu., self-understanding &amp; development</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*SEC 1 - Skill Enhancement Course 1 – Each student will select any one of the 5 courses offered.

Evaluation – C₁ + C₂ = 50%; C₃ = 50%*

### TABLE 6: Semester III (Credits: B.Sc.12; AEC 6; SEC 3; B.Ed. 8; Total 29)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Credits: Practicum/al (Lab/Field) (T/P)</th>
<th>Practicum/al Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>Core Course 1C Physics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Core Course 2C Chemistry</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Core Course 3C Mathematics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>AEC 1C Language H/K/M/Tam/Tel</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>AEC 2C English</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>Skill Enhancement Course 1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>Understanding the Learner</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>Gender School &amp; Society</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>School Attachment Programme 1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
<td>2 weeks</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*SEC 1 - Skill Enhancement Course 1 – Each student will select any one of the 5 courses offered.

Evaluation – C₁ + C₂ = 50%; C₃ = 50%
**TABLE 7: Semester IV (Credits: B.Sc.12;  AEC 6;  SEC 3;  B.Ed. 8; Total 29)**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits/L</th>
<th>Teaching Hours per week/L</th>
<th>Credits/P</th>
<th>Practicum/al Hours per week/T/P</th>
<th>Total Hours per week/L+T+P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>Core Course 1D Physics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Core Course 2D Chemistry</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Core Course 3D Mathematics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>AEC 1D Language H/K/M/Tam/Tel</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>AEC 2D English</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>*Skill Enhancement Course 2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>Learning &amp; Teaching</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>Drama &amp; Art Education</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>School Attachment Programme 2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2 weeks</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* SEC 2 - Skill Enhancement Course 2 – Each student will select any one of the 5 courses offered.
Evaluation – $C_1 + C_2 = 50\%$; $C_3 = 50\%$
### TABLE 8: Semester V (Credits: B.Sc. 12; B.Ed. 14; Total 26)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Pracitcum/al (Lab/Field) (T/P)</th>
<th>Practicum/al Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>Core Course 1E Physics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Core Course 2E Chemistry</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Core Course 3E Mathematics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Assessment For Learning</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Pedagogy of Physical Sciences</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Pedagogy of Maths.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>School Attachment Programme 3</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
<td>2 Weeks</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
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</table>

Evaluation – $C_1 + C_2 = 50\%; \; C_3 = 50\%$

### TABLE 9: Semester VI (Credits: B.Sc. 12; B.Ed. 15; Total 27)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Pracitcum/al (Lab/Field) (T/P)</th>
<th>Practicum/al Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>Core Course 1F Physics</td>
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<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Core Course 2F Chemistry</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Core Course 3F Mathematics</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Critical Understanding Of ICT</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Pedagogy of Physical Sciences</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Pedagogy of Maths</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>School Attachment Programme 4 Community Living</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
<td>3 weeks</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
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<td></td>
<td></td>
<td></td>
<td>15</td>
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</tbody>
</table>

Evaluation – $C_1 + C_2 = 50\%; \; C_3 = 50\%$
### TABLE 8: Semester VII*(Credits: DSE 9; B.Ed. 20; Total 29**)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits: Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Credits: Practicum/al Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>DSE 1 A Physics</td>
<td>1</td>
<td>1</td>
<td>1+1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>DSE 2 A Chemistry</td>
<td>1</td>
<td>1</td>
<td>1+1</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>DSE 3 A Mathematics</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Creating an Inclusive School</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>Health &amp; Physical Education</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Reading &amp; Reflections On Text</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>7*</td>
<td>6</td>
<td>Internship School Subject 1 : Physical Sciences</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>6</td>
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<tr>
<td>8</td>
<td>6</td>
<td>Internship School Subject 2 : Mathematics</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Semester duration 25 weeks; Instructional duration -14 weeks; Engagement in field -10 weeks; **includes Internship 12 credits; DSE Discipline Specific Elective

Evaluation – $C_1 + C_2 = 50\%; \ C_3 = 50\%$

### TABLE 11: Semester VIII (Credits: DSE 9; GE 2; B.Ed. 10; Total 21)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits: Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Credits: Practicum/al Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>DSE 1 B Physics</td>
<td>1</td>
<td>1</td>
<td>1+1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>DSE 2 B Chemistry</td>
<td>1</td>
<td>1</td>
<td>1+1</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>DSE 3 B Mathematics</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>GE 2 Indian Const. &amp; Human Rights</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Knowledge &amp; Curriculum</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Guidance &amp; Counseling</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>Value &amp; Peace Education</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Evaluation – $C_1 + C_2 = 50\%; \ C_3 = 50\%$
TABLE 12: Semester IX (Credits: M.Sc. 20: Prof. Edu.3; Total 23)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Credits: Practicum/al (Lab/Field) (T/P)</th>
<th>Practicum/al Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>Core Maths 1</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>Core Maths 2</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>Core Maths 3</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>Core Maths 4</td>
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<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Professional Education</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td></td>
<td>18</td>
<td>18</td>
<td>5</td>
<td>10</td>
<td>28</td>
</tr>
</tbody>
</table>

Evaluation – $C_1 + C_2 = 50%$; $C_3 = 50%$

TABLE 13: Semester X (Credits: M.Sc. 20 Prof. Edu. 3; Total 23)

<table>
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<th>Course No.</th>
<th>Total Credits</th>
<th>Courses</th>
<th>Credits Theory (L)</th>
<th>Teaching Hours per week (L)</th>
<th>Credits: Practicum/al (Lab/Field) (T/P)</th>
<th>Practicum/al Hours per week (T/P)</th>
<th>Total Hours per week (L+T+P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>Core Maths 5</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>Core Maths 6</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>Core Maths 7</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>Core Maths 8</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Professional Education</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td></td>
<td>18</td>
<td>18</td>
<td>5</td>
<td>10</td>
<td>28</td>
</tr>
</tbody>
</table>

Evaluation – $C_1 + C_2 = 50%$; $C_3 = 50%$
TABLE 14: Semester XI (Credits: M.Sc. 20 Prof. Edu. 4; Total 24)

<table>
<thead>
<tr>
<th>Course No.</th>
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Evaluation – C₁ + C₂ = 50%; C₃ = 50%

TABLE 15: Semester XII (Credits: M.Sc. 20; Prof. Edu.3; Total 23)

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Evaluation – C₁ + C₂ = 50%; C₃ = 50%
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Semesters IX to XII:

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7.0 Change to another programme
Candidates admitted to M.Sc.Ed.(Mathematics) programme have the option of changing to M.Sc.Ed. Physics or Chemistry programme in the beginning of IX semester, after successful completion of first eight semesters without dropping any course, and subject to conditions laid down by the Academic Committee constituted for the purpose.
8.0 **Continuous Assessment, Earning of Credits and Award of Grades**
The evaluation of the candidate shall be based on continuous assessment. The structure for evaluation is as follows:

8.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 discrete components identified as C₁, C₂, and C₃.

8.2 The performance of a candidate in a course will be assessed for a maximum of 100 marks as explained below.

8.2.1 The first component (C₁), of assessment is for 25 marks. This will be based on Test/assignment/seminar. During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8th week of the semester. Beyond 8th week, making changes in C₁ is not permitted.

8.2.2 The second component (C₂), of assessment is for 25 marks. This will be based on test/assignment/seminar. The continuous assessment and scores of second half of the semester will be consolidated during the 16th week of the semester. During the second half of the semester the remaining units in the course will be completed.

8.2.2.1 The outline for continuous assessment activities for Component-I (C₁) and Component-II (C₂) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Section/Department. The students should be informed about the modalities well in advance. The evaluated courses/assignments during component I (C₁) and component II (C₂) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained for this purpose by the concerned teacher.

8.2.3 During the 18th-20th week of the semester, a semester-end examination of 2 hours duration shall be conducted for each course. This forms the third/final component of assessment (C₃) and the maximum marks for the final component will be 50.

**Setting questions papers and evaluation of answer scripts.**

I. Questions papers in three sets shall be set by the internal examiner for a course. Whenever there are no sufficient internal examiners, the chairman of BoE shall get the questions papers set by external examiners.

II. The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation. There shall be separate BoE for UG and PG papers.

III. (i) **For semesters I to VIII, there shall be single valuation for all theory papers by internal examiners. In case, the number of internal examiners falls short, external examiners may be invited.**

(ii) The examination for Practical work/Field work/Project work will be conducted jointly by two internal examiners. However, the BoE on its discretion can also invite external examiners if required.

IV. **For semesters IX to XII, a separate PG board of Examiners approved by the University will be constituted. All question papers will be set by internal examiners but valuation shall be done by external examiners.**
V. Each theory paper comprises of 9 questions of 10 marks each. Each unit will have two questions with internal choice. Question 9 will have questions drawn from all the 4 units.

IV. Challenge valuation
A student who desires to apply for challenge valuation shall obtain a Xerox copy of the answer script by paying the prescribed fee within 10 days after the announcement of the results. He / She can challenge the grade awarded to him/her by surrendering the grade card and by submitting an application along with the prescribed fee to the Registrar (Evaluation) within 15 days after the announcement of the results. This challenge valuation is only for C3 component. The answer scripts for which challenge valuation is sought for shall be sent to another external examiner. The marks awarded will be the higher of the marks obtained in the challenge valuation and in maiden valuation.

8.2.4 In case of a course with only practical component a practical examination will be conducted with two examiners (ref: 8.2.3 III (iii)). A candidate will be assessed on the basis of a) knowledge of relevant processes b) Skills and operations involved c) Results / products including calculation and reporting. If external examiner does not turn up then both the examiners will be internal examiners. The duration for semester-end practical examination shall be decided by the departmental council.

8.2.5 If X is the marks scored by the candidate out of 50 in C3 in theory examination, if Y is the marks scored by the candidate out of 50 in C3 in Practical examination, and if Z is the marks scored by the candidate out of 50 in C3 for a course of (L=0):T:(P=0) type that is entirely tutorial based course, then the final marks M in C3 is decided as per the following table.

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<th>L.T.P. distribution</th>
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<td>[ \frac{[(L+T) \times X] + [(T + P) \times Y]}{L + 2T + P} ]</td>
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<tr>
<td>L: (T = 0) : P</td>
<td>[ \frac{(L \times X) + (P \times Y)}{L + P} ]</td>
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<tr>
<td>L:T : (P=0)</td>
<td>X</td>
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<tr>
<td>L : (T=0) : (P = 0)</td>
<td>X</td>
</tr>
<tr>
<td>(L=0) : T : P</td>
<td>Y</td>
</tr>
<tr>
<td>(L=0) : (T = 0) : P</td>
<td>Y</td>
</tr>
<tr>
<td>(L=0) : T : (P = 0)</td>
<td>Z</td>
</tr>
</tbody>
</table>

8.2.6 The details of continuous assessment are summarized in the following Table.

<table>
<thead>
<tr>
<th>Component</th>
<th>Syllabus in a Course</th>
<th>Weightage</th>
<th>Period of Continuous Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>First 50% (2 units of total units)</td>
<td>25%</td>
<td>First half of the semester. To be consolidated by 8th week.</td>
</tr>
<tr>
<td>C2</td>
<td>Remaining 50% (Remaining units of the course)</td>
<td>25%</td>
<td>Second half of the semester. To be consolidated by 16th week.</td>
</tr>
<tr>
<td>C3</td>
<td>Semester-end examination (All units of the course)</td>
<td>50%</td>
<td>To be completed during 18th - 20th Week</td>
</tr>
</tbody>
</table>

**Final Grades to be announced latest by 24th week**
8.2.7 A candidate’s performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (25 + 25 + 50).

8.2.8 Finally, awarding the grades should be completed latest by 24th week of the semester.

8.3 In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.
In case a candidate’s class attendance in a course is less than 75% or as stipulated by the University, the candidate is said to have DROPPED that course, and such a candidate is not allowed to appear for C3 in that course.
Teachers offering the courses will place the above details in the Departmental meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Principal before the commencement of C3 examination. A copy of this notification shall also be sent to the office of the Registrar & Registrar (Evaluation).

8.4 In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.
In case a candidate secures more than or equal to 30% in C3, but his/her grade (G) = 4, as per section 8.12 below, then he/she may be declared to have been conditionally successful in this course, provided that such a benefit of conditional clearance based on G=4 shall not be availed for more than 24 credits for the entire programme.
In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKEUP option.
The candidate has to exercise his/her option to DROP immediately within 10 days from the date of notification of results.
A MAKE UP examination for odd semester courses will be conducted along with next regular odd semester examinations and for even semester courses along with a next regular even semester examinations. If a candidate is still unsuccessful, he/she may opt for DROP or again take up MAKE UP examination; however, not exceeding double the duration norm in one stretch from the date of joining the course.

8.5 A candidate has to re-register for the DROPPED course when the course is offered again by the Institute if it is a hard core course. The details of any dropped course will not appear in the grade card.

8.6 Each student can go with a normal pace of credits prescribed for each per semester. However, he/she has provision to go with a slow pace of 20 credits per semester or an accelerated pace of +4 credits per semester.

8.7 The tuition fee and the examination fee of a semester will be in accordance with the number of credits registered by each student in that semester.

8.8 The student may avail a maximum of two blank semesters in one stretch. However, he has to pay a nominal fee for maintaining a semester blank to the institution.
8.9 The Institute shall follow the CBCS guidelines of the University and its amendments thereof provided they are beneficial to the system.

8.10 The tentative / provisional grade card will be issued by the Registrar (Evaluation) at the end of every semester indicating the courses completed successfully. This statement will not contain the list of DROPPED courses.

8.11 Upon successful completion of M.Sc.Ed., a final grade card consisting of grades of all courses successfully completed by the candidate will be issued by the Registrar (Evaluation).

8.12 The grade and the grade point earned by the candidate in the subject will be as given below.

<table>
<thead>
<tr>
<th>Marks</th>
<th>Grade</th>
<th>Grade Point (GP = V x G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39</td>
<td>4</td>
<td>V*4</td>
</tr>
<tr>
<td>40-49</td>
<td>5</td>
<td>V*5</td>
</tr>
<tr>
<td>50-59</td>
<td>6</td>
<td>V*6</td>
</tr>
<tr>
<td>60-64</td>
<td>6.5</td>
<td>V*6.5</td>
</tr>
<tr>
<td>65-69</td>
<td>7</td>
<td>V*7</td>
</tr>
<tr>
<td>70-74</td>
<td>7.5</td>
<td>V*7.5</td>
</tr>
<tr>
<td>75-79</td>
<td>8</td>
<td>V*8</td>
</tr>
<tr>
<td>80-84</td>
<td>8.5</td>
<td>V*8.5</td>
</tr>
<tr>
<td>85-89</td>
<td>9</td>
<td>V*9</td>
</tr>
<tr>
<td>90-94</td>
<td>9.5</td>
<td>V*9.5</td>
</tr>
<tr>
<td>95-100</td>
<td>10</td>
<td>V*10</td>
</tr>
</tbody>
</table>

Here, P is the percentage of marks (P=\[(C1+C2)+M\]) secured by a candidate in a course which is rounded to nearest integer. V is the credit value of course. G is the grade and GP is the grade point.

8.13 A candidate can withdraw any course within in ten days from the date of notification of final results. Whenever a candidate withdraws a paper, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is soft core/open elective.
A DROPPED course is automatically considered as a course withdrawn.

8.14 Overall cumulative grade point average (CGPA) of a candidate after successful completion the required number of credits (302) is given by $CGPA = \frac{\sum GP}{\text{Total number of credits}}$

9. Classification of results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.
<table>
<thead>
<tr>
<th>CGPA</th>
<th>FGP</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 &lt;= CGPA &lt; 5</td>
<td>5</td>
</tr>
<tr>
<td>5 &lt;= CGPA &lt; 6</td>
<td>6</td>
</tr>
<tr>
<td>6 &lt;= CGPA &lt; 7</td>
<td>7</td>
</tr>
<tr>
<td>7 &lt;= CGPA &lt; 8</td>
<td>8</td>
</tr>
<tr>
<td>8 &lt;= CGPA &lt; 9</td>
<td>9</td>
</tr>
<tr>
<td>9 &lt;= CGPA &lt; =10</td>
<td>10</td>
</tr>
</tbody>
</table>

Overall percentage=10*CGPA or is said to be 50% in case CGPA<5

10.0 Provision for Appeal
A candidate, if dissatisfied with the grades that he/she has got with a feeling that he/she is unnecessarily penalized can approach the grievance cell with the written submission together with all facts and all the assignments, test papers etc. which were evaluated. He/She can do so before the semester-end examination (based on 2 continuous assessment components already completed) or after the semester-end examination. The grievance cell is empowered to review the grades if the case is genuine and is also empowered to penalize the candidate if his/her submission is found to be baseless and unduly motivated. This Cell may recommend to take disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the Grievance Cell is final.

The Registrar (Evaluation) will be the Chairman and Convenor of the Grievance Cell. The composition of the Grievance Cell is as follows:

1. The Principal
2. The Dean of Instruction
3. Heads of DESM, DESSH and I/c Sections. An external expert from the University of Mysore in the concerned subject.
4. The Registrar (Evaluation) ex-officio Chairman/Convenor.
5. The appropriate fee as fixed by the University shall be collected from the candidate who goes for an appeal to the Grievance Cell.

11.0 Barring of Simultaneous Study

11.1 No student admitted to a degree course in a college under the jurisdiction of this university, shall be permitted to study simultaneously in any other course leading to a degree (regular, evening, morning) offered by this/any other university.

11.2 If a candidate gets admitted to more than one course leading to a degree, the university shall without giving prior notice cancel his/her admission to all such courses to which he/she has joined.
12.0 Miscellaneous:

12.1 These revised regulations will apply to the candidates admitted for the academic year 2016-17 and onwards for the course mentioned in Regulation No.1.0 above.

12.2 Other regulations not specifically mentioned above are as per the Regulations of the University as applicable from time to time.

12.3 Any other issue not envisaged above, shall be resolved by the Vice-Chancellor in consultation with the appropriate Bodies of the University, which shall be final and binding.
FIRST SEMESTER

Core course 1A: Physics

MSE 1.1 : MECHANICS

Credits: 4 (3L+ 0T +1P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:

- The students will be able to understand Newtonian mechanics and apply its principles to explain natural physical phenomena.
- The teacher will be able to enable the students to identify and modify alternative conceptions in the domains of Newtonian Mechanics.

COURSE CONTENT:

Unit I

*Vectors*: Vector and scalar products. Scalar triple product and Vector triple product. Differentiation of a vector with respect to scalars (such as time). Gradient, Divergence, Curl-definitions, physical meaning, and operations, Laplacian, Line, Surface, and Volume integrals. Gaussâ€™ Stokes, and Greens theorem.

*Ordinary Differential Equations*: 1\(^{st}\) order homogeneous differential equations. 2\(^{nd}\) order homogeneous differential equations with constant coefficients.

Unit II


Unit III


Unit IV
Oscillations: Simple Harmonic Motion (Basic idea), Differential equation of SHM and its solutions (simple pendulum, compound pendulum, loaded spring), Kinetic and Potential Energy, Total Energy and their time averages. Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats), Lissajous figures with equal an unequal frequency and their uses. Damped vibrations. Forced vibrations.

Reference Books:
2. Harris Benson, University Physics, Revised Edition, John Wiley and Sons, Inc.
3. FW Sears, MW Zemansky and HD Young, University Physics, 1986. Addison-Wesley.
6. Ronald Lane Reese, University Physics, 2003, Thomson Brooks/Cole
9. H C Verma, Concepts of Physics, Bharati Bhawan; Revised Reprint 2015 edition

PRACTICAL

Exam Duration : 3 hrs C3 : 50

Objectives:
- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:
(A minimum of TEN experiments out of the following)
2. Study of the motion of a freely falling body.
3. Study of the acceleration of a body subjected to different unbalanced forces.
4. Study of accelerations of different masses under a constant unbalanced force.
5. Study of conservation of energy and momentum in head-on-collision between two spheres of equal mass.
6. Study of conservation of momentum and energy of a collision in a plane.
8. To study the relation between length and time period of a simple pendulum.
9. To study the relation between force and extension produced in a stretched spring.
10. Study of the variation of the time period of a bar pendulum with different length and determination of $g$ at the given place.
11. Study of the dependence of the period of oscillation of a spring-mass system on mass
12. The Spiral spring: Determination of the acceleration due to gravity by the graphical method.
14. Moment of inertia of a disc supported on strings.
15. The moment of inertia of a wheel and axle.
16. The Bifilar Suspension

Reference Books:
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S. Panigrahi & B. Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015

Core Course 2A - Chemistry

MSEI.2 : ATOMIC STRUCTURE AND BONDING

Credits: 4 (3L + 0T + 1P)  
Marks: 100
Contact hrs per week: 5  
C1 + C2: 50
Exam Duration: 2 hrs  
C3: 50

Objectives:
- To understand and appreciate the development of various atomic theories
- To develop an understanding of principles of Atomic structure
- To justify the need for quantum mechanical structure of atoms
- To develop an understanding of the periodic trends, preparation and uses of $s$- and $p$-block elements and their compounds in terms of structure and bonding
- To understand the nature of bonding and to predict the shapes of molecules
- To construct MO energy level diagrams and predict the properties of molecules

COURSE CONTENT:

Unit I: Atomic Structure
Schrodinger wave equation and its importance, physical interpretation of the wave function, significance of $\psi$ and $\psi^2$, postulates of quantum mechanics, particle in one dimensional box. Radial wave functions, angular wave functions. Quantum numbers and their importance, atomic orbitals and shapes of s, p, d orbitals, Multi-electron atoms, Aufbau and Pauli exclusion principles and Hund’s multiplicity rule. Electronic configurations of the elements (s, p, d blocks), effective nuclear charge. Explanation for the stability of completely filled and half filled shells with examples. Screening effect: Slater’s rule, Energy level diagram for multi $\bar{\text{i}}$ electron atoms.

**Unit II: Periodic Properties and s-and p-Block Elements**

Atomic radii, Covalent radii, ionic radii and Vander waal's radii- definition with explanation with examples in a group and period. Explanation of observed trends. Comparison of the ionic size of atoms with the corresponding anion and cation. Variation in ionic radii in isoelectronic ions. Additive nature of covalent radii.

**Ionization energy**: Definition, the factors influencing ionization energy, variation in a group and period. Effect of the size and electronic configuration on successive ionization energies.

**Electron affinity**: Definition, variation in a group and in a period (observed trends in the values to be accounted for).

**Electronegativity**: Definition, variation in a group and in a period (observed trends in the values to be accounted for), calculation of electronegativity by Pauling and Mulliken methods.

**s- and p-block elements**: Comparative study of s-Block Elements, diagonal relationships, an introduction to alkyls and aryls in salient features of hydrides. Action of Liquid Ammonia, Properties of solutions of alkali metals in Liquid Ammonia, Anomalous properties of Lithium and Beryllium.

To appreciate the wide variety in Physical and Chemical characteristics of p-Block elements and their compounds. Comparative study (including diagonal relationships) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16, tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.

**Unit III: Chemical Bonding - I**

Chemical bond as a basis for predicting the properties which should be expected for a given chemical substance. Ionic Solids. Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan’s rule, Metallic bond-free electron, valence bond and band theories. Weak interactions. Hydrogen bonding, van der Waals forces. Covalent Bond. Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to $\text{NH}_3$, $\text{H}_2\text{O}^+$, $\text{SF}_4$, $\text{ClF}_3$, $\text{ICl}_2$, and $\text{H}_2\text{O}$.

**Unit IV: Molecular Orbital theory, boranes and Xenon compounds**

Approaches to understand the properties and stabilities of molecules as viewed by different theories of bonding. Molecular orbital theory, basic ideas. Criteria for forming M.O. from A.O., construction of M.O. by LCAO for $\text{H}_2^+$ ion, calculation of energy levels from wave functions, physical picture of bonding and antibonding wave functions, concept of $\sigma$, $\sigma^*$, $\pi$, $\pi^*$ orbitals and their characteristics. Hybrid orbitals $\bar{\text{i}}$ sp, sp$^2$, sp$^3$; calculation of coefficients of A.O.s used in these hybrid orbitals. Introduction to valence bond model of $\text{H}_2$, comparison
of M.O. and V.B. Models.
Discussion about homonuclear (\( \text{He}_2, \text{N}_2, \text{O}_2, \text{F}_2, \text{C}_2 \)) and heteronuclear (CO and NO) diatomic molecules, bond Order and bond energy, percentage ionic character from dipole moment and electronegativity difference.
Hydrides of boron-diborane and higher boranes, borazine, borohydrides, fullerenes, carbides, silicates (structural principle), - Chemistry of xenon: structure and bonding in xenon compounds.

References :
1. University Chemistry : Bruce Mahan
3. An Introduction to Inorganic chemistry Mackay and Mackay

PRACTICAL

Exam Duration : 3 hrs  C3 : 50

Objectives:
- To develop the concept of good lab practices including safety, glasswares handling,
- chemicals handling, chemical/glassware waste management, error analysis, note
- book maintenance
- To strenghten the concepts of mole and stoichiometry
- To develop analytical skills of volumetric technique

COURSE CONTENT :

1. Calibration and handling of balances, pipette, burette, and standard flask. Basic principles underlying the preparation of solutions, knowledge of primary and standard substances, Indicators used in titrations, their working principles range and their uses. Concept of Molarity, Normality, Molality, Equivalent weight and related calculations.
2. Stoichiometry of neutralization reactions of Sulphuric, Hydrochloric and Nitric acid using sodium hydroxide solution.
3. Preparation of standard Sodium Carbonate solution, Standardisation of Hydrochloric acid and estimation of Sodium hydroxide present in the given solution.
4. Estimation of carbonate and hydroxide present in a mixture.
5. Estimation of Carbonate and Bicarbonate in a given mixture by double indicator method.
6. Estimation of ammonium chloride in a given solution by back titration
7. Estimation of oxalic acid present in the given solution using sodium hydroxide solution and pure crystals of potassium hydrogen phthalate.
8. Estimation of Ferrous ammonium sulphate present in the given solution using potassium permanganate solution and pure crystals of oxalic acid.
9. Estimation of iron(II) using Potassium dichromate with internal and external indicators.
10. Estimation of ferrous and ferric ions in a given mixture using potassium dichromate solution.
11. Standardisation of Sodium thiosulphate using potassium dichromate and estimation of copper by Iodometry.
12. Estimation of Copper in the given Copper salt by Iodimetry.

References:
1. A Text Book of Quantitative Inorganic Analysis, A I Vogel

Core Course 3A Mathematics
MSEI.3 : CALCULUS - I AND MATRICES

Credits: 4 (3L+ 1T +0P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
At the end of the course students will be able to understand and to apply the concepts, principles and techniques of calculus and matrix theory in problem solving.

COURSE CONTENT:

Unit I: Differential calculus:
Limits revisited, Continuous functions, Discontinuous functions and types. Differentiation, Linear approximation theorem, Higher derivatives, Leibnitz’s theorem. Monotone functions, Maxima and Minima, Concavity, Convexity and Points of inflection. Angle of intersection between two curves. Differentiability theorems, Rolle’s theorem, Mean Value theorems, Taylor’s theorem, Maclaurin’s theorem, Taylor’s and Maclaurin’s infinite series, Indeterminate forms.

Unit II: Integral Calculus:
The integral of a function, Techniques of integration, Integration of Rational Functions, Rationalizable Integrals. Definite Integral, Properties, Definite integral as the limit of a sum, The fundamental theorem of Calculus, Reduction formulae, Area, Volume and Length.
Unit III: Matrices – I
Matrices of order mXn, Algebra of matrices, Symmetric and Skew Symmetric, Hermitian and
Skew Hermitian matrices and their standard properties, Determinants, Adjoint of a square
matrix, Singular and non-singular matrices, Rank of a matrix, Elementary row / column
operations, Invariance of rank under elementary operations, Inverse of a non-singular matrix
by elementary operations.

Unit IV : Matrices - II
System of m-linear equations in n-unknowns, Matrices associated with linear equations,
Trivial and non-trivial solutions, Criterion for existence of non-trivial solution of
homogeneous and non-homogeneous systems and their uniqueness.
Characteristic equation of a square matrix, Eigen values and Eigen vectors, Finding them for
a real symmetric matrix, Diagonalization of a real symmetric matrix, Cayley ï Hamilton
theorem and its applications.

References :
1. Calculus by Anton, Addison-Wiley.
2. First Course in Calculus, Serge Lang, Addison-Wiley
3. Calculus by Lipman Bers, Vols. 1 and 2, IBH.
5. Higher Algebra by Bamard and Child, MacMillan India Ltd.
6. Integral Calculus by Shanthinarayan, S.Chand and Co.Ltd.
7. Differential Calculus by Gorakhprasad, Pothishala Ltd.

Ability Enhancement Course 1 A : Language
MSE I.4A : HINDI

Credits 4 (2L+1T) Max. Marks: 100
Contact Hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C 3:50

Objectives:
- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To internalize grammar rules so as to facilitate fluency in speech and writing.
- To develop functional and creative skills in language.
- To develop values of liberalism and an insight into the cultural heritage of the region
  which remains embodied in the literary output of the region.
Transaction Mode:
Lecture cum discussion, group discussion, panel discussion, seminar group work, library work.

COURSE CONTENT:

Unit I: History of Language and Literature-1
Hindi Bhasha aur Sahitya ka Itihas [Aarmbha se Lekar 1857 Tak]

Unit II: Short Story-1 [Pre-Independence Literature]
Swatantratapurva Hindi Kahani Ka Vikas
1. Chandradhar Sharma Guleri- Usne Kaha Tha
2. Jayshankar Prasad- Puraskar
3. Premchand- Panch Parmeshwar
4. Jainendra- Ek Raat

Unit III: Short Story-2 [Post-Independence Literature]
Swatantryottar Hindi Kahani Ka Vikas
1. Mohan Rakesh- Uski Roti
2. Kamleshwar- Dilli Mein ek Maut
3. Phanishwar Nath Renu- Teesari Kasam
4. Bhism Sahani- Cheef ki Dawat

Unit IV: Communication skill:
Group Discussion [Samooh Charcha]
Introduction ñ Definition ñ Characteristics ñ Types of Discussion ñ Round table, Symposium, Lecture forum etc. ñ Relevance of Group Discussion ñ Exercises.

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

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

Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects), tests & assignments.
C1-10 (test) + (seminars, projects, assignments etc) =15
C2-10 (test) + (seminars, projects, assignments etc) =15
Total =50

MSE I.4B KANNADA

Credits 4 (2L+1T)       Max. Marks: 100
Contact Hours per week: 4       C1+C2:50
Exam duration: 2 Hrs       C 3:50

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

COURSE CONTENT:

Unit I : Descriptive Grammar

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

Reference: Kannada Kaipidi, Prasaranga Publication, University of Mysore.
Unit II: Functional Language

a. Group Discussion: Introduction, definition, characteristics, types of discussions, round-table symposium, panel, lecture forum, etc. Relevance of Group Discussion exercises.

b. Conversation: Definition, styles of conversation, formats of conversation, telephonic conversation, etc. Exercises.


Unit III: Modern Poetry

i. Kalki Ñ Kuvempu
ii. Sabhyata Devate Ñ Kuvempu
iii. Balegaarana Haadu Ñ K S Narashimha Swamy
iv. Patitha Pavana Ñ Pu Thi Na
v. Nanna avathara Ñ M Gopalakrishna Adiga
vi) Hakki Haruthide Nodidra Ñ DA. RA. Bendre

Selected from Aunika Kannada Kavya Part I, University of Mysore.

Unit IV: Prose: Collection of short stories

Collection of Short Stories
i. Mochi Ñ Bharteepriya
ii. Kallina Kolalu Ñ Chaturanga
iii. Radheya Kshame Ñ Ananda
iv. Cappaligalu Ñ Sara Abubakkar

Selected from Sanna Kathegalu, Mysore University, Mysore

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

Continuous Assessment:
Assessment will be based on tutorials, seminars, projects etc., tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50
MSE 14C MALAYALAM

Credits 4 (2L+1T) Max. Marks: 100
Contact Hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C 3:50

Unit I: Descriptive Grammar - Sandhi
Ref: Kerala Panineeyam By A R Rajaraja Varma, NBS, Kottayam

Unit II: Functional Language
Group Discussion - Introduction, Definition, characteristics, types of discussions, round-table symposium, panel, lecture forum etc., relevance of Group Discussion, exercises
Conversation - Definition, styles of conversation, formats of conversation, telephonic conversation, etc., exercises

Unit III: Modern Poetry
Lessons from Kavya Mala, University of Kerala publications, Kerala
1. Mazhvinte Katha
2. Sabhalamee yaatra
3. Shanta
4. Kochiyile Vrikshangal
5. Bharatheeyam

Unit IV: Literature
Collection of Short Stories:
From Katha malika, University of Kerala publications
1. Kadal theerathu
2. Shavadaham
3. Ammayum makanum
4. Perumazhayude pittennu
5. Chaya

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

Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects etc.,) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50
ABILITY ENHANCEMENT COURSE - AEC 1 A: LANGUAGE
MSE I. 4D Tamil

Credits 3 (2L+1T+0P)  Max. Marks: 100
Contact hours per week: 4  C1+C2:50
Exam duration: 2 Hrs  C3:50

Objectives:
(i) To develop the students to acquire basic skills in functional language
(ii) To develop independent reading skills and reading for appreciation the literary works
(iii) To internalize grammar rules so as to facilitate fluency in speech and writing
(iv) To develop functional and creative skills in language
(v) To develop value of liberalism and an insight into the cultural heritage of the region
    which remains embodied in the literary output of the region

Mode of Interaction:
Theoretical aspects will be discussed through lecture and discussion mode. Activities like
enacting a drama scene, etc. will be conducted in the class room as a practice to conversation
skills. Students will be given activities to prepare different types of letters (Official, Demy
official, personal letters etc.). Group discussion will be conducted in the classroom on various
topics. With the help of newspapers, the NEWS Reporting abilities will be enhanced among
the students in class room. Appreciation of literary works will be practiced through group
work and seminars.

COURSE CONTENT:
Unit I: Descriptive Grammar:
Sandhi (Ezhuthu Elakkanam) Muthal Ezhuthugal, Sarpezhuthugal, Punarchi

Unit II: Functional Language:
Group Discussion: Introduction-Definition-Characteristics Types of Discussion-Round
Table-Symposium-Panel-Lecture forum etc., - Relevance of Group Discussion - Exercises
Conversation: Definition - Styles of conversations - Formats of conversations - Telephonic
conversations, etc., - Exercises

Unit III: Poetry: Modern Poetry:
Ikkala Kavithaikal,
Kannan En Sevagan,
Thiru Aruṭpa

Unit IV: Prose: Collection of Short Stories:
Naatru - (Collection of Short Stories)

Suggested Activities:
In the internal class during the different activities the performance of the student will be
assessed by the teacher. Test, assignments and small projects works may be given.
Continuous Assessment:
Assessment will be based on tutorials, seminars, projects, Tests and assignments.
C1-10(Test)+ 15(seminars, projects, assignments etc.) =25
C2-10(Test)+ 15(seminars, projects, assignments etc.) =25,
Total=50.

References:
1. Tamil Neengalum Thavarillamal Ezhuthalam - Dr. Porko.
2. Effective Group Discussion- Theory and Practice, Gloria J. GALANES, Mc Graw Hill Company (Publishers)
3. Nannul-Ezhuthathikaram, Prof. Soma Elavarasu, Manivasar Pathippagam, Parish, Chennai 600 108
4. Natru, Vaanathi Pathippagam, 13 Deenadayalu Street, T. Nagar, Chennai- 600 017.
5. An Anthology of Tamil Poetry (For First Year Degree Classes), University of Mysore, Mysore.

ABILITY ENHANCEMENT COURSE - AEC 1 A: LANGUAGE
MSE I. 4E Telugu

Credits 3 (2L+1T+0P) Max. Marks: 100
Contact hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C3:50

Objectives:
(i) To enable the students to acquire basic skills in functional language.
(ii) To develop independent reading skills and reading for appreciating the literary works
(iii) To internalize grammar rules so as to facilitate fluency in speech and writing
(iv) To develop functional and creative skills in language.
(v) To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region.

Mode of Interaction:
Theoretical aspects will be discussed through lecture and discussion mode. Activities like enacting a drama scene, etc. will be conducted in the classroom as a practice to conversation skills. Students will be given activities to prepare different types of letters (Official, Demy official, personal letters etc.). Group discussion will be conducted in the classroom on various topics. With the help of newspapers, the NEWS Reporting abilities will be enhanced among the students in class room. Appreciation of literary works will be practiced through group work and seminars.

COURSE CONTENT:
Unit I: Functional language:
Letter writing: Characteristics ĭ Definition ĭ Types of Letters ĭ E-mails ĭ Language of Letters ĭ Exercises
News Reporting: Characteristics ĭ Definition ĭ Language of NEWS Reporting - Models ĭ Role of Median NEWS Reporting ĭ Exercises.
Unit II: Communication skills in language:
**Group discussion:** Introduction ñ Definition ñ Characteristics ñ Types of Discussion ñ Round table, Symposium, Lecture forum etc. ñ Relevance of Group Discussion ñ Exercises.
**Interview:** Characteristics ñ Definition ñ Types of Interviews ñ Preparation for Interview ñ Models ñ Exercises.

Unit III: Modern Poetry and Folk literature:
**Desha Charitrulu** ñ Sree Sree (From Maha Prasthanam, Visalandhra Publications, Hyderabad).
**Folk Songs** from Rayalaseema Raagalu & Triveni Published by Telugu Academy, Hyderabad.

Unit IV: Genre of Literature: (Piece of Drama/Portion of Autobiography)
Selected scenes from drama Kanyashulkam by Gurazada Apparao (available at Visalandhra Publication, Hyderabad.

**Continuous Assessment:**
Assessment will be based on tutorials, (seminars, projects etc.), tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc.) =25
C2-10 (test) +15 (seminars, projects, assignments etc.) =25
Total =50

**References:**
1. *A Handbook of writing activities*, Prasaranga, University of Bangalore.
3. *Effective Communication Skills*, by Omkar N Kour
Ability Enhancement Course 1B : English

MSEL5 : PROFICIENCY IN ENGLISH

Credits 3 (2L+1T+0P)  Max. Marks: 100
Contact Hours per week: 4  C1+C2:50
Exam duration: 2 Hrs.  C 3: 50

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

COURSE CONTENT:

Unit I: Descriptive Grammar
1. Tenses:
   a) Simple Present: Habitual action, General truths, Future time, Verbs of state, Verbs of perception, Verbs of sensation, Narration, Use of simple present for demonstration and commentaries, Present perfect, present perfect continuous, Present continuous also indicative of future action.
   b) Simple past: Past time reference, Present time reference, Future time reference, Past continuous, Past perfect, past, perfect continuous

Unit II: Skills in Communication
1. Negotiating a point of view – learning to talk persuasively so as to get across one’s perspective.
2. Debating on an issue – agreeing / disagreeing.

Unit III: Study and Reference Skills
Note making; Note-taking; Summary writing.
Comprehension Skills
Extracts from literary, scientific and educational journals.

Unit IV: Skills of Communication
Advanced Writing Skills, writing advertisement copy; Writing a project proposal and Writing Resume, sending an application.
Listening effectively; Talking about one self (likes, dislikes, interests, beliefs, personality traits, ambitions); Expressing an opinion about personal belief on a current issue. (Ability to speak fluently for 3-4 minutes. Focus would be on organized, logical, sequential presentation of thought through spontaneous speech).
Suggested Activities:
• Politeness competitions- students with partners take turns in using a given number of utterances for negotiation / requests/complaints/small talk.
• Students introduce themselves though using symbols/ metaphors.
• Students collect newspaper/magazine cuttings on topical and/ or cultural issues of interest-write and share their opinion with peers.

References:

GENERIC ELECTIVE 1
MSE16 : ENVIRONMENTAL EDUCATION

Credits: 2 (1L+ 1T +0P)  Marks: 100
Contact hrs per week: 3  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives
The student-teacher will be able to:
• Develop awareness and concern for environmental issues and sustainable development.
• Acquaint with the concept, objectives and importance of Environmental Education (EE).
• Introduce multi-disciplinary approach to environmental problems.
• Acquaint how to design, develop and implement strategies for Environmental Education (EE).
• Acquaint with the different methods and techniques of teaching Environmental Education (EE).
• Undertake practical activities for school cleanliness, neighbourhood cleanliness drive, and healthy personal hygiene in relation to Swachh Bharat and healthy living. (These activities would have been observed and practiced during the 16-week Internship in schools)
• Inculcate environment friendly values through EE.

COURSE CONTENT :
Unit I : Meaning and Concepts
Meaning as evident from Indian literature and contemporary texts, Definition, Objectives, Importance of EE with special reference to Indian view of life and sustainable development Sustainable Development Goals.
Unit II: Basic Environmental Concepts
Ecosystem, Biotic and Abiotic factors, Inter-relationship, Factors affecting environment, population, air, water, soil, noise; Acid rain, Greenhouse effect, Extinction of species, Soil erosion, Energy crisis, Environment and sustainable development; Role of specially designed strategies for cleanliness, Role of mass media and technology in developing awareness about Environmental problems and its prevention, Role of NGO and governmental organizations in developing EE.

Unit III: Curriculum, Methods and Techniques of EE
Designing, developing strategies for EE, Evaluation of EE resources materials; Field trips, Role play, Poster presentation, Quiz, Debate, Projects, Swachh Bharat Abhiyan sustainability

Unit IV: Value Development through EE as in Indian View of Life
Practical work in relation to school cleanliness and neighbourhood watch, Text book evaluation for contents on environment and cleanliness, Field trip on environmental degradation, and school and neighbourhood cleanliness, Visit to nature park, industry polluted areas.

Practicum
- Study sustainable development initiative in the country.
- Visits to polluted sites and preparation of report.
- Interviewing people and reporting the inconveniences due to any of the environmental problems.
- To study innovations done by to improve the environment of that area.
- To study the implementation of Environmental Education Programmes in schools/stated country.
- To prepare models and exhibits for general awareness of public regarding environmental hazards.
- To prepare a programme for environmental awareness and school cleanliness, and to conduct the same with school children.
- To visit industries and study alternative strategies of Environmental pollution management.
- To prepare a resource material on any of the environmental problems along with a suitable evaluation strategy. To prepare quizzes and games on environmental issues.
- Organise Swacch Bharat Abhiyan as sustainable activity.
- To study the contribution of NGOs in improving the environment of the city. Classroom. Prepare posters/chart on Sustainable Development Goals.
* In addition, school and community based activities may be organised.

Evaluation Strategies
1. Assignments/sessional work.
2. Unit tests.
3. Portfolio assessment of exhibits, model of charts prepared by student teachers.
4. Seminar presentations followed by group discussion.
References:
4. UNESCO, Environmental Education in the light of the Tbilisi Conference, UNESCO.
5. NCERT (2009), Project Book in Environmental Education from Class I-X. New Delhi: NCERT.
7. Web ResourcesTowards a Green School on Education for Sustainable Development for Elementary Schools, 2015, NCERT

PROFESSIONAL EDUCATION COURSES

MSEI.7 : Language Across Curriculum

Credits: 4 (3L+ 1T +0P) Marks: 100
Contact hrs per week: 5 C1 + C2: 50
Exam Duration: 2 hrs C3: 50

Objectives:
The student teacher will be able to:

• Understand nature, function and role of different kinds of languages in curriculum transaction
• Acquaint with obstacles in language usage while using the language and ways to overcome them.
• Understand importance and use of first and second language, multilingualism and impact of culture.
• Acquire knowledge about the communication process and verbal and nonverbal communication skills.
• Familiarize the students with of barriers to (Listening, Speaking, Reading, Writing) LSRW skills and activities for developing these skills.

COURSE CONTENT :
Unit I Nature and Functions of Language
Language ï Meaning and Concept, Functions of Language, Role of Language in Curriculum Transaction, Theories of Language Learning, Barriers in Using a Language & Strategies to Overcome them, Verbal and Non-verbal communication
Unit II: Language across Curriculum in the Indian Context
Language as a determinant of Access, Language proficiency and students' attitude towards Learning and Schooling/ dropouts, Language/oral proficiency and critical thinking

Unit III: Strategies for Multilingual Classrooms
Role Plays and Discussions as tools for learning, Questioning to stimulate thought and to encourage and motivate to respond, Preparing Subject/content based exercises in reading, comprehension and usage, Sensitizing, Reflecting and Facilitating, Understanding the learner and his/her language background, Creating sensitivity to the language diversity, Using oral & written language in the classroom for optimal learning

Unit IV: Developing Receptive Skills and Productive Skills
Barriers to Listening Skills, Activities for Developing Listening Skills, Barriers to Reading Skills, Activities for Developing Reading Skills, Barriers to Writing Skills, Activities for Developing Writing Skills, Need and Importance of Classroom Discourse. Barriers to Speaking Skills, Activities for Developing Speaking Skills

Practicum
1. School Visit to Find out Communication Problem/Apprehension in Students
2. Designing Games and Exercises for Developing Listening, Speaking, Reading and Writing Skills
3. Assignments on Developing Writing Skills—Summary, Letter, Paragraph, Essays, Speech
4. Assignments on Developing Speaking Skills—Oral Presentations, Debate, Elocution, Discussion, Brain-storming
5. Assignments on Developing Listening Skills—Listening to speech, directions

* In addition, school and community based activities may be organized with provisions for visits to innovative centres of pedagogy and learning, innovative schools, educational resource centres, etc. Action research based on teaching learning and school and community could be conducted.

References:

Web Resources
6. First and Second Language Acquisition—A Brief Comparison.
   Retrieved from https://www.uni-due.de/ELE/FLA_SLA_brief_comparison.pdf
7. Similarities and Differences between First and Second Language Acquisition
   Retrieved from
   http://multilingualism.pbworks.com/w/page/21913433/Similarities%20and%20Differences%20between%20First%20and%20Second%20Language%20Acquisition

8. Activities for Developing Speaking Skill
   Retrieved from http://faculty.weber.edu/ppitts/ed4320/Handouts/speakingskills.htm


10. Activities for Developing Listening Skill Retrieved from
    http://www.educ.ualberta.ca/staff/olenka.bilash/best%20of%20bilash/listening.html

11. https://blog.udemy.com/listening-skills-exercises/

12. Learning curves: Language Education (2009), by Azim Premji Foundation

13. Courses on Communication Skills, http://nptel.ac.in/courses/109104030/
SECOND SEMESTER

Core Course I B  Physics

MSEII.1 : ELASTICITY, WAVES, HEAT, AND THERMODYNAMICS

Credits: 4 (3L+0T+1P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:

- The students will be able to understand principles of elasticity, waves, heat, thermodynamics and classical statistical mechanics and apply its principles to explain natural physical phenomena.
- The teacher will enable the students to identify and modify alternative conceptions in the domains of elasticity, waves, heat, thermodynamics and classical statistical mechanics.

COURSE CONTENT:

Unit I: Elasticity

Unit II: Waves

Unit III: Thermodynamics-I
Unit IV: Thermodynamics-II

References:
6. Matveev, Thermal Physics, MIR Publications
7. D S Mathur, Elements of Properties of Matter, S Chand (G/L) & Company Ltd., 2010.

PRACTICALS
Exam Duration : 3 hrs 

Objectives:
• To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
• To validate the theoretical basis of the experiments.

COURSE CONTENT:
(A minimum of TEN experiments out of the following).
1. Study of the oscillations of a column of water as a function of its length and study of damped oscillation.
2. To determine the velocity of sound at 0°C and the end correction by setting up a resonance column (first resonance length).
3. Study of torsional oscillations of a loaded wire and determination of the rigidity modulus of the material of the wire.
4. Study of transverse vibrations on a sonometer. To determine the frequency by (i) absolute method, (ii) Comparison method.
5. Study of Newton's law of cooling.
6. Determination of solar constant.
8. Study of the rate of flow of water through a capillary tube under different pressure heads.
9. Study of the relation between pressure and volume of a gas at constant temperature.
10. Study of variation of pressure and temperature of a gas at constant volume.
11. To study the variation of thermo emf across two junctions of a thermocouple with temperature
12. Surface Tension-capillary rise method-radius by Vernier microscope
13. Study of the motion of a steel sphere in a viscous liquid and determination of the coefficient of viscosity of the liquid.
14. Meldeâ€™ experiment i determination of frequency.
15. Lees and Charlton disc i Thermal conductivity of a bad conductor.
16. Specific heat of a solid by the method of mixtures.

References:
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015

Core Course 2 B :Chemistry

MSEII.2 :STATES OF MATTER AND NUCLEAR CHEMISTRY

Credits: 4 (3L+ 0T +1P)  
Contact hrs per week: 5  
Exam Duration: 2 hrs  
Marks: 100  
C1 + C2: 50  
C3: 50

Objectives:
- Illustrate how a scientific model can be constructed based on the experimental observations of the behaviour of gases and to explain the properties in terms of microscopic organization.
- To develop an understanding of properties of Gases, Liquids, colloids and Solutions.
- To understand the shapes of molecules in terms of symmetries and to relate the properties of matter in solid state to the structure.
- To develop an understanding of the concept of acids and bases, characteristics of non-aqueous solvents.
- To familiarize radioactivity as a nuclear phenomenon in understanding the nuclear reactions.
COURSE CONTENT

Unit I : Gaseous and Solid State

Review of kinetic theory of gases and van der walls equation. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquefaction of gases based on Joule-Thomson effect.

Explanation of the macroscopic properties of solids in terms of structure, bonding and defects. Definition of space lattice, unit cell.


X-ray diffraction by crystals. Derivation of Bragg equation. Predicting crystal structure. Defects in solids, Dielectric properties. Review a perfect gas connecting temperature with kinetic theory. Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals equation of state. Critical Phenomena: P-V isotherms of real gases, continuity of states, the isotherms of van der Waals equation, Derive a relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.

Molecular Velocities: Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquefaction of gases (based on Joule-Thomson effect).

Unit II : Liquids and Colloids

Accounting the Isotropic and intermediate behaviour of liquids as a link between solids and gases. Also tracing the role of liquids as solvents and reaction regulators. Intermolecular forces, structure of liquids (a qualitative description).

Structural differences between solids, liquids and gases.

Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholesteric phases. Thermography and seven segment cell.

Definition of colloids, classification of colloids.

Solids in liquids (sols) : Properties ï kinetic, optical and electrical; stability of colloids, protective action, Hardy ï Schulze law, gold number.

Liquids in liquids (emulsions) : Types of emulsions, preparation. Emulsifier.

Liquids in Solids (gels) : Classification, preparation and properties, inhibition, general applications of colloids.

Unit III : Acids and bases

A discussion on changing concepts of acids and bases involving concentrations and effects of solvent medium. Arrhenius, Bronstead-Lowry and Lewis concepts of acids and bases.

Hard and Soft Acids and Bases (HSAB) - Classification of acids and bases as hard and soft. Pearsonâs HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.

Non-aqueous Solvents- Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH₃ and liquid SO₂.
Unit IV : Nuclear Chemistry

Fundamental particles of nucleus, Concept of Nuclides, isotopes, isobars and isotones (with specific examples), nuclear forces, qualitative idea of stability of the nucleus (n/p ratio), binding energy, packing fraction, Natural and artificial radioactivity, Radioactive Disintegration series, half life, average life, nuclear reactions, artificial transmutation, nuclear fusion and fission. Nuclear fusion as a future source of energy, Nuclear reactors, Application of Radioactivity and Radio isotopes as tracers in chemistry, biology, medicine, agriculture and industry. Isotope dilution analysis, Neutron activation analysis.

References :
1. Essentials of Physical Chemistry Arun Bahl B.S.Bahl, G.D.Tuli, S.Chand & Company Ltd.
2. Principles of Physical Chemistry : Marron and Prutton
3. Elements of Physical Chemistry : Samuel Glasstone and Lewis
4. Physical Chemistry : P W Atkins

PRACTICAL

Exam Duration : 3 hrs C3 : 50

Objectives:
- To evolve a scheme of qualitatively analyzing an inorganic mixture classification of anions and cations.
- Quantitative inorganic analysis of mixtures containing four radicals.
- To develop skills of synthesizing coordination compound

COURSE CONTENT:

1. To arrive at a scheme of analysis of anions and cations based on solubility products and common ion effect: Systematic qualitative analysis by micro-scale methods of a mixture containing two acidic and two basis radicals from the following list (not more than one interfering radical):
   Cations: lead, copper, bismuth, cadmium, tin, antimony, iron, aluminium, zinc, cobalt, nickel, calcium, strontium, barium, magnesium, sodium potassium, ammonium.
   Anions: carbonate, bicarbonate, acetate, fluoride, chloride, bromide, iodide, nitrate, sulphate, borate, oxalate, phosphate.
2. Preparation of the complexes:
   Tris(thiourea)copper(I)sulphate monohydrate, Mercury tetra thiocyanato cobaltate(II), simple cobalt and chromium complexes and their analysis.

References:
2. Advanced Practical Inorganic Chemistry, Gurudeep
Core Course 3 B Mathematics

MSEII.3 : CALCULUS – II - ANALYTICAL GEOMETRY AND
NUMBER THEORY

Credits: 4 (3L+ 1T +0P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
At the end of the course students will be able to understand the concepts of number system and analytical geometry and principles and techniques of calculus of several variables in problem solving.

COURSE CONTENT:

Unit I: Partial Derivatives – I
Functions of two or more variables, Limits, Continuity, Partial derivatives, Differentiable functions, Linear approximation theorem. Homogeneous functions, Euler’s Theorem, Chain Rule, Change of Variable, Directional Derivative, Partial Derivatives of higher order, Taylor’s Theorem, Derivative of Implicit functions, Jacobians.

Unit II: Analytical Geometry – I
Cartesian coordinates in three dimensional spaces, Relation between Cartesian coordinates and position vector, Distance formula (Cartesian and Vector form), Direction cosines, Direction ratios, Projection on a Straight line, angle between two lines, Area of Triangle, Volume of a tetrahedron. Straight line, equations of straight lines (Cartesian and Vector form).

Unit III: Analytical Geometry – II
Planes, Equations of Planes (Cartesian and Vector form), Normal form, Angle between planes, Coaxial planes, Parallel and Perpendicular planes, Length of a Perpendicular from a point to a plane, Bisectors of angles between two planes, Shortest distance between two skew lines. Translation and Rotation of Cartesian axes in plane, Curves of second degree, Discriminant and Trace, Theorem on Discriminant and trace, Classification theorem on second degree equation.

Unit IV: Theory of Numbers
Division Algorithm ï Prime and Composite Numbers ï proving the existence and uniqueness of GCD and the Euclidean Algorithm ï fundamental theorem of Arithmetic - the least common multiple ï congruences ï linear congruences ï Wilson’s theorem ï Simultaneous congruences ï Theorem of Euler ï Fermat and Lagrange.

References :
1. Calculus by Anton,Wiley.
3. Calculus and Analytical Geometry by Thomas and Finney, S.Chand and Co. Ltd.
4. First Course in Calculus by Serge Lang, Addison-Wiley.
5. Calculus, Vols. 1 and 2 by Lipman Bers, IBH.
6. Introduction to Calculus and Analytical Geometry by Courant and John, Narosa.
Publishing House.
7. Advanced Calculus by Frank Ayres, Schaum Publishing Co.
8. Higher Algebra by Bamard and Child, Macmillan India Ltd.
9. Integral Calculus by Shantinarayan, S.Chand and Co. Ltd.
10. Differential Calculus by Gorakhprasad, Pothishala Ltd.
11. A Course in calculus and Real Analysis-Iby Ghorpade S R and Limaye B V (2006), Springer Verlag

ABILITY ENHANCEMENT COURSE AEC 1B: LANGUAGE

MSE II.4A: HINDI

Credits 4 (2L+1T) Max. Marks: 100
Contact Hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C 3:50

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

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

COURSE CONTENT:

Unit I: History of Language and Literature-2
Aadhunik Hindi Sahitya ka Itihas [1857 Se Lekar Ab Tak]

Unit II: Modern Poetry-I [Pre-Independence Literature]
Swatanratapurva Hindi Kavita Ka Vikas
1. Maithilisaran Gupt- Nar Ho Na Nirash Karo Man ko
2. Jayshankar Prasad- Himadri Tung Sring Se Prabudh Sudhha Bharti
3. Suryakant Tripathi Niral- Joohi ki Kali
4. Sumitranandan Pant- Drut Jharo Jagat Ke Jirn Patra
5. Mahadevi Verma- MaiNeer Bhari Dhukh Ki Badli,
Unit III : Modern Poetry-2 [Post-Independence Literature]
Swatantrayottar Hindi Kavita Ka Vikas
   1. **Gajanan Madhav Muktibodh**- Bhool Galti,
   2. **Kedarnath Agrawal**- Chandra Gahna Se Lautati Ber
   3. **Raghveer Sahay**- Aapki Hansi
   4. **Nagarjun**- Aakal Aur Uske Bad
   5. **Kedarnath Singh**- Aakal Me Saras

Unit IV : Communication skills
Conversation [Varta]:
Characteristics ï Definition ï Styles of conversation ï Higher order skills-Telephonic conversation, Role Play, ï Models, etc. ï Exercises.

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

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

Assessment will be based on tutorials, (seminars, projects etc.), tests & assignments.
C1-10 (test) + (seminars, projects, assignments etc) =15
C2-10 (test) + (seminars, projects, assignments etc) =15
Total =50

MSE II.4B : KANNADA

Credits 4 (2L+1T) Max. Marks: 100
Contact Hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C 3:50

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

COURSE CONTENT :

Unit I : Descriptive Grammar

Samasa and Alankara
Reference: Kannada Kaipidi, Prasaranga Publication, University of Mysore

Unit II : Functional Language

a. News reporting: Characteristics i definition i language of news reporting i model of news report i patterns i role of media in news reporting i exercises.

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

b) The Perfect Interview by Max Eggert, Random House, UK.
Unit III: Medieval Poetry

i) Enna Devange Jagavella Hennu Noada - Akkamahadevi
ii) Kaayuttirdanirulu Hagalemname-Raghavanka
iii) Parahimseyam Madi Manavam Baldapane - Laksheesha

( Kaavya Sanchaya – 3- Mysore University, Mysore).

Unit IV : Collection of Essays

i. Chatavannu kurithu ì B G L Swamy
ii. Samakalina Prajneì G S Shivarudrappa
iii. Namma Praachiinara Jiivana Moulyagalù ì T V Venkatachala Shasthri
iv. Janapada Geethe ì C P K

(Selected from Gadya Vihara Part III) Mysore University, Mysore

Suggested Activities

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

Continuous Assessment:

Assessment will be based on tutorials, (seminars, projects etc), tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

MSE II.4C : MALAYALAM

Credits 4 (2L+1T) Max. Marks: 100
Contact Hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C 3:50

Unit I. Descriptive Grammar
Samasa and Alamkara
(Ref : Bhashaa bhushanam and Kerala Paanineeyam , NBS , Kottayam )

Unit II : Functional Language
1. News reporting- Characteristics ì definition ì language of news reporting ì model of news report ì patterns ì role of media in news reporting ì exercises

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

Unit III: Poetry - Medieval
VEENA POOVU By Kumaaran ashan, Published by Devi Book Stall, Kodungalloor

Unit IV: Collection of Essays
Lessons from ṍā Bharatha Paryatanam By Kutti Krishna Maraar, Published by Maraar Sahitya Prakash, Kozhikode

1. Yudhathinte parinaamam
2. Amba
3. Karnante arangetram
4. Markandeyante chiri

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

Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects etc), tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

ABILITY ENHANCEMENT COURSE AEC 1B: LANGUAGE
MSE II. 4D: Tamil

Credits 3 (2L+1T+0P) Max. Marks: 100
Contact hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C 3:50

Objectives:
(i) To develop the students to acquire basic skills in functional language
(ii) To develop independent reading skills and reading for appreciation the literary works
(iii) To internalize grammar rules so as to facilitate fluency in speech and writing
(iv) To develop functional and creative skills in language
(v) To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region

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

Unit I: Aspects of Style:
Styles of writing, Idioms, Phrases and Proverbs

Unit II: Functional Languages:
Interview: Characteristics-Definition-preparation for interview-various types of interviews(business-employment-literary/etc)-exercises

Unit III: Medieval Poetry:
Periya Puranam -Selection of poems
Naladiyar-Selection of poems

Unit IV: Collection of Essays:
Ariviyal Tamilzhakkam-SV Shanmugam (First three Essays)- Tamil Nenjam-Dr Mu. Varatharajan (First three essays)

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

Continuous Assessment:
Assessment will be based on tutorials, seminars, projects, Tests and assignments.
C1-10(Test)+ 15(seminars, projects, assignments etc..) =25
C2-10(Test)+ 15(seminars, projects, assignments etc..) =25
Total=50.

References:
1. An Anthology of Tamil Poetry (For first year degree classes), University of Mysore, Mysuru.
2. Tamil Neengalum Thavarillamal Ezhuthalam - Dr. Porko.
6. The perfect interview by Max Eggert, Random house, UK.
ABILITY ENHANCEMENT COURSE AEC 1B: LANGUAGE

MSE II. 4E Telugu

Credits 3 (2L+1T+0P) Max. Marks: 100
Contact hours per week: 4 C1+C2:50
Exam duration: 2 Hrs. C 3:50

Objectives:

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

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

COURSE CONTENT:

Unit I: Functional language:
Essay Writing: Characteristics ï Definition ï Format of Essays ï Types of Essays (Literary,
Scientific, etc.,) ï Models ï Exercises.
Translation: Characteristics ï Definition ï Need of Translation ï Translation Models ï
Exercises (From English to Regional Languages).

Unit II: Communication skills in language:
Conversation: Characteristics ï Definition ï Styles of conversation ï Higher order Skills-
Telephonic conversation, Role Play, ï Models, etc., ï Exercises.
Debate: Characteristics ï Definition ï Need of Debate ï Technique to conduct Debates, etc.
ï Exercise.

Unit III: Ancient poetry and Medieval poetry:
Damayanthee Swayamvaram by Nannaya (First 18 Poems)
Sathyabhama Santhwanam by Nandi Timmana (Poems 82 to 104)
(From Telugu Sahithya Sravanthi, by Prasaranga, University of Mysore, Mysore).

Unit IV: Genre of literature: (Prose: Literary Work)
Andhrula Sanghika Acharamulu by Khandavalli Lakshmi Ranjanam.
Telugu Samethalu by Nayani Krishna Kumari
(From Telugu Sahithya Sravanthi, by Prasaranga, University of Mysore, Mysore).

Suggested Activities:
In the internal class during the different activities the performance of the student will be
assessed by the teacher. Test, assignments and small projects works may be given.
Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects etc.), tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc.) =25
C2-10 (test) +15 (seminars, projects, assignments etc.) =25
Total =50

References:

Ability Enhancement Course AEC 2B : English

MSEII.5 : PROFICIENCY IN ENGLISH-II

Credits 3 (2L+1T+0P) Max. Marks: 100
Contact Hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C 3:50

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

COURSE CONTENT:

Unit I: Descriptive Grammar
Function of Auxiliaries; Modals; Question form
Clauses: Noun Clause; Reported Speech and Change of Voice.
Unit II: Development of Language Competence
To be based on the use of multiple texts which address issues of multiculturalism, gender, racism and texts which relate with current issues and contemporary trends. Short stories, comic strips, cartoons and animations (both print and non-print media) to be used. Speeches of famous persons, diaries, travelogues can also be used.

Unit III: Writing for Functional Purposes
Letter-writing (Professional / Personal)

Unit III: Creative Skills in Writing
Writing dialogues, poems and essays

Unit IV: Basic Phonetics
Sounds of English language, intonation and transcription using IPA.

References:

PROFESSIONAL EDUCATION COURSES

MSE II.6: CONTEMPORARY INDIAN EDUCATION

Credits: 4 (3L+ 1T +0P) Marks: 100
Contact hrs per week: 5 C1 + C2: 50
Exam Duration: 2 hrs C3: 50

Objectives:
The course enables the student teachers to:
- Understand different perspectives of Education.
- Analyse the concept of Education and its related terms
- Analyse the Aims of Education and their determinants
- Reflect on the educational ideas and systems of various thinkers and develop the ability to theorize educational practices;
- Collect evidences for the influence of socio-cultural aspects on Education
• Analyse the role of Education on society by gathering various evidences and illustrations
• Understand and appreciate the need of autonomy to teacher and learners
• See the relationship between autonomy, accountability, and commitment
• Arrive at a list of qualities of a committed teacher through discussions.

COURSE CONTENT:
Unit I: Education: Concept, Nature, and Purpose
Education as concept and its distinct nature; Classical, Liberalists and Progressivists view on Education; Analytical concept of education - education as a normative concept; Education as a family of Processes; Education as worthwhile activity; Cognitive and normative dimensions of education; Education and Educated person; Education as System; Modes of education- formal, informal, non-formal; Education and its related concepts- Training, Instruction and teaching
Education: Purpose(s) and Determinants - Determinants of Purpose-individual, Community, Religion, State and Market; Brief historical inquiry into purposes and determinants of education (from ancient India to contemporary India); social context of purposes of education
Education as a Discipline and Interdisciplinary in nature
Aims of Education from ancient to contemporary Indian society
Education as value development
Determinants of Aims of Education in emerging India

Unit II: Education and Socio-cultural context
Education as an instrument of social change; Influence of education on society and family; Socio-cultural influences on the aims of education; Emerging trends in societies and their influence on education
Education and Development
Globalization and Internationalization of education

Unit III: Educational thoughts and practices
Critical reflection on the educational thoughts of Indian and Western thinkers and on their relevance to the present education system
Indian: Mahatma Gandhi, Rabindranath Tagore, Aurobindo, Swami Vivekananada, Jiddu Krishnamurthy, Gijju Bhai Badheka; B R Ambedkar.
Western: Plato, Rousseau, John Dewey, Froebel, Montessori, Ivan Iliach, Paulo Frieri

Unit IV: Autonomy of Teacher and Learner
Autonomy: Meaning and extent
Teacher autonomy: Meaning, extent and nature; Teacher as autonomous professional; Areas of teacher autonomy: Their limit-situations - Curriculum making; Learning resources and material selection and use; Pedagogical practices; Assessment modalities;Limit-situations: Structures- Structured curriculum, and examination system; Time-tables;
Learner Autonomy: Meaning, extent and nature; Learning as an autonomous act; Meaning making and learners’ autonomy-opportunities and constraints
Autonomy and Accountability: Teacher Accountability; Teacher commitment
Sessional Activities:
- Presentations on Educational thoughts of Various thinkers
- Preparation of an Album or posters on different thoughts of great thinkers
- Analysis of aims of education from ancient Vedic times to modern times
- Collection of examples/evidences to show the influence of Education on social change and the socio-cultural influences on Educational aims
- Comparative study of National curriculum frameworks of NCERT on aims of education
- Readings on Position paper on “Aims of Education” NCF 2005
- Comparative study of Aims of Education of few countries
- Collection of case studies that exemplifies teacher accountability and commitment

References:
3. Dewey, John (1938) Experience and Education Kappa Delta Pi, Indianapolis, USA
MSEII.7: YOGA EDUCATION, SELF UNDERSTANDING AND DEVELOPMENT

Credits: 2 (1L+ 0T +1P)  
Marks: 100  
Contact hrs per week: 3  
Exam Duration: 2 hrs

Objectives:
The student teacher will be able to:
- Understand the meaning and importance of self-concept and self-esteem.
- Be aware of different factors related to self-concepts and self-esteem. Record a brief history of development of yoga through the ages. Discuss how yoga and yoga practices are important for healthy living.
- Explain some important principles of yoga.
- Explain the different limbs of Astaṅga yoga.
- State the different types of yoga.
- Derive how Hatha yoga and Astaṅga yoga are complementary to each other.
- Enable the student to have good health.
- Practice mental hygiene.
- Possess emotional stability.
- Integrate moral values.
- Attain higher level of consciousness.
- Demonstrate some important asanas and pranayama.

COURSE CONTENT:
Unit I: Introduction to Yoga and Yogic Practices  
Yoga: meaning and initiation, What is Yoga? Conceptions of Yoga, History of development of yoga, The streams of Yoga: Astanga yoga Raja yoga, Yogic practices for healthy living

Unit II: Introduction to Yogic Texts  
Historicity of yoga as a discipline, Classification of yoga and yogic texts, Hatha yogic practices, Meditational processes

Unit III: Yoga and Health  
Need of yoga for positive health, Role of mind in positive health as per ancient yogic literature, Concept of health, healing and disease: yogic perspectives, Potential cause of ill health, Yogic principles of healthy living

Unit IV: Personality Development and Stress Management through Yoga  
Yogic Practices for Personality Development: Surya Namaskar, Asanas: Tadasana, Simhasana, Kukkutasana, Akarna Dhanurasana, Matsyasana, Prnayama, Anuloma-Viloma Pranayama, Bhashrika Pranayama, Banda, Uddiyana Bandha, Dhyana (Meditation), What is
Stress, Yoga as a Way of Life for Stress Management: Ahara, Vihara, Achara, Vichara, Vyavahara, Yogic Practices for Stress Management; Asanas, Hastottanasana, Padahastasana, Trikonasana, Shashankasana, Ushtrasana, Ardhamatsyendrasana, Bhujangasana, Makarasana, Sarvangasana, Matsyasana, Shavasana; Pranayama, Bhramari Pranayama, Sheetali Pranayama; Yoga for Healthy Living, Shirshasana, Bakasana, Hamsasana, Mayurasana

PRACTICALS

Exam Duration: 3 hrs

C₃ : 50 marks

Practicum

- General guidelines for performance of the practice of yoga for the beginners
  1. Guidelines for the practice of āsanas
  2. Guidelines for the practice of prāṇāyāma
  3. Guidelines for the practice of meditation

- Select yoga practices for persons of average health for practical yoga sessions
  1. Supine position
  2. Prone position
  3. Sitting position
  4. Standing position
  5. Mudras
  6. Prāṇāyāma

* In addition, school and community based activities may be organised.

Evaluation Strategies

The evaluation will be done through practicals/ assessment of ability to develop and design softwares for selected contents.

References:

2. NCERT (2015). Yoga: A Healthy Way of Living Upper Primary Stage, New Delhi (Also available in Hindi)
THIRD SEMESTER

Core Course 1 C : Physics

MSEIII.1 : ELECTRICITY AND ELECTROMAGNETISM

Credits: 4 (3L+ 0T +1P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
To enable students to acquire a broad conceptual framework of electrostatics electromagnetic phenomena.

COURSE CONTENT:

Unit I: Electrostatics
Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss’s theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere and continuous charge distributions (charged rod, ring, disk). Calculation of electric field from potential.

Unit II: Electric Fields in Matter and DC circuits

Unit III: Magnetism
Unit IV: Electromagnetic Induction and AC Circuits


Reference Books:
5. F.W.Sears, Electricity and Magnetism, Addison Wesley Co.

PRACTICALS

Exam Duration: 3 hrs C3: 50 Marks

Objectives:
- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

1. To study the variation of Magnetic field along the axis of a circular coil.
2. To determine $M$ & $H$ using deflection magnetometer & vibration magnetometer.
3. To determine horizontal component of Earth’s magnetic field using a Tangent galvanometer.
4. To calibrate an ammeter using a potentiometer and Daniel cell.
5. Mapping of magnetic field due to a current carrying straight conductor.
6. Determination of resistance & resistivity using Meter Bridge.
10. Mapping of magnetic field lines for a current carrying solenoid.
12. Box type vibration magnetometer - M & Bh.
13. Caparison of emf and determination of internal resistance of a cell using a potentiometer.
14. Determination of resistance & resistivity using PO Box.
15. Comparison of capacitance by Desauty's bridge using BG.
17. Variation of phase angle with capacitance for a RC circuit.
19. Unknown resistance by Carey Foster bridge.
20. Induced emf.
21. Maximum power transfer theorem.
22. To verify the Thevenin's and Norton's theorem

References:
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015

Core Course 2 CChemistry
MSEIII.2 : ORGANIC CHEMISTRY – I

Credits: 4 (3L+ 0T +1P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
- To review the concept of isomerism and its types
- To develop an understanding of chemistry of hydrocarbons and their halogenated derivatives.
COURSE CONTENT:

**Unit I: Stereochemistry of Organic Compounds**
Review of Concept of Isomerism and Types of isomerism with examples.

**Optical Isomerism:** Structural changes responsible for properties: elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization and asymmetric synthesis.
Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.

**Geometric isomerism:** Determination of configuration of geometric isomers. Cis ÷ trans and E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

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

**Unit II: Aliphatic Hydrocarbons**

**Alkanes:** Review of IUPAC nomenclature of branched and unbranched alkanes. Isomerism in alkanes and industrial source. Methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation), physical properties and chemical reactions of alkanes (halogenation, nitration, sulphonation, oxidation and isomerisation reactions) Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity.

**Cycloalkanes:** Nomenclature, methods of formation (from acetoacetic ester / malonic ester and Dieckmann reaction), chemical reactions (halogenation), Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring: banana bonds.

**Alkenes:** Accounting for Reactions due to unsaturation in compounds. Nomenclature of alkenes, methods of formation (by dehydration, dehydrohalogenation and dehalogenation) with mechanism. Regioselectivity in alcohol dehydration. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes ÷ mechanism of hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration followed by oxidation, oxymercuration ÷ reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO₄. Polymerization of Alkenes. Substitution at the allylic and vinic positions of alkenes.

**Cycloalkenes:** Methods of formation and chemical reactions of cycloalkenes.

**Alkadienes:** Nomenclature and classification of dienes: Isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions ÷ 1,2 and 1,4 additions. Diels-Alder reaction.

Unit III: Aromatic Hydrocarbons

Methods of formation and chemical reactions of alkylbenzenes, alkylnylbenzenes and biphenyl.

Unit IV: Alkyl and Aryl Halides

Aryl halides: Methods of formation of aryl halides, nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions.
Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides. Synthesis and uses of DDT and BHC.

References:
1. Organic Chemistry: Seyhand N Ege
2. Organic Chemistry: Morrison and Boyd
3. Organic Chemistry: I L Finar
4. Organic Chemistry: Hendricson, Cram and Hammond
PRACTICALS

Exam Duration : 3 hrs

Objective:
To develop basic skills in organic synthesis and purification of organic compounds

COURSE CONTENT:

1. Calibration of Thermometer using naphthalene / acetanilide / urea
2. Determination of melting point of Benzoic acid / cinnamic acid / m - dinitro benzene / p - dichlorobenzene
3. Determination of boiling point of aniline / nitrobenzene / chlorobenzene
4. Distillation of water - alcohol mixture using water condenser; Distillation of chlorobenzene - nitrobenzene mixture using air-condenser
5. Crystallization: Benzoic acid from hot water, naphthalene from ethanol
6. Sublimation of camphor / phthalic acid / succinic acid

Organic synthesis:

1. Preparation of Iodoform from ethanol / acetone using sodium hypochlorite and KI
2. Preparation of m - dinitrobenzene from nitrobenzene by nitration
3. Preparation of p - bromoacetanilide from acetanilide by bromination
4. Preparation of 2,4,6 - tribromo phenol from phenol / 2,4,6 - tribromoaniline from aniline
5. Preparation of Acetanilide from aniline by acetylation
6. Preparation of benzoic acid from benzamide by base hydrolysis
7. Preparation of aspirin from salicylic acid by acetylation
8. Preparation of p - bromoaniline from acetonilide
9. Preparation of 0 - iodobenzoic acid from anthranilic acid
10. Preparation of p - nitroacetanilide from acetonilide by nitration

References:
A Text Book of Qualitative organic Analysis, A .I . Vogel

Core Course 3 C :Mathematics

MSEIII.3 : REAL ANALYSIS

Credits: 4 (3L+ 1T +0P) Marks: 100
Contact hrs per week: 5 C1 + C2: 50
Exam Duration: 2 hrs C3: 50

Objectives:
At the end of the course students will be able to understand the concepts of real number system, real sequences, infinite series and the convergence tests. Also understand the concept of Riemann integration and its properties.
COURSE CONTENT:

Unit I:
The field axioms; Theorems about field properties, Order in R-Absolute value, Completeness, some important subsets, Intervals, Countable and Uncountable sets. Neighborhoods, Open Sets, Closed Sets, Limit points of a set, Closure of a set, Interior of a set, Compactness, Connectedness.

Unit II:
Introduction to sequences, Convergent sequences, Divergent sequences, Oscillatory sequences, Bounded sequences, Some important limit theorems, Cauchy sequences, Monotonic sequences, Cluster points of a sequence, Limit superior and limit inferior of a sequence, SumSequences.

Unit III:
Introduction to Infinite Series, Sequence of partial sums of a series, Convergent series, Cauchy’s general principle of Convergence for Series, A necessary condition for convergence, Series of positive terms, A fundamental result for series of positive terms, Geometric series, Comparison test, Cauchy’s nth root test, D’Alembert’s Ratio test, Raabe’s test, Maclaurin’s integral test.

Unit IV:
Riemann Integration: Upper and lower sums, Criterion for inerrability, Inerrability of continuous functions and monotone functions, Fundamental theorem of Calculus, Change of variables, Integration by parts, First and Second Mean Value Theorems of Integral Calculus.

References:
2. Real Analysis by Malik, Wiley Eastern.
3. Mathematical Analysis by Shanthinarayan, S. Chand and Co. Ltd.
4. Mathematical Analysis by Malik and Savita Arora, New Age International Pvt. Ltd.
5. Real Analysis by Royden, Prentice Hall of India Pvt. Ltd.
7. Introduction to Real Analysis by Bartle R G & Sherbert, Wiley India
8. Kumar Ajit & Kumaresan S, Real Analysis, CRC Press
12. Real Functions by G. Goffman.
13. Principles of Real Analysis by Malik, New Age International Ltd.
Ability Enhancement Course – AEC 1 C : Language
MSE III.4A : HINDI

Credits 4 (2L+1T) Max. Marks: 100
Contact Hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C 3:50

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

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

COURSE CONTENT:

Unit I: Modern Literary Genres:
Naveen Gadya Vidhavon Ka Janm Aur Hindi Gadya Ka Vikas
(i) Nibandh-Sardar PurnSingh- Aacharan Ki Sabhyata
(ii) Yatra-Vritant-Bhartendu Harishchandra-Saryu Par ki Yatra
(iii) Sansmarn-Mahadevi Verma- Gungiya
(iv) Riportaj- Phaniswar Nath ‘Renu’- Rinjal-Dhanjal
(v) Aatmkatha- Bharatendu Harishchandra - Kuchh AapBeeti Aur Jag Beeti

Unit II: Criticism:
Hindi Aalochna Ka Aarambh Aur Vikas

Unit III: Novel:
Karmbhoomi by Premchand, Swaraj Prakashan, Delhi.

Unit IV: Communication skill:
Interview [Sachchatkar]
Characteristics Ņ Definition Ņ Types of Interviews Ņ Preparation for Interview Ņ Models Ņ Exercises.

References:
1. Hindi Nibandh Sahitya ka Sanskritik Addhyay: Dr Baburam, Vani Prakashan, Delhi
3. Hindi Sahitya Ka Itihas: Ramchandra Sukla, Vani Prakashan, Delhi
4. Hindi Sahitya Ka Aadikal: Hajari Prasad Divedi, Vani Prakashan, Delhi
5. Hindi Sahitya Ka Itihas: Dr Nagendra, Mayoor Paperbacks, Delhi
Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given.

Continuous Assessment (C1+C2)
Assessment will be based on tutorials, (seminars, project etc), tests & assignments.
C1-10 (test) + (seminars, projects, assignments etc) =15
C2-10 (test) + (seminars, projects, assignments etc) =15
Total =50

MSE III.4B : KANNADA

Credits 4 (2L+1T)  Max. Marks: 100
Contact Hours per week: 4  C1+C2:50
Exam duration: 2 Hrs  C 3:50

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

Unit I : Functional Language :

a) Letter drafting

Characteristics ĭ types of letters ĭ Emails - language of letters ĭ letters of famous people ĭ exercises.

b) Essay writing ĭ Characteristics ĭ Definition ĭ format of essay ĭ types of essays (literary, scientific etc) ĭ models, exercises

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

Unit II : Translation from English to Regional Language.

Reference: a) About Translation by Peter Newmark, MultiLingual Motters, Clavedon, UK. b) Aspect of Translation by K V V L Narasimha Rao, CIIL, Mysore.c0

Bhashanthara kale by Dr.Pradhana gurudatt, B M Sri Memorial foundations , 54, 3rd cross, gavipuram extention , Bangalore

Unit III : Medieval and Folk Literature

i. Halatorege Bellada kesaru - Basavanna
ii. Chintayemuppu santhoshave javvana ĭ Rathnakaravarne
iii. Adava nama jola Ulidava Nama hadu ĭ Folk

(Selections from Kavya Sanchaya Part III), Mysore University, Mysore

Unit IV : Novel

Odalaala ĭ Devanuuru Mahadeva

Suggested Activities :

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

Continuous Assessment:

Assessment will be based on tutorials, (seminars, projects etc.), tests & assignments.

C1-10 (Test) +15 (seminars, projects, assignments etc) =25
C2-10 (Test) +15 (seminars, projects, assignments etc) =25
Total =50
MSE III.4C MALAYALAM

Credits 4 (2L+1T)  Max. Marks: 100
Contact Hours per week: 4  C1+C2:50
Exam duration: 2 Hrs  C 3:50

Unit I: Functional Language

1. Letter drafting - Characteristics ₡ types of letters ₡ language of letters ₡ letters of famous people ₡ exercises
2. Essay writing - Characteristics ₡ Definition ₡ format of essay ₡ types of essays (literary, scientific etc) ₡ models, exercises

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

Unit II: Translation (English to Malayalam)
(Ref: Tharjama-Siddhanthavum Prayogavum Malayathil, Current Books, Trichur.)

Unit III: Poetry and Folk literature
Text: 1. Sishyanum makanum By Vallathol Narayana menon, NBS, Kottayam
Text 2: Othenanum ponniyam pada nilatha angavum, Shantha Book stall, Kodungaloor

Unit IV: Novel
BALYA KALA SAKHI by Vaikkam Muhammed Basheer, DC Books, Kottayam

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

Continuous Assessment:
Assessment will be based on tutorials,( seminars, projects etc.), tests & assignments.
C1-10 (Test) +15 (seminars, projects, assignments etc) =25
C2-10 (Test) +15 (seminars, projects, assignments etc) =25
Total =50
ABILITY ENHANCEMENT COURSE – AEC 1 C: LANGUAGE

MSE III. 4D: Tamil

Credits 3 (2L+1T+0P) Max. Marks: 100
Contact hours per week: 4 C1+C2:50
Exam duration: 2 Hrs. C 3:50

Objectives:

(i) To develop the students to acquire basic skills in functional language
(ii) To develop independent reading skills and reading for appreciation the literary works
(iii) To internalize grammar rules so as to facilitate fluency in speech and writing
(iv) To develop functional and creative skills in language
(v) To develop value of liberalism and an insight into the cultural heritage of the region which remains embodied in the literary output of the region

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

COURSE CONTENT:

Unit I: Medieval Poetry:
i) Thirukkural ii) Silappathikaram

Unit II: Novel:
Onpadhu Rupaai Nottu

Unit III: Communication skills (Effective speaking and effective writing) in language:
Precise writing - concept - importance - techniques - types - etc.-exercises
Book review – concept - importance of review - techniques-significance-types - etc.-exercises

Unit IV: Grammar:
Sol Elakkanam- Sol-Peyar Sol-Vinai sol-Edai Sol-Uri Sol

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

Continuous Assessment:
Assessment will be based on tutorials, seminars, projects, Tests and assignments.
C1-10(Test)+ 15(seminars, projects, assignments etc.) =25
C2-10(Test)+ 15(seminars, projects, assignments etc.) =25
Total=50.

References:

1. An Anthology of Tamil Poetry (For second year degree classes) University of Mysore, Mysore
2. A handbook of writing activities, Government of Karnataka, Prasaranga, University of
ABILITY ENHANCEMENT COURSE – AEC 1 C: LANGUAGE

MSE III. 4E: Telugu

Credits 3 (2L+1T+0P)  Max. Marks: 100
Contact hours per week: 4  C1+C2:50
Exam duration: 2 Hrs.  C 3:50

Objectives:

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

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

COURSE CONTENT:

Unit I: Functional Language:
Book Review: definition-features of review-techniques of reviewing-reviewing different genres-examples-exercises.

Unit II: Selected Translated Stories: (From English to Telugu)
Selections from Shakspeare Kathalu

Unit III: Poetry:
Vamana Charitra
Subhadra Parinayamu
(Lessons from Telugu Sahitya Sravanthi)

Unit IV: Novel:
Kalaatheetha Vyakthulu (by Dr P Sridevi)

Suggested Activities:
In the internal class during the different activities the performance of the student will be assessed by the teacher. Test, assignments and small projects works may be given.
Continuous Assessment:
Assessment will be based on tutorials, (seminars, projects etc.), tests & assignments.
C1-10 (Test) +15 (seminars, projects, assignments etc.) =25
C2-10 (Test) +15 (seminars, projects, assignments etc.) =25
Total =50

References:
2. Government of Karnataka, *Telugu Sahitya Sravanthi*, Published by Prasaranga, University of Mysore, Mysore

Ability Enhance Course AEC 2C : English

**BAE III.5 ENGLISH**

Credits : 4 (2L + 1T)  
Contact hrs per week: 4  
Exam Duration : 2 hrs  

Marks: 100  
C1 + C2 : 50  
C3 : 50

Objectives:
Students develop proficiency in English which equips them to:

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

Transaction Mode:
Lecture-cum-discussion, interactive session, group dynamics, role-play, peer-assessment, self-valuation.

COURSE CONTENT:

**Unit I : PROSE**
Walter Benjamin: Experience, Art In the Age of Mechanical Reproduction
Sylvia Townsend Warner: *The Phoenix*

**Unit II : POETRY**
1. P.B.Shelley - Ode to a Skylark
2. Alfred Lord Tennyson - Lotus Eaters
3. E.D.Browning - How Do I Love Thee ( from Sonnets from the Portugese)
4. Walter De La Mare Í The Ghost
5. Hopkins - Thou Art Indeed Just My Lord
6. Wilfred Owen - Anthem for Doomed Youth
7. William Shakespeare - (Sonnet- 18) Shall I Compare Thee to a Summer’s Day?
8. Robert Browning - Porphyria’s Lover
9. R.S.Thomas - Song for Gwydion
10. Auden - Refugee Blues

Unit III : DRAMA

Anton Chekov : The Bear
Shakespeare : Othello

Unit IV : FICTION
Somerset Maugham : The Razor’s Edge

Emile Bronte - Wuthering Heights

Continuous Assessment:
Assessment will be based on tutorials( seminars, projects etc ) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

Suggested Readings:

Skill Enhancement Course- 1 Physics

MSEIII.6A : BASIC INSTRUMENTATION SKILLS

Credits: 3 (2L+ 0T +1P) Marks: 100
Contact hrs per week: 5 C1 + C2: 50
Exam Duration: 2 hrs C3: 50

Objectives:
To get exposure with various aspects of instruments and their usage through hands- on mode.

COURSE CONTENT:
Unit I: Basic of Measurement
Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac
voltage, ac current and resistance. Specifications of a multimeter and their significance.

**Electronic Voltmeter:** Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance.

**AC millivoltmeter:** Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance.

**Unit II: Cathode Ray Oscilloscope and its uses**
Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only, no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.

**Unit III:**

**Signal Generators and Analysis Instruments:** Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

**Impedance Bridges & Q-Meters:** Block diagram of bridge. working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCR bridges.

**Unit IV:**


**Digital Multimeter:** Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time base stability, accuracy and resolution.

**References :**
PRACTICALS

Exam Duration: 3 hrs

C3: 50 Marks

Objectives:
To get exposure with various aspects of instruments and their usage through hands-on mode.

COURSE CONTENT:

(A minimum of EIGHT experiments to be selected from the following)

2. Use of Digital multimeter/VTVM for measuring voltages.
3. Winding a coil / transformer.
4. Study the layout of receiver circuit.
5. Trouble shooting a circuit.
6. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.
7. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
8. To measure Q of a coil and its dependence on frequency, using a Q-meter.
9. Measurement of voltage, frequency, time period and phase angle using CRO.
10. Measurement of time period, frequency, average period using universal counter/frequency counter.
11. Measurement of rise, fall and delay times using a CRO.

References:

Skill Enhancement Course 1 - Botany

MSE III.6B : PLANT PROPAGATION, NURSERY AND GARDENING

Credits: 3 (2L + 0T + 1P)  
Marks: 100
Contact hrs per week: 5  
C1 + C2: 50
Exam Duration: 2 hrs  
C3: 50

Objectives:  
After completing the course students will be able to:
- Plan and manage a garden
- Cultivate vegetables in kitchen gardens
- Multiply plants through appropriate techniques
- Identify seeds and garden plants

COURSE CONTENT:

Unit I  

Unit II  
Nursery: Definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.

Unit III  
Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seed production technology - seed testing and certification.

Unit IV  
1. Gardening: Definition, objectives and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.

2. Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures.
PRACTICAL

Exam Duration : 3 hrs

C3 : 50

COURSE CONTENT:
1. Identification of common agricultural tools and implements.
   - Demonstration and practice of different methods of plant propagation
   - Raising a floral nursery, soil bed preparation, transplantation and maintenance of garden
   - Identification of seeds of common garden plants, crop plants and vegetables.
   - Steps in the Preparation of pots for planting, maintenance of pots
   - Methods of breaking seed dormancy
   - Visit to Brindavan garden, Zoo garden and parks in Mysore for study and preparation of report.

References:

Skill Enhancement Course 1: Chemistry
MSEIII.6C: INDUSTRIAL CHEMICALS AND ENVIRONMENT

Credits: 3 (2L+0T+1P)
Marks: 100
Contact hrs per week: 5
Exam Duration: 2 hrs

C1 + C2: 50
C3: 50

Objectives:
- To understand the basic techniques of chemical industry
- To gain idea about the energy sources
- To understand the properties and application of lubricants
- To study the effects of green house phenomena
- To study the water quality parameter and waste water management
- To acquire the basic knowledge about common pesticides
COURSE CONTENT:

Unit I:
Chemical Technology: Basic principles of distillation, solvent extraction, solid-liquid leaching and liquid liquid extraction, separation by absorption and adsorption. An introduction into the scope of different types of equipment needed in chemical technology, including reactors, distillation columns, extruders, pumps, mills, emulgators. Scaling up operations in chemical industry. Introduction to clean technology.

Unit II:

Coal: Uses of coal (fuel and non fuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro Gasification and Catalytic gasification), Coal liquefaction and Solvent Refining.


Lubricants: Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pore point) and their determination.

Unit III:

Water pollution and Water Quality Standards: Pollutants and their sources, Effluent treatment plants (primary, secondary and tertiary treatment). Industrial effluent from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum and petrochemicals, agro, fertilizer, etc. Sludge disposal. Industrial waste management, incineration of waste. Water treatment and purification (reverse osmosis, electro dialysis, ion exchange). Water quality parameters for waste water, industrial water and domestic water.

Unit IV:
Pesticides General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship, synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion); Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).
Exam Duration : 3 hrs  

Objectives:
- To monitor the water quality parameters
- To prepare simple industrial products
- To analyse food adulterants

COURSE CONTENT:
1. Determination of dissolved oxygen in water.
2. Determination of Chemical Oxygen Demand (COD)
3. Determination of Biological Oxygen Demand (BOD)
4. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride, sulphate and salinity of water samples by simple titration method. (AgNO₃ and potassium chromate)
6. Estimation of total alkalinity of water samples (CO₃, HCO₃) using double titration method.
7. Preparation of borax/ boric acid.
8. To calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications.
9. Preparation of simple organophosphates, phosphonates and thiophosphates
11. Preparation of soap.

References:
5. R. Cremlyn: Pesticides, John Wiley. 7. William O. Foye, Thomas L., Lemke , David A. William:
Skill Enhancement Course 1 : Mathematics

MSEIII.6D : COMBINATORICS, STATISTICS AND BASIC PROBABILITY

Credits :3 (2L + 1T + 0P)  Marks: 100
Contact hrs per week: 4    C1 + C2: 50
Exam Duration : 2 hrs      C3 : 50

Objectives:
To enable the students to understand the basic concepts of combinatorics, statistics and probability, to obtain the skills and apply them in problem-solving and teaching.

COURSE CONTENT:
Unit I:
Partially ordered sets, Lattices, Complete lattices, Distributive lattices, Complements, Boolean Algebra, Boolean expressions, Application to switching circuits.

Unit II:
Permutations and Combinations, Pigeon-hole principle, Principle of inclusion and exclusion. Solving real life problems based on them.

Unit III:
Introduction to statistics, Mean, Mode and Median of grouped and ungrouped data, Graphical representations; Pie Charts, Line Graphs, Bar Graphs, Histographs, frequency polygon. Measures of dispersion; Range, Mean deviation, Variance and Standard deviation, Analysis of frequency distribution.

Unit IV: Random experiment, Concept of probability, Sample space, Events- different kinds Probability definitions- Mathematical or Classical or Statistical, Conditional probability, Independent events, Baye’s theorem.
Random variable, Discrete and continuous random variables, Probability function, Probability density function, Distribution function. Mean Variance and standard deviation of a random variable.

References:
Skill Enhancement Course 1: Zoology

MSE III.6E : APICUL TURE

Credits: 3 (2L + 0T + 1P) Max. Marks: 100
Contact Hrs per Week: 2 hrs C1+C2: 50
Exam. Duration: 2 hrs C3: 50

Objectives:
- Impart education about techniques in beekeeping,
- to inculcate and sharpen the observation skill to enjoy the wonders of nature
- to understand the social life of honey bees, management and their importance to man
- to learn the uses of hive products and biopesticides
- to learn the technique of processing and preserving of honey, its economic and medicinal value
- to understand the diseases of honeybees and propylatic measures.
- to develop enterpreneurial skills in beekeeping

UNIT I:
Introduction to Apiculture, history, importance of bee keeping, b) Types of bee hives, floral calander, bee biology and behavior, c) Role of bees in Pollination.

UNIT II:
Study of morphology of honey bees (workers drones and queen bees), b) Reproduction in honey bees, Bee hives, types of beehive boxes, selection of bee hive equipment, Populating and management of bee colony.

UNIT III:
Composition and types of honey, Different methods of collecting honey. Harvesting quality honey, Hive products.

UNIT IV:
Bee pests, predators and diseases and propylatic methods, Economics of bee keeping, Medicinal importance of honey.

PRACTICAL

Exam Duration : 3 hrs C3 : 50

Objectives:
- To provide the hands-on experience in Bee Keeping practices
- To understand the importance of Honey Bees in environment
- To appreciate the modern technology employed in Bee Keeping
COURSE CONTENT:

1. Collect different species of honey bees
2. Study the morphology of worker drone and queen bees.
3. Study different types of hive boxes
4. Study the life cycle of honey bees
5. Extraction of honey in different methods
6. Study on predators on Honey bees
7. Dealing with robber bees

Visit to Apiaries at Mysore and agriculture universities to study the new techniques in bee keeping

References:

1. The complete book on BEE keeping and honey Processing (2nd revised edition) NPCS Board, Published by: NIIR project consultancy services
2. A practical manual of beekeeping by David Cramp (spring Hill)
3. Beekeeping in India; Ghosh G K; APH Publishing 1994
4. Beekeeping in India; Sardin Singh; ICAR 1982
7. ABC of Beekeeping problems and problem Beekeepers By William Dullas.
8. Fundamentals of Beekeeping by Clarence H Collison; Pennsylvania State University
9. The biology of stingless Bees by Hayo H. W. Vethuis
11. Beescape of maliponines: Conservation of Indo-Malayan stingless bees By Abu Hassain Jalil, Ibrahim huib M B; B S (Malaya)
12. Diseases and hygienic Behavior in Honey bees and stingless bees by University of Sheffield.

PROFESSIONAL EDUCATION COURSES

MSE III.7: UNDERSTANDING THE LEARNER

Credits: 4 (3L+ 1T +0P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives
The student teacher will be able to:
- Understand the salient features and problems of growth and development during childhood to adolescence.
- Understand the dynamics of personality development in order to facilitate student trainees and their students' personal growth.
- Develop the ability to apply the knowledge provided by Educational Psychology to
classroom problems of various kinds.

- Understand the intra and inter individual differences in the learners and their Implications for organizing educational programmes.
- Acquire the skills of understanding the needs of all the learners in the classroom and meeting their needs.
- Appreciate the contribution of psychology in realizing the objectives of education.

COURSE CONTENT

Unit I: Nature of Human Development and Educational Implications
Concept and Branches of Psychology; Importance of Study of Psychology by Classroom Teachers, Meaning of Growth and Development. Differences between growth and development, importance of growth and development for the teachers. Principles of Development, Factors Influencing Growth and Development; Role of Heredity and Environment in Determining individual Differences in Development. Developmental Stages and Tasks, Development during Early Childhood, Late Childhood and Adolescence-Characteristics, Factors Influencing and Educational Implications:(a) Physical (b) Psychomotor (c) Intellectual (d) Language (e)Emotional (f) Social and (g) Moral and Value Development

Unit II: Management of Issues and Concerns of Adolescent Students
Factors Affecting Adolescent development; Issues and Concerns during Adolescence - Physical and Health concerns, Emotional Issues, Social Issues, Socio-cultural diversity, Adverse Life experiences, Identity Vs Role Confusion; Adolescent Cognition and its effect on Adjustment, Need and Importance of Adolescence Education, Significance of Life Skill Education for Adolescence, Role of Schools for the Balanced Personality

Unit III: Individual Differences in Learners
Individual Differences in - Psycho-Motor skills, Intelligence, Aptitude, Personality, Learning styles and Cognitive Preferences, Self concept and Self esteem, Social-Emotional Development, Aptitude, Interest, Attitude and Values and Study Habits.

Unit IV: Assessment of Individual and Intra Individual Differences in Learners

Meeting the Individual Differences in the Classroom- General Approaches; Remedial Instruction, Guidance and Counseling, Whole School Approach.

Practicum
Administering Group Tests
Conducting Case Studies
Diagnosing the deviations
Studying School Record and preparing Reports.
Getting Familiarised with Individual Psychological Tests.
References:

Web Resources
- Animated Videos from Study.com, [http://study.com/academy/course/educational-psychology-course.html](http://study.com/academy/course/educational-psychology-course.html)
MSEIII.8 : Gender, School and Society

Credits: 2 (1L+ 1T +0P)    Marks: 100
Contact hrs per week: 3    C1 + C2: 50
Exam Duration: 2 hrs    C3: 50

Objectives:
This course enables the student teachers to
- Understand and contextualize ideals of the Constitution of India;
- Appreciate humanistic agenda of the Constitution of India;
- Value and recognize the role of education in realizing the ideals of the Constitution;
- Analyse various educational contexts to see whether the child’s rights are ensured;
- Understand and develop positive attitudes towards various forms of exclusions;
- Appreciate the measures taken at the national level to universalize elementary and secondary education;
- Analyse the contextual examples to understand the gender issues and concerns;
- Develop positive attitude and values towards promoting gender equality;
- Evolves strategies and mechanisms as a teacher to ensure equality in school and learning contexts

COURSE CONTENT:
Unit I: Education as Fundamental Right

Unit II: Policy framework for public Education in India and its implementation
Education in Post-Independent India: Significant recommendations of commissions and committees, National Policy on Education-1986,Revised 1992, Delors Report: learning the treasure within, Universalization of elementary education: Need and significance; Government schemes and efforts with special focus on Sarva Shiksha Abhiyan, Issues in implementing RTE-2009: A critical understanding. Issues that affect and negate the children’s right to education (Child labour: Street children, abandoned and orphans; Differently abled children; Attitude towards the girl child and her participation in schooling; Punishment, abuse and violence in schools); alternative schooling. Secondary education: Universalization of secondary education; universal access, universal enrollment, universal retention, universal success; interventions of RMSA, Initiatives and measures taken at national level to improve teacher education at secondary level: Role of NCTE and NCERT
Unit III: Contemporary Indian Schooling: Concern and Issues
Equality of Educational Opportunity: Meaning and nature; Forms of inequality: Caste, Gender, Transgender, regional, religious and other marginalized groups;
Inequality in Schooling: Public- private schools, Rural-urban schools,Mass-elite schools, single teachers' schools and many other forms of in equal school systems. Positive discrimination: concept and issues and policy intervention;
Understanding Exclusion in schooling: Exclusion: Meaning, and nature; Forms of Exclusion:
Physical/physiological Exclusion: Different kinds/types of differently abled children: Measures to address the issues of leaning of differently abled children and professional preparedness of institutions;
Socio-cultural and economic exclusion
Understanding different forms of socio-cultural and economic exclusion in schooling Caste, Class, Gender, Minority, and other Marginalized sections of the society; Critical understanding of ascribed identities on educational opportunities;

Unit IV: Gender: Issues and concerns
Basic Gender concepts: Difference between Gender and Sex; Social construction of Gender; Gender roles as viewed in Indian context; Concept of Transgender

Gender roles in society through various institutions such as family, caste, religion, culture, media and popular culture (films, advertisements, songs etc), law and State; stereotype in gender roles

Issues related to women/girl child: female infanticide and feticide, sex ratio, honour killing, dowry, child marriage, property rights, divorce, widowhood.

Gender bias in school enrolments, household responsibilities, societal attitude towards girl education

Issues related to gender in school: sexual abuse, sexual harassment, perception of safety at school, home and beyond

Representation of gendered roles, relationships and ideas in textbooks and curricula.

Role of schools, peers, teachers, curriculum and textbooks in challenging gender inequalities or reinforcing gender parity

The Indian constitution and provisions accorded to women; women rights; legal aspects related to women, indecent representation of women (Prohibition act), cybercrime:

Educational and Employment provisions for Transgender: Legal aspects; social recognition

Sessional activities
- A critical study, with the help of survey and observational study, of alternative schools-child labour schools, night schools, mobile schools and boat schools.
- Critical analysis of different committees and commissions on Education
- Survey of schools to see the implementation of various incentives of government to equalize educational opportunities
- Textbook analysis for identifying integration of gender issues.
• Prepare presentation on laws related to women harassment, early marriage, property inheritance, trafficking etc.
• Prepare presentations on constitutional provisions and other government measures to promote girl child’s education
• Presentation of Case study reports on girl child’s problems in schools and at home.

Suggested Readings
• Anand, C.L. et.al. (1983). Teacher and Education in Emerging in Indian Society, NCERT, New Delhi.
• Govt. of India (1986). National Policy on Education, Min. of HRD, New Delhi.
• Govt. of India (1992). Programme of Action (NPE). Min of HRD.
• UNESCO; (1997). Learning the Treasure Within.
• Dr. Veda Mitra. Education in Ancient India, Arya book Depot, New Delhi 1967
• Reports of SSA and RMSA
• NCTE (2009) National curriculum framework for teacher education


**MSEIII.9 : School Attachment Programme 1**

| Credits : 2 | Marks: 100 |
| Duration: 2 Weeks | C1+C2 : 50 |
| C3 : 50 |

**Objectives**
• To familiarize the student teachers to school environment, its structure, functions and processes.
• To provide field experience of assessment practices including record maintenance and report cards followed in schools at elementary and secondary levels.
COURSE CONTENT:

- The student teachers will visit the neighbourhood schools for two weeks to get acquainted with the school environment and its functions and processes and submit the report.

- The student teachers will familiarize themselves with school structure and administration.

- The student teachers will visit schools and interact with teachers to know about the assessment practices like CCE, grading patterns and reporting the performance of students and submit the report.

- Students will analyse the assessment records and the report cards to study the models of assessment and procedures followed in reporting students' performance. The students will attend the PTA meetings where feedback about students' performance is given by the teachers and submit the report.

Evaluation: All assessments are internal

C1  ttk  Report 1
C2  ttk  Report 2
C3  ttk  Presentation  through PPT.
FOURTH SEMESTER

Core Course 1D : Physics

MSEIV.1 : OPTICS

Credits: 4 (3L+ 0T +1P)  
Marks: 100
Contact hrs per week: 5  
C1 + C2: 50
Exam Duration: 2 hrs  
C3: 50

Objectives:

To enable students to

- understand that light is a wave phenomenon.
- apply the understanding of wave phenomenon to light.

COURSE CONTENT:

Unit I: Nature of Light and Scattering
A brief discussion on Tyndall, Rayleigh and Raman scattering of light. A qualitative account of fluorescence and phosphorescence, the Raman Effect experiment and its explanation, intensity and polarisation of Raman lines, some applications of Raman Effect.

Unit II: Interference
Michelson and Fabry-Perot interferometers: determination of wavelength of light. Wavelength difference, Refractive index and Visibility of fringes

Unit III: Diffraction
Fraunhoffer Diffraction, Diffraction at a single slit, double slit, multiple slits, Diffraction grating, Resolving power - Rayleigh's criterion, Resolving power of a grating and telescope. Fresnel diffraction, half period zone, zone plate, diffraction at a circular aperture and at a straight edge, a slit and a wire using half-period zone analysis.

Unit IV: Polarisation
Polarization by reflection, Brewster's law, Malus law. Double refraction, Production and detection of linearly, circularly and elliptically polarized light, Quarter and half wave plates, Polariods, Discussion on use of Polaroid sheets in preparing tinted sunglasses, Optical activity, Fresnel's theory, Rotatory polarization, use of biquartz.
Reference Books:

PRACTICALS

Exam Duration : 3 hrs  C3 : 50

Objectives:
- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)
1. To determine the refractive index (n) of a liquid by Liquid Lens.
2. Determination of \( R \) of a Lens using the Newton\( R \) ring arrangement.
3. Determination of thickness of a paper foil using Air wedge setup.
4. Refractive index (n) of the material of Prism by Spectrometer- measuring angle of minimum deviation.
5. To determine the refractive index (n) of glass & water by apparent depth method.
7. Spectrometer- \( i_1- i_2 \) curve.
8. Refractive index of glass prism (i-d curve).
9. Spectrometer-solid prism- Dispersive power.
10. Wavelength of sodium D1 & D2 lines using Diffraction grating.
13. p\( n \) junction diode characteristics.
14. Half wave Rectifier
15. Construction of full wave, Centre tapped and Bridge rectifiers

References:
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt.

Core Course 2 D: Chemistry

MSEIV.2: THERMODYNAMICS, EQUILIBRIUM AND SOLUTIONS

Credits: 4 (3L+0T+1P) Marks: 100
Contact hrs per week: 5 C1 + C2: 50
Exam Duration: 2 hrs C3: 50

Objectives:
- To understand that conservation of energy is the central concept which governs all the changes and to appreciate its role in various thermochemical equations.
- Explain the origin of the driving force of physical and chemical changes and evolution of second law of thermodynamics and related concepts.
- Apply the concept of equilibrium to construct and interpret the phase diagrams.
- To understand the colligative properties of solutions and the behaviour of immiscible liquids.

COURSE CONTENT:

Unit I: Thermodynamics – I

Unit II : Thermodynamics – II
Discussion of experiential knowledge to account for the spontaneity in changes around us.: need for
the Second law of thermodynamics , different statements of the law, Carnot cycle and its efficiency,
Carnot theorem, Thermodynamic scale of temperature.
Concept of Entropy : Entropy as a state function, entropy as a function of V & T, entropy as
a function of P & T, entropy change in physical changes, Clausius inequality, entropy as a
criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.
Gibbs and Helmholtz functions: Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities. A and G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.
Third law of thermodynamics : Nernst heat theorem, statement and concept of residual
entropy, evaluation of absolute entropy from heat capacity data.

Unit III : Chemical Equilibrium and Phase Equilibria
Recognising a system at Chemical Equilibrium. Attributes of Chemical Equilibrium,
Thermodynamic derivation of law of mass action, Equilibrium constant and free energy.
Factors that affect the chemical equilibrium and Le Chatelier principle. Calculations
involving equilibrium constant ionic equilibria in aqueous solutions, sparingly soluble salts,
solubility product common ion effect, selective precipitation, applications in qualitative
analysis.
Ionisation of water, pH scale, weak acids and bases, hydrolysis, buffer solutions, acid base
indicators, acid base titrations and multi stage equilibria. Reaction isotherm and reaction
isochore.
To establish a systematic way of discussing the changes systems undergo when they are
heated and cooled and when their composition is changed. Clapeyron equation and Clausius ï
Clapeyron equation, applications.
Statement and meaning of the terms phase, component and degree of freedom, derivation of
Gibbs phase rule, phase equilibria of one component system water, CO₂ and Sulphur systems.
Phase equilibria of two component system solid-liquid equilibria simple eutectic BiCd.
Pb-Ag Systems, desilverisation of lead. Simple eutectics, systems forming compounds with
congruent melting points.

Unit IV: Solutions
To unify the equilibrium properties of simple mixtures on the basis of chemical potential.
Distribution law, application of distribution law to association, dissociation and extraction.
Dilute Solution : Colligative properties, Osmosis, Osmotic pressure, Vant Hoff Theory,
Lowering of Vapour Pressure, Depression in Freezing point and Elevation in Boiling Point,
Vant Hoff Factor.
Solid solutions compound formation with congruent melting point (Mg Zn) and
incongruent melting point (NaCl H₂O), (FeCl₃ H₂O) and (CuSO₄ H₂O) system. Freezing
mixtures, acetone dry ice.
Liquid liquid mixtures: Ideal liquid mixtures, Raoults and Henry’s law. Non-ideal system
Azetropes HCl H₂O and ethanol Water systems.
Partially miscible liquids Phenol-water, trimethylamine-water, nicotine-water systems.
Lower and upper consolute temperature. Effect of impurity on consolute temperature.
Immiscible liquids, steam distillation. Nernst distribution law thermodynamic derivation,
applications.
References:
2. Physical Chemistry: Atkins

PRACTICAL

Exam Duration: 3 hrs

Objectives:
- To study the energetics of chemical reactions
- To find out the equilibrium constants of selected systems
- To study the behaviour of immiscible liquid systems
- To appreciate the physical properties of liquids and liquid mixtures

COURSE CONTENT:
2. Determination of solubility of sparingly soluble salt at various temperature, calculation of enthalpy of solution.
3. pH titration of acid versus base (observation of change in pH)
4. Determination of equilibrium constant of hydrolysis of an ester (ethyl acetate/methyl acetate)
5. Determination of dissociation constant of a weak acid.
6. Determination of solubility product constant ($K_{sp}$) of a sparingly soluble salt
7. Determination of dissociation constant of phenolphthalein/methyl orange by colorimetric method.
8. Determination of molecular weight of a given liquid by steam distillation.
9. Determination of percentage composition of the given NaCl solution by miscibility temperature method (phenol-water system).
10. Determination of distribution coefficient of benzoic acid between water and toluene or acetic acid between water and 1-butanol.
11. Determination of transition temperature of a given salt hydrate by thermometric method.
13. Determination of density, coefficient of viscosity and surface tension of the given liquid.

References:
- Systematic Experiments in Chemistry by Arun Sethi.
Core Course 3D : Mathematics

MSEIV.3 : DIFFERENTIAL EQUATIONS

Credits: 4 (3L + 1T +0P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
By the end of the semester the students will be able to understand the concept of ordinary and partial differential equations, and their uses in solving real life problems.

COURSE CONTENT:
Unit I:
Definition, Formation of a differential equation, Solution of a differential equation, Equations of the first order and first degree, Variables separable, Integrating factors, Homogeneous form ï Reducible to homogeneous form, Linear equations, Bernoulli's equation, Exact equations, Equations reducible to exact equations.

Unit II:
Equations of the first order and higher degree, Clairaut's equation solvable for x and y and p, Orthogonal trajectories in polar and Cartesian form, Operator D, Rules for finding the particular integral, Cauchy-Euler differential equation, Legendre's differential equations, Simultaneous differential equations.

Unit III:
Equations which do not contain x, Equation whose one solution is known, Equations which can be solved by changing the independent variable and dependent variable, Variation of parameters, Total differential equation :\(Pdx + Qdy + Rdz = 0\), Simultaneous equations of the form \(dx/P = dy / Q = dz / R\).

Unit IV:
Formation by elimination of arbitrary constants, Formation by elimination of arbitrary functions, Solution by direct integration, Lagrange's linear equations \(Pp + Qq = R\), Standard types of first order non-linear partial differential equations, Charpit's method, Homogeneous linear equations with constant coefficients, Rules for finding the complementary functions, Rules for finding the particular integral, Separation of variables.

References:
2. An Introduction to Partial Differential Equations by Stephenson, ELBS.
3. A Short Course in Differential Equations by Rainville and Bedient, IBH.
5. Introductory Course in Differential Equations by Murray, Orient Longman.
6. Differential Equations by Simmons, TMH.
10. A Textbook of Differential Equations by Mittal, Har Anand Publications
REGIONAL LANGUAGES

MSE IV 4A : HINDI

Credits 4 (2L+1T) \hspace{2cm} Max. Marks: 100
Contact Hours per week: 4 \hspace{2cm} C1+C2:50
Exam duration: 2 Hrs \hspace{2cm} C 3:50

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

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

COURSE CONTENT:

Unit I : Media Studies:
Television, Cinema Aur New Media

Unit II: New Literary Discourses
Stri Vimarsh Aur Dalit Vimarsh

Unit III: Drama:
Hanoosh by Bhishm Sahani Published by Rajkamal Prakashan, Delhi

Unit IV: Communication skill:
Debate [Vaad-Vivad]
Characteristics Ī Definition Ī Need of Debate Ī Technique to conduct Debates, etc. Exercise

Reference:
2. Media Samgra- Jagdishwar Chaturvedi, Swaraj Prakashan, Delhi
3. Media Vimarsh- Sudhish Pachauri, Vani Prakashan, Delhi
4. Hindi Cinema Ka Sapharnama- Bhaskar Rao, Delhi
5. Yatharthvad Aur Hindi Dalit Sahitya: Dr Sarvesh Mourya, Swaraj Prakashan, Delhi
6. Dalit Vimarsh Ki Bhoomika: Kaval Bharti, Sahitya Upkram, Allahabad
7. Dalit Sahitya Ki Awdharna: Kaval Bharti, Sahitya Upkram, Allahabad
8. Dalit Sahitya Ki Bhoomika: Harpal Singh Arush, Vagdevi Prakashan, Delhi
9. Dalit Strivad Ka Svar: Vimal Thorat, Anamika Prakashan, Delhi
10. Samkaleen Dalit Strivad: Rajni Tilak, Swaraj Prakashan, Delhi
11. Aurat Hone Ki Saja: Arvind Jain, Vani Prakashan, Delhi
12. Ek Aurat Ki Notebook: Sudha Arora, Vani Prakashan, Delhi
13. Stri Sangharsh Ka Itiha: Radha Kumar, Vani Prakashan, Delhi
14. Stritva Ka Maanchitra: Anamika, Vani Prakashan, Delhi
15. Hindi Natak-Udbhav aur Vikas: Dasrath Ojha, Rajpal and sons, Delhi
16. Bhishm Shahnai ki Katha Bhasha: Kiran Kishra, Swaraj Prakashan, Delhi
17. Natyashastra ki Bhartiya Parmparaa aur Dasroopak: Hajar Prasad Divedi, Rajkamal Prakashan, Delhi
18. Rangmanch ke Siddhant: Mahesh Aanand, Devendararaj Ankur, Rajkamal Prakashan, Delhi
19. Rangmanch ka Saundryashastra: Devendararaj Ankur, Rajkamal Prakashan, Delhi
20. Antrang Bahirang: Devendararaj Ankur, Rajkamal Prakashan, Delhi
21. Darshan Pradarshan: Devendararaj Ankur, Rajkamal Prakashan, Delhi
22. Aaj Ki Kala: Prayag Shukla, Rajkamal Prakashan, Delhi
23. Rangmanch ka Jantana: Hrishikesh Sulabh, Rajkamal Prakashan, Delhi
24. Mantar: Hrishikesh Sulabh, Rajkamal Prakashan, Delhi
25. Natya Darpan: Mohan Raksh, Rajkamal Prakashan, Delhi
26. Aadhunik Bhartiya Natya-Vimarsh: Jaydev Taneja, Rajkamal Prakashan, Delhi
27. Rang-Darshan: Nemichand Jain, Rajkamal Prakashan, Delhi

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

Continuous Assessment:
Assessment will be based on tutorials (seminars, projects etc.) tests & assignments.
C1-10 (test) + (seminars, projects, assignments etc) =15
C2-10 (test) + (seminars, projects, assignments etc) =15
Total =50

MSE IV.4B : KANNADA

Credits 4 (2L+1T) Max. Marks: 100
Contact Hours per week: 4 C1+C2:50
Exam duration: 2 Hrs C 3:50

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

Unit I : Functional Language


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

Unit II : Technical Writing


b. Creative Writing: Poem Writing, Essay Writing


Unit III : Ancient Poetry

1. Melpu balpanaligum - Pampa
2. Paligum paapakkamanjadavar eegeyyar - Nagachandra
3. Muktiyanolisuven - Janna

( Kaavya Sanchaya -3 î Mysore University, Mysore)

Unit IV : Drama

Sankraanthi-Lankesha

Suggested Activities:

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

Continuous Assessment:

Assessment will be based on tutorials (seminars, projects etc) tests & assignments.

C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50
MSE IV.4C: MALAYALAM

Credits 4 (2L+1T)  
Contact Hours per week: 4  
Exam duration: 2 Hrs  
Max. Marks: 100  
C1+C2:50  
C 3:50

Unit I: Functional Language
2. Precis-writing: Characteristics ċ definitions ċ steps to précis writing ċ models ċ exercises.

Unit II: Technical Writing

Unit III: Ancient Poetry
Text: Karna Parvam (Krishna Darshanam) By Ezhuthachan, NBS, Kottayam

Unit IV: Drama
SAKETHAM by C. N. Sreekantan Nair, Current Books, Trichur

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

Continuous Assessment:
Assessment will be based on tutorials (seminars, projects etc) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50
Objectives:

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

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

COURSE CONTENT:

Unit I: New Genres & Media Studies:
- a) Travellogue: Nadanthai Vaazhi Kaveri- Janakiraman
- b) Cinema, TV, Newspaper and New Media: significance of media-role of media in society- values-etc.

Unit II: Drama
Tanneer Tanneer

Unit III: Poetry: Ancient Poetry
1. Nedunalvaadai
2. Kalithogai


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

Continuous Assessment:
Assessment will be based on tutorials, seminars, projects, Tests and assignments.
C1-10(Test)+ 15(seminars, projects, assignments etc.) =25
C2-10(Test)+ 15(seminars, projects, assignments etc.) =25
Total=50.

References:
1. An anthology of Tamil poetry (for second year Degree class), University of Mysore, Mysore.
2. Thandiyalangaaram, Thirunelveli Saiva Chithaantha Noorpathippu Kazhagam, 522, DDK
ABILITY ENHANCEMENT COURSE - AEC 1D: LANGUAGE

MSE IV. 4E TELUGU

<table>
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<tr>
<th>Credits 3 (2L+1T+0P)</th>
<th>Max. Marks: 100</th>
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<tr>
<td>Contact hours per week: 4</td>
<td>C1+C2:50</td>
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<td>Exam duration: 2 Hrs.</td>
<td>C 3:50</td>
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Objectives:

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

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

COURSE CONTENT:

Unit I: Functional Language
1. Analytical writing: definition-how to analyze a poem-a story- a novel and an essay-different approaches to observe-examples-exercises
2. Precise-writing: Characteristics ī definitions ī steps to précis writing ī models ī exercises.

Unit II: Technical Writing

Unit III: Ancient Poetry
Padmavyuha bheda samayam-Tikkana (Sree Madaandhra Mahabharatham)
Ruthu varnanalu ī Srikrishna devaraya (Amuktha Malyada)
Lessons from īTelugu Sahitya Sravanthi ī
Unit IV: Short stories:
(i) *Nannu gurinchi katha vrayavoo* - Buchchibabu
(ii) *Lakshmi* - Rachakonda Viswanatha Sasthry
(Selections from Telugu Katha, by Central Sahithya Academy, New Delhi.)

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

Continuous Assessment:
Assessment will be based on tutorials (seminars, projects etc.) tests & assignments.  
C1-10 (test) +15 (seminars, projects, assignments etc.) =25  
C2-10 (test) +15 (seminars, projects, assignments etc.) =25  
Total =50

References:
3. Government of Karnataka, *Telugu Sahitya Sravanthi*, Published by Prasaranga, University of Mysore, Mysore

**Ability Enhancement Course – AEC 2D**

**MSE IV.5 ENGLISH**

Credits 4 (2L+1T)                    Max. Marks: 100            
Contact Hours per week: 6          C1+C2:30
Exam duration: 3 Hrs C 3:70

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

**Transaction Mode:**
Lecture-cum-discussion, interactive session, group dynamics, role-play, peer-assessment, self-valuation.
COURSE CONTENT:

Unit I : PROSE
1. J.B.Priestley : Travel by Train.
2. Bertrand Russell : Knowledge and Wisdom

Unit II : POETRY
T.S.Eliot : Hollow Men
Wordsworth : The Solitary Reaper
Pablo Neruda : The Portrait in the Rock
William Shakespeare : True Love.
William Blake : A Poison Tree.
William Wordsworth : Lucy Gray.
Robert Frost : The Road Not Taken
Emily Dickinson : There is a certain slant of light

Unit III : DRAMA
Ionesco : Rhinoceros
Harold Pinter : The Dumb Waiter

Unit IV : FICTION
D.H.Lawrence : Sons and Lovers
Gabriel Garcia Marquez : One Hundred Years of Solitude

Continuous Assessment:
Assessment will be based on tutorials( seminars, projects Etc ) tests & assignments.
C1-10 (test) +15 (seminars, projects, assignments etc) =25
C2-10 (test) +15 (seminars, projects, assignments etc) =25
Total =50

Suggested Readings:
Cambridge Companion to British Romanticism
Pelican Guide to English Literature Ī Dickens to Hardy to Lyrical Ballads
NortonÔ Anthology, Volume.2 1-7, 139
Mathew Arnold- Culture and Anarchy
Dickens- Novel ÔChanging Face of CityÔ
Meenakshi Mukherjee - Jane Austen
William Congrev- Excerpts from London Gazette
Brown, John Russel, and Harris, Bernard(ed).- Restoration Theatre (London, 1965)
Addison and Steele - Spectators Papers
Cambridge Companion to English Poetry- Donne to Marvel
Restoration Theatre - ed. Brown, John Russel
Background Prose Reading - papers 6,7 & 8: Worldview, an Imprint of Book Land Publishing co.
Skill Enhancement Course - SEC 2 Physics

MSEIV.4A : COMPUTATIONAL PHYSICS

Credits: 3 (2L + 0T +1P)  Marks: 100
Contact hrs per week: 4  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
The course aims to emphasize the role of computer programming and numerical analysis in solving problems in Physics.

- To use of computational methods to solve physical problems.
- To use computer language as a tool in solving physics problems (applications).

COURSE CONTENT:

Unit I: Introduction
Importance of computers in Physics, paradigm for solving physics problems for solution. Algorithms and Flowcharts, Algorithm: Definition, properties and development. Flowchart: Concept of flowchart, symbols, guidelines, types. Examples (Cartesian to Spherical Polar Coordinates, Roots of Quadratic Equation, Sum of two matrices, Sum and Product of a finite series, calculation of sin (x) as a series, algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal).

Unit II: Scientific Programming
Concept of high level language, steps involved in the development of a Program, Compilers and Interpreters. Development of C, Basic elements of C. Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. Operators: Arithmetic, Relational, Logical and Assignment Operators. Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions. Data types, Type declaration of variables, Symbolic constants, Arithmetic operators, Increment and decrement operators, Conditional operator, Bitwise operators, Hierarchy, Arithmetic expressions, Logical operators and expressions, Assignment operators, Arithmetical and assignment statements, Mathematical functions, Input/output statements (unformatted/formatted), Relational operators, Decision making and branching, Go to, if, if-else, switch statements, Looping, While, do and for, Arrays (Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Handling characters and strings, Functions and voids, structures, Pointers (elementary ideas only), File operations(defining and opening, reading, writing, updating and closing of files, Enough examples from physics problems.

Unit III: Scientific word processing
Introduction to LaTeX: TeX/LaTeX word processor, preparing a basic LaTeX file, Document classes, Preparing an input file for LaTeX, Compiling LaTeX File, LaTeX tags for creating different environments, Defining LaTeX commands and environments, Changing the type style, Symbols from other languages. Equation representation: Formulae and equations, Figures and other floating bodies, Lining in columns- Tabbing and tabular environment,
Generating table of contents, bibliography and citation, Making an index and glossary, List making environments, Fonts, Picture environment and colors, errors.

Unit IV: Visualization

Introduction to graphical analysis and its limitations. Introduction to Gnuplot. importance of visualization of computational and computational data, basic Gnuplot commands: simple plots, plotting data from a file, saving and exporting, multiple data sets per file, physics with Gnuplot (equations, building functions, user defined variables and functions), Understanding data with Gnuplot.

References:
12) K.E. Atkinson, Elementary Numerical Analysis, , 3rd edition, 2 007, Wiley India.

PRACTICALS

Exam Duration: 3 hrs C3: 50 Marks

Objectives:
The course aims to emphasize the role of computer programming and numerical analysis in solving problems in Physics and to provide hands on training on the Problem solving on Computers.

COURSE CONTENT:
(A minimum of TEN experiments to be selected from the following)
1. To print out all natural even/ odd numbers between given limits.
3. To find maximum, minimum and range of a given set of numbers.
4. Calculating Euler number using exp(x) series evaluated at x=1
5. To compile a frequency distribution and evaluate mean, standard deviation etc.
6. To evaluate sum of finite series and the area under a curve.
7. To find the product of two matrices
8. To find a set of prime numbers and Fibonacci series.
9. To write program to open a file and generate data for plotting using Gnuplot.
10. Plotting trajectory of a projectile projected horizontally.
11. Plotting trajectory of a projectile projected making an angle with the horizontally.
12. Creating an input Gnuplot file for plotting a data and saving the output for seeing on the screen. Saving it as an eps file and as a pdf file.
13. To find the roots of a quadratic equation.
14. Motion of a projectile using simulation and plot the output for visualization.
15. Numerical solution of equation of motion of simple harmonic oscillator and plot the outputs for visualization.
16. Motion of particle in a central force field and plot the output for visualization.

References:

Skill Enhancement Course - SEC 2 Botany

MSE IV.6B :UTILIZATION OF PLANTS AND HERBAL TECHNOLOGY

Credits: 2(1L+0T+1P) Max Marks: 100
Contact Hours per week: 3 C1+C2 = 50
Exam duration: 2 hrs. C3 = 50

Objectives:
After completion of the course students will be able to:
1. Appreciate the wealth and potential of medicinal plants in our country
• Identify important plants that are useful to us
• Familiarise with phytochemical and micropropagation techniques
COURSE CONTENT:

Unit I: Utilization of plants
Brief account (botanical name, family, extraction/processing where necessary) and uses of the following:

a) Cereals and Pulses: Rice, wheat, maize, millets, pigeon, pea, Bengal gram, green gram, black gram.
b) Fibres: Cotton, jute, linen, coir.
c) Vegetable oils: Groundnut, coconut, sunflower, safflower, castor.
d) Timber and bamboos: Rosewood, teakwood, honne, canes and bamboos.

Beverages: General account, coffee, tea, cocoa.

Spices and condiments: General account, cardamom, clove, pepper, ginger, cinnamon, saffron, turmeric, mustard.

A. Rubber: General account, Hevea, Ficus.
B. Pharmacognosy: Uses of Rauwolfia, Phyllanthes, Catharanthus, Ocimum, Tylophora, Zingiber, Trigonella, and other locally available medicinal plants.

Unit II
Herbal medicines: history and scope - definition of medical terms - role of medicinal plants in Siddha systems of medicine; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants.

Unit III:
Phytochemistry - active principles and methods of their testing - identification and utilization of the medicinal herbs; Catharanthus roseus (cardiotonic), Withania somnifera (drugs acting on nervous system), Clerodendron phlomoides (anti-rheumatic) and Centella asiatica (memory booster).

Unit IV:
a) Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds)
b) Medicinal plant banks micro propagation of important species (Withania somnifera, neem and tulsi- Herbal foods-future of pharmacognosy)

PRACTICAL

Exam Duration : 3 hrs C3 : 50

COURSE CONTENT:
1. Identification and study of plants of economic importance included in theory.
   - Methods of cultivation and micropropagation of medicinal plants
   - Familiarisation with basic phytochemical techniques
- Submission of a report on local medicinal plants
- Preparation of 2 herbarium sheets of medicinal plants
- Visit to medicinal plants garden and herbal extraction companies

References:
7. Pharmacognosy, Dr.C.K.Kokate et al. 1999, Nirali Prakashan.

Skill Enhancement Course – SEC 2 Chemistry

MSEIV.4C : INDUSTRIAL INORGANIC MATERIALS

Credits : 3 (1L + 0T +1P)  
Contact hrs per week: 3  
Exam Duration : 2 hrs

Marks: 100

C_1 + C_2: 50
C_3 : 50

Objectives :
- To understand the production, handling and storage of industrial gases
- To gain knowledge about the manufacture, application and hazardous in handling the inorganic chemicals
- To know the composition, properties and application of silicate minerals in industry
- To acquire the knowledge of simple fertilizers, surface coatings, alloys, and chemical explosives

COURSE CONTENT

UNIT I : Industrial Gases and Inorganic Chemicals

Industrial Gases: Large scale production, uses, storage and hazards in handling of the following gases: oxygen, nitrogen, argon, neon, helium, hydrogen, acetylene, carbon monoxide, chlorine, fluorine, sulphur dioxide and phosgene.

Inorganic Chemicals: Manufacture, application, analysis and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt,
Industrial Metallurgy - Preparation of metals (ferrous and nonferrous) and ultra pure metals for semiconductor technology.

UNIT II: Silicate Industries

**Glass:** Glassy state and its properties, classification (silicate and non silicate glasses). Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armoured glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.

**Ceramics:** Important clays and feldspar, ceramic, their types and manufacture. High technology ceramics and their applications, super conducting and semi conducting oxides, fullerenes carbon nanotubes and carbon fiber.

**Cements:** Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

UNIT III

**Fertilizers:** Different types of fertilizers. Manufacture of the following fertilizers: Urea, Ammonium nitrate, Calcium ammonium nitrate, Ammonium phosphates; Polyphosphate, Super phosphate, Compound and mixed fertilizers Potassium Chloride, Potassium sulphate.


UNIT IV

**Alloys:** Classification of alloys, Ferrous and Non-Ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon decarbonization, Page 39 of 80 demanganizing, desulphurization dephosphorisation) and surface treatment (argon treatment, heat treatment, nitriding, carburizing). Composition and properties of different types of steels.

**Chemical Explosive:** Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX). Introduction of rocket propellant.
PRACTICAL

Exam Duration : 3 hrs

C3 : 50

Objectives:

- To analyse the chemical composition, properties of simple fertilizer and alloys
- To familiarise with the preparation of inorganic salts, dyes and pigments

COURSE CONTENT:

1. Determination of free acidity in ammonium sulphate fertilizer.
2. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
3. Estimation of phosphoric acid in superphosphate fertilizer.
4. Estimation of Cu-Zn in brass
5. Determination of composition of dolomite (by complexometric titration).
6. Analysis of Cu-Ni or (Cu, Zn ) in alloy or synthetic samples.
8. Preparation of pigment (zinc oxide).
10. Determination of phosphoric acid in commercial sample of phosphoric acid.
11. Preparation of chrome alum.
12. Preparation of potash alum from alluminium scarp
13. Preparation of mthyl orange.

References:

6. S. M. Khopkar, Environmental Pollution Analysis: Wiley Eastern Ltd, New
Skill Enhancement Course – SEC 2: Mathematics
MSEIV.4D: DATA HANDLING

Credits: 2 (2L + 1T + 0P)  Marks: 100
Contact hrs per week: 4  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
On completion of this course, the students will be able to:
- understand the types of educational data, procedures of data validation and its analysis.
- appreciate the analysis of educational data by using statistical tests.
- Develop skill of using the application software for data analysis and computation of various statistical measures.
- Compute the different statistical measures by using computerized application software.
- Drawing meaningful conclusions based on the interpretation of analysed data.

Unit I: Data Collection- Nature and types of data
Data collection- primary sources and secondary sources; Scales of measurement (NOIR)
Coding: Variable names; Coding responses; Coding open-ended questions
Tabulation, Constructing frequency distribution table, Graphical representation of data—Pie diagram, Histogram, frequency curve.

Unit II: Descriptive Analysis of Data-1
Measures of dispersion—Range; Quartile deviation; Standard deviation; Coefficient of dispersion; Skewness and Kurtosis.

Unit III: Descriptive Analysis of Data-2
Measures of Relationships: Meaning of Correlation and Methods of computing correlation - Product Moment Correlation; Rank Difference Method of Correlation

Unit IV: Inferential Statistics
Sampling Procedures—Random sampling, Systematic Random sampling, (with and without repetitions), Stratified random sampling, Cluster sampling, Snow ball sampling.
Hypothesis—Meaning and types; testing of hypothesis—one sample t-test, independent samples t-test, paired samples t-test, Chi-square test.

Practicum:
1. Collect data live—class test scores/ survey data and generate frequency distribution table and represent it graphically.
2. Collect test scores of any school subject of any class and compute Mean, Quartile Deviation and Standard Deviation.
3. Compute coefficient of correlation among language subject papers and core subject papers like English and History, Mathematics and Science, etc.
4. Study the sampling procedures adopted by taking various school contexts like selecting a team for school reports, team for debate competition, etc.
Skill Enhancement Course SEC 2: Zoology

MSE IV.6E : SERICULTURE

Credits: 3 (1L + 0T + 1P)  
Max. Marks: 100
Contact Hrs per Week: 3 hrs  
C1+C2: 50
Exam. Duration: 2 hrs  
C3: 50

Objectives
- To understand the importance of sericulture
- To provide the hands-on experience in sericulture practices
- To enhance the skill of practicing silk production
- To appreciate the modern technology employed in sericulture practices

COURSE CONTENT:

Unit I: Introduction to Silkworm Practices
Sericulture: Definition, history and present status
Silkworms: Types of silkworms, their food plants and distribution
Non-Mulberry Silkworm: Tasar (Antherea): Distribution, life cycle, food plant and marketing
Muga silkworm: Distribution, Food plants and Life cycle, marketing
Eri Silkworm: Distribution, life cycle and food plants, marketing.
Prospectus of Sericulture in India: Sericulture industry in different states, employment
Central Silk Board (CSB): Role of Central Silk Board and Directorate of Sericulture in extension and development.
Moriculture: Salient features and economic importance of the genus Morus; Anatomy of mulberry leaf, stem and root
Soil: Physical and chemical properties; Soil nature; Soil moisture; Climatic conditions: Temperature, photoperiod, humidity and rainfall

Unit II: Silkworm Taxonomy And Distribution
Classification and Taxonomic characters: Phylum, class, order, family, genus and species;
Moultingism and voltinism: Univoltine, bivoltine and multivoltine races; Distribution and Races; Geographical distribution in the world and India;
Life cycle: Egg, larvae, pupa and adult, life span

Unit III: Silkworm Morphology
Egg: External and internal morphology and colour change;
Larvae: Mouth parts, legs, prolegs, spiracles, eyes, claspers and integumentary hair and sexual markings;
Pupa: Male and Female Morphology and sexual dimorphism;
Adult: Mouth parts, antenna, wings, external genitalia.
Silk glands: Structure, development and mechanism of silk synthesis
Endocrine glands: Endocrine glands in lava and pupa; Hormonal control on metamorphosis, diapause, silk synthesis. Pheromone: sex attractants and their role in mating.
Unit IV: Silkworm Rearing Technology and Diseases

Rearing: Rearing appliances, Rearing trays, ant-wells, rearing stands and racks, paraffin papers, rubber foam pads, net, chopsticks and feathers; Mountages

Disinfectants appliances: Disinfect ants - Formalin, bleaching powder, RKO, Disinfectant appliances: Sprayers and dusters

Seed: Collection of disease-free layings (DFLs), cards, loose eggs, incubation; Hatching and Brushing: Uniform hatching and Brushing methods for I instar larvae

Basic concepts of silkworm diseases: Viral and Protozoan diseases (Nuclear polyhydrosis virus (NPV); Nosema bombycis (Pebrine disease) and Preventive measures

Bacterial diseases: Bacterial septicemia (Bacillus sp.); Fungal Diseases (white muscardine (Beauveria bassiana), Silkworm pests: Tachinid Fly (Uzifly), Dermistid beetles; Vertebrate and other silkworm pests and their control.

References
8. Appropriate Sericultural Techniques Ed, by M. S. Jolly Director, CSR & TI, Mysore.

PRACTICAL

Exam Duration : 3 hrs C3 : 50

Objectives
To provide the hands-on experience in sericulture practices
- To enhance the skill of practicing silk production
- To appreciate the modern technology employed in sericulture

COURSE CONTENT:
1. Preparation of a map showing extension of sericulture in the world.
2. Preparation of a map showing extension of sericulture in India.
3. Graphical representation of cocoon and silk production by various silkworms in India.
4. Moriculture: a) Soil sampling and analysis of pH and moisture content. b) External
morphology of root, stem and leaf. c) Methods of propagation by cutting.
4. Morphology ï Egg, last instar larva, pupa, adult, sexual dimorphism, mouthparts, antennae, legs, prolegs, wings.
5. Anatomy ï Dissection of silk gland of larva and adult.
6. Study of appliances ð Types of trays and racks, types of mountage, Cellule, humidity and temperature devices, dusters and sprayers.
7. Life cycle of Silkworm
8. Silk products ð Silk wastes, spun yarn and other byproducts.
9. Single cocoon reeling ð determination of average filament length and denier
10. Visit to various sericulture department/centres.
12. Study of mulberry fungi, viruses and bacteria causing diseases.

PROFESSIONAL EDUCATION COURSES
MSE IV.7: LEARNING AND TEACHING

Credits: 4 (3L+ 1T +0P)  
Marks: 100
Contact hrs per week: 5  
C1 + C2: 50
Exam Duration: 2 hrs  
C3: 50

Objectives:
The student teacher will be able to:
• Gain an understanding of the process of learning.
• Understands the Conditions Essential for Facilitating Learning and Retention.
• Apply the Principles and Strategies of Major Approaches to Learning in Classroom Environment.
• Understands the Process of Effective Teaching and Qualities of Effective Teachers.
• Understands various Approaches to Teaching and will be able to apply them in the relevant situations.
• Understands the Principles and Strategies for Creating Conducive Classroom Environment.
• Appreciates the role of a teacher as leader, organizer, a facilitator & a humane reflective practitioner.
• Realize the difficulties in learning and teaching.

COURSE CONTENT
Unit I : Concept and Nature of Learning
Factors Associated with Learning
Maxims of Learning and their Educational Implications
Apparaches to Learning( Concept, Associated Concepts Basic Principles and Educational
Implications) - Habitual Learning, Associative Learning (Classical and Instrumental Conditioning), Spatial Learning/Cognitive Maps, Observational Learning, Learning by Insight, Information Processing Approach, Humanistic Approach, Constructivist Learning Approach

Types of Learning - Concept Learning, Skill Learning, Verbal Learning, Learning of Principles and Problem Solving (Meaning, Nature, Stages, Principles and Approaches/Strategies)

**Unit II: Understanding Components of Learning**

Attention - Meaning, Factors Influencing Attention, Strategies for Enhancing Attention; Perception - Meaning, Laws of Perceptual Organization (Gestalt Psychologists' View) and Educational Implications.

Process of Memory - Sensory Registration, Retention (Storing), Recognition, Recall; Factors Influencing Retention; Strategies for Enhancing Memory.

Transfer of Learning - Concept, Types, Theories; Strategies for Enhancing Positive Transfer of Learning

Achievement Motivation - Concept, Intrinsic and Extrinsic Motivation; Strategies for enhancing Achievement Motivation in Students.

**Unit III: Understanding the Process of Teaching-Learning**

Teaching as a Profession

Teaching as an Art and Science.

Understanding the Process of Teaching as a Profession

Identifying the need and importance of classroom teaching-learning

Reflective teaching/practice

Skillful teaching

Applying the knowledge of Maxims of Teaching

Role of teacher in identifying classroom related problems

**Unit IV: Teacher and Teaching as a Profession**

Various Approaches to Teaching: Behaviourist, Cognitivist, Constructivist, Connectionist, Participatory, Cooperative, Collaborative, Personalized, and Holistic

Teacher as a Facilitator and Guide/Philosopher/Friend

Teachers' commitment towards fulfilling Felt Need of Learners

Professional Characteristics of Teacher in Classroom Management.

Skills & Competencies of a Teacher

Communication: Meaning, mode: input/process/output

Basic Model of Communication: Sender, Message, Medium, Receiver & Reach; Factors facilitating communication

Effective Classroom Management - Principles and Strategies

Leadership Qualities in Teachers

**Practicum**

Conducts Projects on

Identifying the Learning Difficulties of Students in Different School Subjects and the Possible Reason for them;

Providing Remedial Instruction to the Students with Learning Difficulties;

Study the Qualities of Effective Teachers through observation, interview, case study etc.,

Visiting Model Schools and Prepare Reports
References:

- Encyclopaedia of Modern Methods of Teaching and Learning (Vol. 1-5).
- Gage N.L. Scientific Basis of art of Teaching

Web Resources

- Courses on Communication Skills, [http://nptel.ac.in/courses/109104030/](http://nptel.ac.in/courses/109104030/)
MSEIV.8 : DRAMA AND ART EDUCATION

Credits: 4 (3L + 1T + 0P)  
Contact hrs per week: 5  
Exam Duration: 2 hrs  
Marks: 100  
C1 + C2: 50  
C3: 50

Objectives
The student teacher will be able to:

- Understand the efficacy of different art forms in education
- Understand the use of ‘Drama’ as a strategy
- Use ‘Role play’ technique in the teaching learning process.
- Understand the importance of dramatic way of presentation.
- Integrate singing method in teaching learning process.
- Understand various ‘Dance forms’ and their integration in educational practices.
- Use art of drawing and painting in teaching learning process.
- Develop creativity through different creative art forms.

COURSE CONTENT

Unit I: Drama and its Fundamentals
Creative writing ‘Drama writing’, Drama writing, Drama as a tool of learning, Different Forms of Drama, Role play and Simulation, Use of Drama for Educational and social change (Street play, Dramatization of a lesson), Use of Drama Techniques in the Classroom: voice and speech, mime and movements, improvisation, skills of observation, imitation and presentation

Unit II: Folklore Music (Vocal & Instrumental)
Sur, Ta al and Laya (Sargam), Vocal - Folk songs, Poems, Prayers, Singing along with ‘Karaoke’, Composition of Songs, Poems, Prayers, Integration of Vocal & Instrumental in Educational practices

Unit III: The Art of Dance
Various Dance Forms - Bharat Natyam, Kathakali, Kuchipudi, Yakshagana- Folk dance and various other dances; integrate movement and rhythm. Integration of Dance in educational practices (Action songs, Nritya Natika)

Unit IV: Drawing and Painting
Colours, Strokes and Sketching - understanding of various means and perspectives, Different forms of painting- Worli art, Madhubani art, Glass painting, Fabric painting and various forms of painting, Use of Drawing and Painting in Education - Chart making, Poster making, match-stick drawing and other forms, Model making 'Clay modeling, Origami, Puppet making, Decorative ‘Rangoli, Ekebana, Wall painting (Mural), Kalameshuthu or any other local art
Transactional Strategies
Lecture cum Discussion for each Unit (Unit 1 to 4) followed by simulated/authentic practices, Workshop schedule, Slide/Film show, Project work, Demonstration, Simulation, Group work and field trips involving meetings with folk singers and other skilled practitioners will especially form part of the transaction scheme. In addition to the above any one or more of the following:

Practicum
Suggestive List:
1. Developing a script of any lesson in any subject of your choice to perform a Play/Drama.
2. Developing a script for the street play focusing on Girl education and Women empowerment.
3. Preparing a pictorial monograph on Various folk dance of South India.
4. Preparing a pictorial monograph on Various Classical Dance forms in India.
5. Preparing a calendar chart on Various Musical Instruments in India.
6. Develop an Audio CD based on newly composed Poems of any Indian language.
7. Preparing some useful, productive and decorative models out of the waste materials.
8. Visit the Faculty of Performing Arts in your city and prepare a detailed report on its multifarious functioning.
9. Development a Review of a theatre programme if possible
10. Organize a competition on some Decorative/Performing Art forms in the school during your School Internship programme and prepare a report on it.
11. Organizing a workshop on some selected Creative Art forms in the school during your School Internship programme and prepare a report on it.

* In addition, school and community based activities may be organized with provisions for visits to innovative centres of pedagogy and learning, innovative schools, educational resource centres, etc. Action research based on teaching learning and school and community could be conducted.

Evaluation Strategies
Sessional, practicum, unit test project work related presentations.

Suggested Readings
1. Natyashastra by Bharathamuni
4. Theory of Drama by A. Nicoll

Web Resources
Position Paper National Focus Group on Arts, Music & Dance, NCERT
Online courses on Arts, http://www.dsource.in/course/index.php
Learning Indicators and Learning Outcomes at the Elementary Stage, (2014), NCERT
MSEIV.9 : SCHOOL ATTACHMENT PROGRAMME 2

Credits : 2  
Duration : 2 weeks

Marks: *100
C1 + C2:50
C3: 50

Objectives:
• To familiarize student teachers with classroom processes and skills employed in teaching-learning process
• To familiarize the student teachers with different types of schools existing in the community.

COURSE CONTENT:
• The student teachers will observe minimum 3 classes of regular teachers for understanding the skills and strategies used in teaching by them.
• The student teachers will visit different types of schools such as Government, Government aided and private schools to study their governing norms, regulations and participation in the community.
• The student teachers will visit the schools run by community/NGO or other organizations like minority run schools, schools in SC/ST dominated areas, schools in slum areas, special and inclusive schools and submit the report.

Evaluation:* All assessments are internal
C1 ⏏ Report 1
C2 ⏏ Report 2
C3 ⏏ PPT
FIFTH SEMESTER

Core Course 1 E: Physics

MSEV.1: ATOMIC AND MOLECULAR PHYSICS

Credits: 4 (3L+0T+1P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
To enable students to apply the basic knowledge of classical and quantum mechanics at the atomic and molecular level.

COURSE CONTENT:

Unit I: Atomic Physics-I
The Electron: Determination of e/m of an electron by Thomson method, Determination of charge of an electron by Millikan’s oil drop method.
Atomic Spectra: Inadequacy of Bohr atomic model, correction due to finite mass of the nucleus, Rydberg constant in terms of reduced mass, Excitation and Ionization potentials, Franck-Hertz experiment, Bohr-Sommerfeld Model of atom, relativistic mass correction, vector model of an atom, Electron spin, space quantisation, magnetic moment of an electron due to its orbital motion. Stern-Gerlach experiment and its theory.

Unit II: Atomic Physics-II

Unit III: Molecular Spectra
Molecular formation, the molecular ion, H₂⁺ molecule. Salient features of molecular spectra. Rotation, vibration and electronic spectra of molecules, associated quantum numbers and selection rules. Theory of pure rotation and rotation-vibration spectra, Raman and Infrared (IR) spectra, simple applications. UV-Visible, Fourier Transform IR, Nuclear Magnetic Resonance (NMR) and Laser Raman spectra of organic molecules and their interpretations.

Unit IV: X-Rays
Electromagnetic spectrum, production of X-rays, X-ray spectra, Continuous X-ray spectra Characteristic X-ray. Duanne and Hunt limit. Moseley’s law and its significance, X-ray energy levels. Bragg’s law and Bragg spectrometer. A brief mention of different types of
crystals. Structures of NaCl and KCl crystals. Compton Effect, Expression for Compton Shift. X-ray diagnostics and imaging

Reference Books:

PRACTICALS

Exam Duration: 3 hrs

C3: 50 Marks

Objectives:
- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:

(A minimum of TEN experiments to be selected from the following)

1. Franck-Hertz experiment.
2. Study of sodium lines using discharge tubes.
4. Study of helium lines using discharge tubes.
5. Dissociation energy of Iodine.
6. Hartmann\'s formula for wavelength.
7. Benzene IR spectrum.
8. Rydberg Constant \( \tilde{\alpha} \) Solar Spectrum
9. Excitation of Brass spectrum using Arc method
10. Rutherford model \( \tilde{\alpha} \) Simulation technique.
11. Zener diode characteristics.
12. Transistor characteristics and transfer characteristics in Common Base configuration-current gain.
13. Transistor characteristics and transfer characteristics in Common Emitter configuration-current gain.
14. CE Transistor Amplifier-Frequency response.
15. Basic operational amplifier.
17. Bi-prism experiment.
18. Resolving power of grating.
19. Current balance experiment- the effects of a magnetic field on a current carrying conductor.
20. Resolving power of a telescope.

References:
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.
4. S.Panigrahi & B.Mallick, Engineering Practical Physics, Cengage Learning India Pvt. Ltd., 2015

Core Course 2EChemistry
MSEV.2 : TRANSITION ELEMENTS, COORDINATION COMPOUNDS AND CHEMICAL KINETICS

Credits: 4 (3L+ 0T +1P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
- To develop an understanding of Principles of Chemical Kinetics and Surface Chemistry.
- To explain the properties of d and f block elements and their compounds in terms of their electronic configuration and bonding.
- To understand the properties of coordination compounds in terms of bonding theories.

COURSE CONTENT:

Unit 1: d-block and f-block elements
To relate the electronic configuration to the properties and structure of transition metals and their compounds. Characteristic properties of d-block elements.
Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.
Chemistry of Elements of Second and Third Transition Series
General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry. Powder metallurgy in extraction of tungsten. Position of lanthanides and actinides in the periodic table, lanthanide contraction and its consequences, spectral and magnetic properties of lanthanides, separation of lanthanides and actinides. General properties of actinides: Extraction of Thorium, Uranium and Plutonium from burnt nuclear fuels.

Unit II: Coordination Compounds
To apply theories that explain certain properties and structure of transition metal complexes. Werner’s coordination theory and its experimental verification, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes. Limitations of VBT. Elementary treatment of crystal field theory, splitting of d-orbitals in square planar, tetrahedral and octahedral complexes, factors affecting crystal field parameters, Explanation of magnetic behavior and color of complexes using CFT, effective atomic number concept. Metal carbonyl, 18 electron rule. Preparation, structure and reactions of Ni(CO)₄, Fe(CO)₅ and V(CO)₆, nature of bonding in metal carbynlets.

Unit III: Chemical Kinetics
Understanding the factors that influence a chemical reaction and rationalising them on the basis of known theories of reaction rates. Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction in concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions in zero order, first order, second order, pseudo order, half life and mean life. Determination of the order of reaction in differential method, method of integration, method of half-life period and isolation method. Radioactive decay as a first order phenomenon. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy, Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects.

Unit IV: Surface Phenomena
Adsorption: Introduction-Absorption and adsorption(definition, examples and differences) types of adsorptions-physical and chemical(definition, examples and differences between them), factors influencing the adsorption of gases on solids. Adsorption isotherms: definition, Mathematical expression for Freundlich and Langmuir's adsorption isotherms. applications of adsorptions.

Catalysis: Definition, general characteristics, action of catalytic promoters and inhibitors. Homogeneous catalysis (definition and examples), Heterogeneous catalysis(definition and examples) mechanism of heterogeneous catalysis(based on adsorption theory) enzyme catalysis (definition and examples) Mechanism of enzyme catalysed reaction(lock and key mechanism)

References:
1. Inorganic Chemistry : James Huhey
2. Essentials of physical chemistry Arun Bahl,B.S. Bahl,G.D. Tuli
PRACTICAL

Exam Duration : 3 hrs

Objectives:

- To understand the kinetics of chemical reactions
- To familiarise with the analysis of ores
- To prepare and analyse inorganic complexes
- To study the adsorption phenomena

COURSE CONTENT:

1. Iodination of Acetone by titration and Colorimetry.
2. Acid Hydrolysis of Ester
3. Reaction between Potassium Peroxydisulphate and Potassium Iodide.
4. Base Hydrolysis of an Ester by Titration and Conductometry
5. Iodine clock reaction
6. Solvolysis of Tertiary Butyl Chloride by Titrimetry, conductometry and pH metry
7. Inversion of Cane Sugar
8. Colorimetric study of kinetics of oxidation of Indigo carmine by Chloromine-T.
9. To study the adsorption of acetic acid on activated charcoal
10. To determine the relative strength of Hydrochloric acid and sulphuric acid by studying the kinetics of hydrolysis of ethyl acetate.
11. To study kinetically the reaction rate of decomposition of iodine by hydrogen peroxide.
12. Determination of Copper by colorimetric method using ammonia as the complexing agent.
13. Determination of Ferric ion by colorimetric method using potassium thiocyanate as the complexing agent.
14. Estimation of Manganese in pyrolusite by volumetric method
15. Preparation of a complex: potassium trioxalato aluminate(III) trihydrate or potassium trioxalato cobaltate(III)
16. To determine the rate constant for the inversion of sucrose using polarimeter.

References:
1. Advanced practical inorganic chemistry by Gurdeep Raj, Goel Publication House, Meerut-India.
Core Course 3E : Mathematics

MSEV.3 : MULTIVARIATE CALCULUS & VECTOR CALCULUS

Credits: 4 (3L+ 1T +0P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
To enable the students to understand the concepts of multi-variate calculus and vector calculus, and also to compute the areas of plain regions, surfaces and volume of solids.

COURSE CONTENT:

Unit I:
Definition of a line integral and basic properties, Evaluation of line integrals, Definition of double integral, Conversion to iterated integrals, Evaluation of Double integral, change of variables, Surface areas. Definition of a triple integral, Evaluation, Volume as a Triple integral.

Unit II:
Improper integrals of the first and second kinds, Convergence, Gamma and Beta functions, Connection between Beta and Gamma functions, Application to Evaluation of Integrals, Duplication formula, Sterling formula.

Unit III:
Quadratic Curves, surfaces, sphere, cylinder, cone, Ellipsoid, Hyperbloid, Parabloid, Ruled surfaces.

Unit IV:

References
2. First Course in Calculus by Serge Lang
3. Calculus ñ Single and Multivariable by Hughes Hallet
4. Calculus and analytic geometry by Thomas and Finny.
5. Advanced Calculus by David Widder
PROFESSIONAL EDUCATION COURSES

MSEV.4 : ASSESSMENT OF LEARNING

Credits: 4 (3L+ 1T +0P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
This course is designed to help student teachers to:
* Understand the nature of assessment and evaluation and their role in teaching-learning process.
* Understand the importance of assessment in continuous and comprehensive manner
* Plan assessment tasks, techniques, strategies and tools to assess learner’s competence and performance in curricular and co-curricular areas,
* Devise marking, scoring and grading procedures,
* Analyse, manage and interpret assessment data.
* Devise ways of reporting on student performance
* Develop the skills of reflecting-on and self-critiquing to improve performance.

COURSE CONTENT:

Unit I: Introduction to Assessment & Evaluation

(a) Concept of test, measurement, Assessment, examination, appraisal and evaluation in education and their inter relationships.
(b) Purpose and objectives of assessment/ Evaluation- for placement, providing feedbacks, grading promotion, certification, diagnostic of learning difficulties.
(c) Importance of assessment & evaluation for Quality Education – as a tool in Pedagogic decision making (writing instructional objectives, selection of content, teaching learning resources, methodology, strategies & assessment procedures followed).
(d) Forms of assessment : -
   (i) (Formative, Summative, diagnostic; prognostic, placement; Norm referenced; Criterion referenced based on purpose)
   (ii) (Teacher made tests Standardized tests: based on nature & scope)
   (iii) (Oral, written, performance: based on mode of response)
   (iv) (Internal, External, self, peer, & teacher, group Vs individual- based on context)
   (v) Based on nature of information gathered (Quantitative, Qualitative)
   (vi) CCE, school based assessment ; Standard Based- based on Approach
(e) Recent trends in assessment and evaluations:
   - Assessment for learning, assessment of learning and assessment as learning; Relationship with formative and summative, Authentic assessment.
   - Achievement surveys- State, National and International; Online assessment; On demand assessment/ evaluation.
   - Focus on Assessment and Evaluation in Various Educational commissions and NCFs
Unit II: Developing Assessment Tools, Techniques and Strategies -I

(a) Concept of Cognitive, Affective, Psychomotor domain of learning
(b) Relationship between educational objectives, learning experiences and evaluation.
(c) Revised taxonomy of objectives (2001) and its implications for assessment and stating the objectives-
   - Knowledge dimensions: factual, conceptual, procedural and meta-cognition.
   - Cognitive, Affective, Psychomotor domains Classification of objectives
(d) Stating objectives as learning out comes: General, Specific.
(f) Construction of achievement tests- steps, procedure and uses (Teacher made test/Unit Tests)
   - Constructing table of specifications & writing different forms of questions (VSA, SA, ET & objective type, situation based) with their merits and demerits; assembling the test, preparing instructions, scoring key and marking scheme; and question wise analysis
(g) Construction of diagnostic test Steps, uses & limitation; Remedial measures- need types and strategies
(h) Quality assurance in tools Reliability: Meaning &Different methods of estimating reliability (Test-retest; equivalent forms, split- half); Validity: Meaning &Different methods of estimating reliability (Face, content, construct), Objectivity and Practicability/ Usability
(i) Inter dependence of validity, reliability and objectivity

Unit III: Developing Assessment Tools, Techniques and Strategies -II

(a) Concept of CCE, need for CCE its importance; relationship with formative assessment and problems reported by teachers and students
(b) Meaning & construction of process-oriented tools- Interview; Inventory; oMServation schedule; check-list; rating scale; anecdotal record;
(c) Assessment of group processes-Nature of group dynamics; Socio-metric techniques; steps for formation of groups, criteria for assessing tasks; Criteria for assessment of social skills in collaborative or cooperative learning situations.
(d) Promoting Self assessment and Peer assessment concepts and criteria
(e) Portfolio assessment meaning, scope & uses; developing & assessing portfolio; development of Rubrics

Unit IV: Analysis, Interpretation, Reporting and Communicating of student’s performance

a) Interpreting student’s performance
   (i) Descriptive statistics (measures of central tendency & measures of variability, percentages, rank correlation)
   (ii) Graphical representation (Histogram, Frequency Curves)
(b) Grading Meaning, types, and its uses
(c) Norms Meaning, types, and its uses
(d) Reporting student’s performance Progress reports, cumulative records, profiles and their uses, Portfolios, Using descriptive Indicators in report cards
(e) Role of feedback to stake holders (Students, Parents, Teachers) and to improve teaching learning process; Identifying the strengths & weakness of learners.
Sessional Works
1. Discussion on existing assessment practices in schools and submitting the report.
2. Constructing a table of specification on a specific topic (subject specific)
3. Constructing a unit test using table of specifications and administering it to target group and interpreting the result.
4. Construction of any one of the process oriented tools and administering it to group of students & interpreting it.
5. Analysis of question papers: teacher made and various Boards
6. Analysis of report cards - State and Central (CMSE)
7. Analysis of various education commission reports and NCFs for knowing various recommendations on Assessment and Evaluation

References:
6. NCERT (2015) CCE Packages, New Delhi
14. VedPrakash, et.al. (2000): Grading in schools, NCERT, Published at the publication Division by the secretary, NCERT, Sri AurobindoMarg, New Delhi
Learning.


Web Resources

1. Assessment in school education, (2013)  
2. Compendium of Tools, (2013), CMSE  
5. www.ncert.nic.in

MSEV.5 : Pedagogy of Physical Science 1

Credits: 4 (2L+ 2T +0P)  
Marks: 100
Contact hrs per week: 6  
C1 + C2: 50
Exam Duration: 2 hrs  
C3: 50

Objectives:

Student teachers will be able to
- Explain the nature of science.
- Specify the goals and objectives of science teaching.
- Review the contributions of major scientists.
- Explore several methods of teaching science.
- Apply various theories science learning and analyze the implications for teaching science.
- Review the science curriculum, syllabus, and text books.
- Explore constructivist practices in teaching of science.
- Create unit plans, lesson plans in an artistic and scientific way.
- Explore the inter-relation between science and other subjects.

COURSE CONTENT:

Unit I: Nature of Science
Nature and scope of science -Scientific method, how science works.  
Science as a process and product. Science as a way of thinking: inquiry, observation, problem-solving, rational thinking, reasoning, science as an empirical body of knowledge.  
Structure of knowledge: facts, concepts, principles, generalizations, theories.
Historical development of physical science with illustrations from topics such as structure of atoms, laws of chemical combinations, stoichiometry, equivalent mass, models of the universe, nature of light, electricity and magnetism etc.

Contributions of Indian and international figures in science to the knowledge domain of physical science.

Basic branches of physical science and applications of physical science to human life. Evolution of Physical Science as a knowledge field; science and technology; science and society;

Correlation between science and other subjects, role of science teacher.

**Unit II:**

a. **Aims and learning objectives of Physical Science**
   Aims of teaching physical science in the school curriculum.
   Development of process skills of science, scientific attitude and temper by learning Physics and Chemistry as experimental sciences.
   Nurturing curiosity, creativity and aesthetic sense.
   Science and society relating physical science with the natural and social environment and technologies relating science to daily life.
   Values through science teaching-open mindedness, objectivity, truthfulness, critical thinking, logical thinking, development of problem solving skill, social learning.
   Ethics of using the knowledge of science and technology.

b. **Physical Science Curriculum**
   Recommendations of major commissions in India and policies on science teaching.
   The school science curriculum with regard to NCF 2005: major themes in secondary school science.
   Brief study of famous curricular reform projects such as Nuffield, STEM, PSSC, Chemical Bond Approach, CHEMSTUDY etc.
   Comparison of international secondary schools science syllabus- Singapore, Oxford, CIE (Cambridge).

**Unit III: Pedagogical shift, Approaches and Strategies of learning Physical Science**
Role of prior knowledge in constructing new knowledge (Ausubel), Piaget’s theories of learning (schema- disequilibrium).
Development of concepts in Science- Real-life as the basis of conceptions; personal vs. verified knowledge of science. Conceptions, alternate concepts, and misconceptions in science, naïve concepts.
Teaching concepts and generalizations: inductive approaches, using advance organizers, problem solving approach, investigatory approach, project method, cooperative learning method.
Vygotsky’s theories of role of language and context in learning.
Van Glaserfeld’s theory. Development of constructivist practices in science teaching, 5E learning model, 7E model, conceptual change model of teaching, challenges in using constructivism in the classroom.
Approaches in teaching Science: Cooperative and Collaborative learning approach, problem solving approach, concept mapping, experiential learning, cognitive conflict, inquiry approach, analogy strategy.

Facilitating learning: Teacher’s role as a facilitator, grouping students, multiple learning experiences, discussing and negotiating ideas, scaffolding, consolidating students’ ideas, questioning-techniques and strategies, higher order and metacognitive questioning.

Maintaining positive learning environment.

Catering to children with varied needs and abilities.

Scope and importance inclusiveness in science classroom.

Gender and Science

Role of learner: each learner as unique individual, involving learner in learning process, role of learner in negotiating and mediating learning, encouraging learner to raise and ask questions.

Unit IV: Planning for Physical Science Teaching-learning

Importance of planning, unit plan and lesson plan.

Anderson and Krathwohl’s revised Bloom’s taxonomy: knowledge domains and cognitive processes, action words. Types of knowledge-factual, conceptual, procedural and metacognitive knowledge.

Identification and organization of concepts.

Elements of physical science lesson plan: learning Objectives, introduction, development, assessment, extended learning, assignment.

Designing learning experiences, pre-existing knowledge, selecting approach/strategy, arrangement of teaching learning materials, group learning, formation of groups, organizing activities.

Planning the lesson by using ICT applications and laboratory materials.

Reflective planning; unit plan; developing lesson plans on different topics and through various approaches taking examples form upper primary, secondary and higher secondary stage (physical and chemical changes, redox reaction, light, magnetic effect of electric current, etc.).

Important skills required to teach in Constructive mode.

Sessional Activities:

- Presentation on historical development of science concepts with a view to understand the nature of science.
  - Pedagogical analysis (units for pedagogic analysis: any unit from VIII, IX or X physical science textbook).
  - Drawing concept-maps for secondary level concepts.
  - Presentation on the contributions of Physicists and Chemists to physical science.
  - Readings on curriculum initiatives in secondary science with a special reference to NCF 2005.
  - Comparison of different science curricula.
- Lab demonstration/exploration of science experiments.
- Exploring common mis-concepts in Physical Science by observing science classes or interviewing science teachers or using VIII and IX textbooks.
- Stating learning objectives for teaching a topic in science.
- Demonstration of different methods of teaching of Physical Science.
• Experimentation of different methods of teaching of Physical Science.

Practicum on teaching skills in integrated and Constructivist form to be carried out in the Block hours allotted.

References:
7. State Textbook in Physics and Chemistry for classes VIII, IX and X.
15. Physics Teacher, American Association of Physics Teachers, Department of Physics and Astronomy, University of Maryland, College Park, MO 20742.
MSEV.6 : Pedagogy of Mathematics 1

Credits: 4 (2L+ 2T +0P)  Marks: 100
Contact hrs per week: 6  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
On completion of the course the students will have
* understanding of nature of mathematics and its branches
* ability to analyse the relationship of mathematics within itself and with other subjects
* ability to categories mathematical knowledge into factual, conceptual, procedural and meta cognitive knowledge
* Appreciates the contributions made by Indian and other country mathematicians contribution
* ability to apply logical reasoning and problem solving ability in solving various mathematical problems

COURSE CONTENT:

Unit I: Knowledge about Mathematics
Nature of mathematics- abstractness, preciseness, brevity, language and symbolism; Nature of mathematical propositions; Quantifiers- necessary and sufficient conditions(one and two way); structure of mathematics- undefined terms, defined terms, definitions, axioms, postulates and theorem; mathematical theorem and its variants- converse, inverse and contrapositive; Pure and Applied mathematics; branches of mathematics- Arithmetic, algebra, geometry and their diversities; mathematization through observation, conjecturing, hypothesing, testing and verifying; creation of conceptual knowledge and its importance; creation of procedural knowledge- derivation of laws/ theorems/ generalizations in mathematics; relationship of mathematics among different branches of science; relationship within and among branches of mathematics; Contribution of Indian and other Mathematician- Aryabhatta, Bhaskara, Ramanujum, Guass, Euclid, Descarte, Cantor, Pythagorous; Organization of Mathematical content- horizontal and vertical linkage (within and between classes IX and X); linkage between upper primary, secondary and senior secondary mathematics.

Unit II: Aims and objectives of teaching Mathematics
Aims of mathematics- Cultural, disciplinary, moral, social and utilitarian aims; General objectives of teaching mathematics Vis-a-Vis the objectives of secondary education; Major shifts in classroom teaching (societal and technological influence); characteristics of a good instructional objectives; Writing specific objectives of different content categories in mathematics; Contribution of Indian and other Mathematician- Aryabhatta, Bhaskara, Ramanujum, Guass, Euclid, Descarte, Cantor, Pythagorous; Organization of Mathematical content- horizontal and vertical linkage (within and between classes IX and X); linkage between upper primary, secondary and senior secondary mathematics.

Unit III: Strategies for learning mathematical concepts
Nature of concepts, types of concept, process of concept formation; Moves in teaching concepts- a) Exemplar moves- giving examples and non-examples (with or without
reasoning); comparing and contrasting; giving counter example b) Characterization move-definition, stating necessary and/or sufficient condition; concept Attainment Model (Bruner); Advance Organizer Model (Ausubel); Planning and implementation of strategies for teaching various mathematical concepts(secondary level maths)

Important skills required to teach in Constructivist mode.

**Unit IV: Teaching of Generalization**

Teaching by exposition- Moves in teaching generalization:- Introductory move, focus move, objective move, motivation move, assertion move, application move, interpretation move, justification move; Planning for expository strategies of teaching generalization.

Teaching by guided discovery- nature and purpose of learning by- discovery, inductive, deductive, guided discovery strategies; maxims for planning and conducting discovery strategies; planning strategies involving either induction or deduction or both.

**Sessional work:**

Analysis of secondary level mathematics text books to identify various categories of mathematical knowledge presented and its horizontal and vertical linkage among 8, 9 and 10 standard text books.

Analysing the structure of mathematics present in selected chapter/unit.

Writing a unit plan for selected unit

Writing of specific instructional objectives for selected unit

Writing a lesson plan on selected content area

Writing a plan for teaching a concept of a generalization using the appropriate moves to teach them.

Practicum on teaching skills in integrated and constructivist form to be carried out and in block hours allotted.

**References:**

3. Focus Group Report (2005), Teaching of Mathematics, New Delhi, NCERT
4. Iglewicz, Boris and Stoyle, Judith (1973), An Introduction to Mathematical Reasoning, New York, the McMillan company
6. NCERT, A textbook of Content-Cum-Methodology of Teaching Mathematics, New Delhi, NCERT
7. NCERT(2012), Pedagogy of Mathematics- textbook for Two year B.Ed course, New Delhi
8. Polya george (1957), How to solve it, Garden city, New York, Doubleday
10. Servas W and T varga, Teaching school Mathematics- UNESCO source book
MSE V.7 : School Attachment Programme - 3

Credits : 2
Duration : 2 weeks
Marks: *100
C1 + C2:50
C3: 50

Objectives:
The student teachers will
• Understand learners coming from diverse backgrounds
• Analyze the availability of physical and learning facilities which function as the curriculum resources at secondary level.
• Analyze the relevance of principles of curriculum organization and transaction to actual implementation process of curriculum in schools

Course Content
The student teachers will perform the activities listed below and prepare reflective diary and the reports on the tasks performed separately level wise. They will present their reports in the seminar organized after the completion of school attachment programme.

During this phase student teachers are expected to begin developing their own understanding about facilities available in school, learners and their learning context, curriculum transactions in school. Student teachers gain understanding being into actual school environment by observation, gathering information and interaction with students, teachers and school Head.

The following tasks centered on school, learner contexts and teacher context are suggested to be carried out by student teachers in this phase.
• Analyze how the curriculum proposed at the national /state levels are translated into classroom practices by observing teacher’s classes of any one subject
• Identity the resources and facilities used by the teacher for teaching a lesson and interact with teacher to identify the resource mobilization.
• Study of the availability of facilities and resources catering to curriculum transaction at upper primary and secondary levels - labs, library, activity rooms, learning resources, art and craft resources and resources for physical education and yoga
• Study of the facilities and scope for inclusiveness in school environment
• Observation of classes to understand the learning processes; Study the learners coming from diverse backgrounds and their interaction in classrooms - social context of learners; Individual differences; learning facilities for Inclusive children
• Observation of learners in various contexts (participation in school activities, play ground, lunch time, participatory role in school functioning, maintenance of class room and school surroundings, responsibilities taken in various club activities etc.)

Records to be submitted for assessment
• Report on the analysis of school and the class room practices in realizing the curricular expectations evolved at national/state level.
• Report on availability and utility of resources in school.
• Report on learners diversities.

Evaluation:* All assessments are internal
• C1 ï Report 1
• C2 ï Report 2
SIXTH SEMESTER

Core Course 1F: Physics

MSEV1.1: CLASSICAL & QUANTUM MECHANICS AND SPECIAL THEORY OF RELATIVITY

Credits: 4 (3L + 0T + 1P)
Contact hrs per week: 5
Exam Duration: 2 hrs

Marks: 100
C1 + C2: 50
C3: 50

Objectives: To enable students to understand the essentials of classical mechanics, quantum mechanics, quantum statistics and relativity.

COURSE CONTENT:

Unit I: Lagrangian formulations of Classical Mechanics

Unit II: Special Theory of Relativity

Unit III: Origin of Quantum Theory
Qualitative discussions on inadequacies of Classical Physics - black body radiation and photoelectric effect, Planck's hypothesis and explanation of black body radiation, Einstein's explanation of photoelectric effect with derivation. Wave-particle duality, de Broglie's hypothesis of matter waves, concept of group velocity and phase velocity and their relationship, experimental evidence for matter waves- Davisson and Germer experiment, electron diffraction experiment. Uncertainty Principle.

Unit IV: Development and application of Schrodinger Equation
Wave function, interpretation of wave function, postulates of quantum mechanics, probability density, Eigen functions and eigen values, expectation values, Normalization of wave functions, development of time dependent and time independent Schrodinger wave equation,
operator method of deriving Schrodinger equation. Applications of Schrodinger wave equation (one dimensional infinite potential well, finite potential well, phenomenon of tunneling, one dimensional harmonic oscillator, hydrogen atom (only qualitative discussion).

**Reference Books:**
12. C. Reed, Quantum Mechanics, Jones and Bartlett Learning, 2008.

**PRACTICALS**

**Exam Duration:** 3 hrs  
**C3: 50 Marks**

**Objectives:**
- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

**COURSE CONTENT:**
(A minimum of TEN experiments to be selected from the following)
1. Stefan’s constant.
2. Planck’s constant using LED (3no.s).
3. Absorption spectra.
4. Photoelectric effect.
5. Variation of resistance with temperature of copper wire (10 mts).
7. Laser-wavelength using transmission grating.
8. Photo conductivity using LDR.
11. BG Absolute Capacity.
12. BG-High resistance by leakage method.
13. BG Mutual inductance.
14. e/m of electron.
15. Verification of inverse square law for light using photodiode.

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Reference Books:
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.

Core Course 2FChemistry

MSEVI.2 : ORGANIC CHEMISTRY – II

Credits: 4 (3L+ 0T + 1P)  
Marks: 100
Contact hrs per week: 5  
C1 + C2: 50
Exam Duration: 2 hrs  
C3: 50

Objectives:
To develop an understanding of the chemistry of Functional groups and mechanism of Organic Reactions.

COURSE CONTENT:

Unit I: Alcohols and Phenols
Dihydric alcohols: Nomenclature, methods of formation (from alkenes and alkyl dihalides), chemical reactions of vicinal glycols-oxidative cleavage [Pb(OAc)₄ and HIO₄] and Pinacol-pinacolone rearrangement.
Trihydric alcohols: Nomenclature and methods of formation (from alkenes and alkenals), chemical reactions of glycerol (with nitric acid, oxalic acid and HI).
Phenols: Nomenclature, structure and bonding, Preparation of phenol, resorcinol and 1 and 2-naphthols (one method each). Physical properties and acidic character of phenol. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide.

**Unit II: Carbonyl Compounds**

**Aldehydes and Ketones**

**Carboxylic Acids and their Derivatives**

Unsaturated monocarboxylic acids: Methods of formation and chemical reactions
Dicarboxylic acids: Methods of formation and effect of heat and dehydrating agents.
Carboxylic acid derivatives: Structure and nomenclature of acid chlorides, esters, amides and acid anhydrides. Preparation of carboxylic acid derivatives, chemical reactions. Mechanism of esterification and hydrolysis (acid, base conditions).

**Unit III: Organic synthesis via Carbanions**
Synthesis of ethyl acetoacetate by Claisen condensation and diethyl malonate. Acidity of Úi hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthetic applications of malonic ester: dicarboxylic acids ß succinic acid and adipic acid; Úb i unsaturated acids ß crotonic acid and cinnamic acid; barbituric acid.
Synthetic applications of acetoacetic ester: dicarboxylic acids ß succinic acid and adipic acid; Ú ß ß unsaturated acids ß crotonic acid and cinnamic acid; antipyrine, uracil and acetyl acetone. keto-enol tautomerism of ethyl acetoacetate. Alkylation of 1,3-dithianes, Alkylation and acylation of enamines.

**Unit IV: Organic Compounds of Nitrogen**
**Nitro Compounds:** Introduction, Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media. Picric acid.
**Aliphatic and Aromatic amines:** Structure and nomenclature of amines, Preparation of alkyl and aryl amines (reduction of nitro compounds, nitrites), reductive amination of aldehyde and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamide reaction. Reactivity, physical properties, stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines (Hinsberg method). Structural features effecting
basicity of amines. Amine salts as phase transfer catalysts. Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Synthetic transformations of aryl diazonium salts and azo coupling.

References:
1. Advanced organic chemistry Arun Bahl and B.S. Bhal

PRACTICAL

Exam Duration : 3 hrs C3 : 50

Objective:
- To develop basic skills of separation of organic compounds and evolve a scheme of analysis of organic compounds based on properties of functional groups for identification
- To develop skills of separation techniques

COURSE CONTENT:

1. Qualitative organic analysis
   1. Separation of organic mixtures containing two solid components using water, NaHCO₃, NaOH

   2. Analysis of an organic compound: Detection of extra elements (N,S and X) and functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, alcohols, amines, amides, nitro and anilides) in simple organic compounds. Identification of organic compound based on functional group analysis, determination of physical constant (mp / bp).

2. Chromatographic Techniques

   (i) Thin Layer Chromatography
   (a) Determination of Rf values and identification of organic compounds:
   (b) Identification of plant pigments by thin layer chromatography
   (c) Preparation and separation of 2,4-dinitrophenylhydrazones of acetone / 2-butanone
      Using toluene : light petroleum (2:3 ratio)
   (d) Separation of mixture of dyes

   (ii) Paper Chromatography
   Determination of Rf values and identification of organic compounds:
   (a) Separation of mixture of amino acids
   (b) Separation of mixture of D-galactose and D-fructose using n-butanol:acetic acid:water 4:5:1 ; Spray reagent: anilinehydrogenphthalate
(iii) **Column Chromatography**
Separation and identification of ortho and para nitro anilines

**References:**
1. A Text Book of Qualitative Organic Analysis, A I Vogel
2. A Text Book of Quantitative Organic Analysis, A I Vogel

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**Core Course 3F Mathematics**

**MSEVI.3 : GROUPS AND RINGS**

Credits: 4 (3L+ 1T +0P)  
Marks: 100

Contact hrs per week: 5  
C1 + C2: 50

Exam Duration: 2 hrs  
C3: 50

**Objectives:**
By the end of the semester the students will be able to develop understanding of the abstract concepts of groups and rings, and special classes of rings and to appreciate modern mathematical concepts.

**COURSE CONTENT:**

**Unit I:**  
Groups, Examples, Properties and types, Sub-groups. Cyclic groups and properties, Cosets, Lagrange’s theorem and its Consequences, Dihedral groups, Normal subgroups, Quotient groups.

**Unit II:**  
Homomorphism and Isomorphism of groups, Kernel of a Homomorphism, Fundamental theorem of Homomorphism, Cauchy’s theorem for abelian groups, Permutation group, Alternating Group, Cayley’s Theorem.

**Unit III:**  
Rings, Integral Domains, Division Rings, Fields, Properties, Field of quotients. Ideals, Quotient rings Maximal, Prime and Principal ideals, Principal ideal ring, Divisibility in an Integral domain, Units and Associates.

**Unit IV:**  
Homomorphism of a ring, Kernel, Isomorphism, Fundamental theorem of Homomorphism, Polynomial rings, Divisibility, Irreducible polynomials, Division Algorithm, Greatest Common Divisor, Euclidean Algorithm, Unique Factorisation Theorem, Eisenstein’s Criterion of irreducibility.

**References:**
1. Topics in Algebra by Herstein, Vikas.
2. A First Course in Abstract Algebra by Fraleigh, Addison-Wesley.
9. A Brief Survey of Modern Algebra by Birkhoff and Maclane, IBH.

PROFESSIONAL EDUCATION COURSES

MSEVI.4 : CRITICAL UNDERSTANDING OF ICT

Credits: 4 (3L+ 0T +1P)   Marks: 100
Contact hrs per week: 5   C1 + C2: 50
Exam Duration: 2 hrs   C3: 50

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

- Appreciate the historical, current and future trends in ICT and its implications to education
- Explain the meaning of ICT and its application in Education
- Demonstrate an understanding of the computer hardware and software fundamentals
- Use various digital hardware and software for creating resources and providing learning experiences
- Use a word processor, spread sheet, drawing and presentation software skilfully and intelligently to produce various teaching learning resources for educational use
- Use internet technologies efficiently to access remote information, communicate and collaborate with others
- Model collaborative knowledge construction using various web 2.0 tools and technologies
- Design and develop technology integrated learning experiences using ICT tools
- Develop skills in using various e-learning and e-content tools and technologies
- Plan, develop, and use multimedia based learning content using open source authoring software
- Use ICT for designing learning experiences using innovative pedagogical approaches
- Explain the role of ICT in authentic and alternative assessment
- Understand the social, economic, security and ethical issues associated with the use of ICT
- Appreciate the scope of ICT for improving the personal productivity and professional competencies
- Appreciate the use ICT in improving educational administration
- Explain the emerging trends in information and communication technology
COURSE CONTENT:

Unit I: ICT and Education
Historical account of the development of various educational media (audio, print, video, storage, display, projection)
Role of technology in emerging pedagogical practices. Visual literacy, media literacy, and new media literacy
Computer hardware fundamentals, computer network-LAN, WAN and Internet. Software meaning and types: proprietary software and open source software, System software and application software
Emerging Trends in ICT and its educational applications: Augmented reality, e-books and rhizomatic learning, learning analytics, ubiquitous computing and mobile learning, Game based learning, cloud computing and software as service, 3D printing, and marker space

Unit II: e-content and e-resources
Educational applications of word processing, spreadsheet, presentation, and drawing tools diagrams, concept maps, timelines, flow charts.
Reusable Learning Objects (RLO), e-content standards, authoring tools- open source and proprietary alternatives
Multimedia: meaning and types, multimedia tools-audio editing, video editing, screen casting, graphic editing, basics of animation, and creating interactive media. Evaluation of multimedia resources.
Open Educational Resources Meaning and importance, various OER initiatives, creative common licensing
Locating internet resources browsing, navigating, searching, selecting, evaluating, saving and bookmarking
Use of digital still and video camera, digital sound recorder, scanner, printer, interactive white board, visualizer, and multimedia projector for creating and using multimedia resources

Unit III: ICT and Pedagogy
Techno pedagogical content knowledge (TPCK). Approaches to integrating ICT in teaching and learning
Web 2.0 tools for creating, sharing, collaborating, and networking: Social networking, social book marking, blog, wiki, instant messaging, online forums/discussion groups and chats, and media streaming.
E-learning: concept, types, characteristics, e-learning tools and technologies, Learning Management Systems (LMS)
Subject specific ICT tools for creating and facilitating learning. Designing technology integrated authentic learning designs and experiences
ICI integrated Unit plan Web 2.0 for creating constructivist learning environment
Technology for pedagogical innovations: web quest, PBL, virtual tours, MOOC, flipped classroom
Assistive technology for special needs and inclusion: tools and processes, ICT and Universal design for Learning (UDL)

Unit IV: ICT for Assessment, Management, and professional development
ICT and Assessment: e-portfolio, electronic rubrics, online and offline assessment tools
rubrics, survey tools, puzzle makers, test generators, reflective journal, and question bank. Use of web 2.0 tools for assessment,

ICT for professional development - tools and opportunities: electronic teaching portfolio, web 2.0 technologies, technology and design based research, ICT for self-directed professional development, web conferencing, role of OER and MOOCs.

ICT for personal management: email, task, events, diary, networking. ICT for educational administration: scheduling, record keeping, student information, electronic grade book, connecting with parents and community, school management systems.

Managing the ICT infrastructure: software installation, troubleshooting of hardware, seeking and providing help, storage and backup, updating and upgrading software.

Computer security: privacy, hacking, virus, spy ware, misuse, abuse, antivirus, firewall, and safe practices, fare use and piracy.

**Sessional Work**

1. Hands on experience in setting up a desktop PC and working with various input devices, output devices, storage devices, and display devices.
2. Using word processor, spread sheet, drawing and presentation software to produce various teaching learning resources and sharing it online.
3. Locating internet resources – navigating, searching, selecting, saving, evaluating (use standard internet evaluation criteria), and bookmarking using social bookmarking.
4. Creating digital concept maps, flow charts, timelines, and other graphics for a particular content.
5. Creating screen cast video and podcast of a lesson.
6. Shooting, editing, and sharing of videos segment on any educational topic.
7. Creating account in YouTube/slide share and sharing the video/presentation. View and comment on others contributions.
8. Creating account in wikispace/wikipedia/mediawiki and adding/editing content.
9. Developing an educational blog in [www.blogger.com](http://www.blogger.com), [www.wordpress.com](http://www.wordpress.com), or [www.edublog.com](http://www.edublog.com)
10. LMS experience- hands on various features of LMS – the ICT course may be provided through LMS.
11. Enrolling and completing some MOOC courses of interest.
12. Creating resources for flipped classroom and Practicing flipped learning in school during internship.
13. Evaluating OER resources. Creating and sharing OER materials- may be in NROER.
14. Developing technology integrated unit/lesson plan and trying out this in the school during internship.
15. Hands on experience on subject specific software tools like Geogebra, PhET.
17. Field visit to the Eduusat center and take part in teleconferencing.
18. Planning and creating digital rubrics for any topic and create an e-portfolio.
19. Organize web conferencing using Skype or any other tools.
20. Review of ICT labs (plans and equipments/resources) in school from internet.
21. Interview of computer hardware engineer/ICT specialist regarding Hardware planning, evaluation, maintenance and up gradation.
22. Readings on emerging ICT trends in education.
24. Using FOSS tools for timetabling, grade sheet.
References:
MSEVI.5: PEDAGOGY OF PHYSICAL SCIENCE 2

Credits: 4 (2L+ 2T +0P)  
Marks: 100  
Contact hrs per week: 6  
Exam Duration: 2 hrs  
C1 + C2: 50  
C3: 50

Objectives
- Enable the students to write the unit plans and lesson plan as per the norms of NCF 2005.
- Applying the different teaching methods based on a constructivist point of view.
- Enable the students to observe the lesson systematically.
- Selecting the learning resource and effective use of the same.
- Using of ICT in physical science teaching and learning.
- Explore various assessment strategies for evaluating learning in Physical science.
- Explore various professional development opportunities.
- Plan and conduct action research in secondary schools.
- Identify various teaching- learning resources.
- Develop skills of facilitation as they teach in simulated situations.
- Reflecting the methods in the class.

COURSE CONTENT:

Unit I: Learning Resources in Physical Science
Print resources: Textbook as a learning resource, criteria for evaluation of a textbook, handbooks, teacher resource books, laboratory manuals, science journals and magazines, encyclopedia, newspaper. Dale’s cone of experience and its use in teaching-learning. Developing and using resources such as charts, models, science kits, posters, science parks. Science laboratories: designing, management, and safe practices. Making low-cost equipment from locally available resources, using the immediate environment and the community resources for teaching of physical science. Exploring and using digital resources: websites, videos, games, simulations, mobile apps, presentations, OER, interactive multimedia resources, e-books, podcasts, digital concept maps, and digital graphics. ICT integration in physical science teaching: different forms of ICT and its application in science education.

Unit II: Need and Importance of Assessment for Learning Physical Science
Learning standards in science, process and product assessment in Physical Sciences, importance of metacognition and reflection in assessment, importance feedback in facilitating learning. Meaning of the terms test, examination, measurement, assessment and evaluation in proper context, Continuous and Comprehensive Evaluation (CCE) and its features.
Assessment and evaluation as intertwined process of classroom experiences performance based assessment, planning assessment framework, Learning Indicators (Lis) and its types, developing LIs for activity, presentation, group work, assignments etc. Recording and reporting of learning evidences – measurement of students’ achievement – marks and grading.

**Unit III: Tools and Techniques Assessment for Learning Physical Science**
Tools and technique of assessment-- assessment of written and oral work, project work, laboratory work, field trips, journal writing, concept map; assessment of learners with special needs.
Use of observation, questioning, concept mapping, rating scales, worksheets, reflective journals/diary, peer and self-assessment in physical science.
Use of rubrics, and portfolio assessment in Physical Science, diagnosing learning difficulties and misconception in Physical Science.
Use of ICT in assessment.
Constructing different types test items in Physical Science at different levels of taxonomy, preparation of blue print/table of specification and constructing unit test.

**Unit IV: Professional development of Physical Science teachers**
Professional competencies of a physical science teacher.
Need for updating content and pedagogical competencies, pre-service and in-service courses and initiatives, agencies to nurture the best teachers, NCERT activities for teachers.
Participation in science fairs, exhibitions, and science club activities
Planning contextual activities—celebration of science day, birthdays of great physicists and chemists, seminars, conferences, online sharing, distance learning, membership to organisations- NSTA, IPA, IAPT, Indian Chemical Society, INSC. NCERT publications and journals
Meaning, nature, scope, designing and implementing innovative approaches to teaching science.
Teacher as a Researcher: meaning of research and its importance, action research versus research, selecting the problem for action research, format of research plan, action research in physical sciences, steps in action research, examples of action research from the primary, secondary, and higher secondary levels.

**Sessional Activities:**
(Any TEN from the following)
- Design and development of unit test.
- Developing rubrics for laboratory work, assignment, field trip, project etc.
- Facilitating the development of digital portfolio by a couple of school students.
- Designing and implementing science lab experiments.
- Analysis of process skills and planning lessons for developing process skills.
- Identifying, selecting, and evaluating various media for chosen unit.
- Case studies of successful teacher leaders.
- Presentation and discussion on sample action research studies.
• Planning and conducting an action research.
• Debates on various ethical issues.
• Visit to a special school, observation of inclusion strategies in regular classroom.
• Development of teaching portfolio.
• Analysis of teacher competency framework of various organization.
• Study of a science professional organization.
• Review of an action research article/teaching of Physical science related research article.
• Organizing a science exhibition.
• Formation of a science club and conducting various activities.
• School visit to study the CCE practice.
• Conducting field trips to science museum, science park, botanical garden.
• Writing unit plan for at least 2 units of secondary science.
• Writing lesson plan for at least 2 topics of secondary science.
• Classroom Experience 2: Classroom observation for studying teacher’s facilitation skills and how student work is distributed (with emphasis on pedagogical aspects-strategies/materials used).
• Preparing and demonstrating low cost/improvised teaching aids based on Class VII, VIII and IX class Physical Science.
• Simulated teaching of class VII-X topics.
• Developing and analysing a Physical Science achievement test.
• Develop an assessment rubric in Physical Science.
• Visit to a Science museum / Science park /Science teacher resource centres.
• Organize a seminar related to Science day. Developing an action research plan for teaching-learning Physical Science.

References:
7. State Textbook in Physics and Chemistry for classes VIII, IX and X.
BS1 6BE, UK.

15. Physics Teacher, American Association of Physics Teachers, Department of Physics and Astronomy, University of Maryland, College Park, MO 20742.


MSEVI.6 : PEDAGOGY OF MATHEMATICS 2

Credits: 4 (2L+ 2T +0P)  Marks: 100
Contact hrs per week: 6  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
On completion of the course the students will have
* understanding of nature of teaching proof and problem solving in mathematics
* ability to analyse the purposes of teaching algebra and geometry
* ability to select suitable tools for mathematical construction and measurements
* Appreciates the usefulness of mathematics in day today activity in various fields
* adopt different strategies to meet the diversified needs of learners and appreciates the availability of various learning resources in mathematics
* Decision making ability to use appropriate assessment tools for mathematical assessment

COURSE CONTENT:

Unit I : Teaching of Proof and Teaching of Problem-solving
Meaning and nature of Proof; kinds of proof- direct, proof by mathematical induction, proof by contradiction, proof by contrapositive, proof by cases, proof by counter examples ; planning and teaching of various theorems in mathematics ( secondary level)

Problem-solving
Definition of problem, problem solving; Meaning and nature of PrOblem solving, strategies of problem solving- Means-ends analysis, backtracking, backward movement, heuristics; Polya's Problem solving steps; solving various mathematical problems

Unit II: Teaching of Algebra and Geometry
Introduction of basic ideas of algebra- variable, constant, coefficient, expression, equation; nature and purpose of teaching algebra; Contextualization of practical situation into algebraic expressions or equations(mathematization); solving various algebraic relations problems of secondary level.
Nature of geometry: purpose of teaching geometry; construction of different geometrical figures; Role of geometry in comprehending mathematics as whole; developing skills in selecting, drawing, using appropriate geometrical instruments and its utility in real life situation; scale drawing; topology and its application in mathematics.

Unit III: Meeting diverse needs of learners (Gifted and Slow learners) and Learning resources in mathematics
Gifted child in mathematics- their characteristics, identification and enrichment programmes slow learners in mathematics- their characteristics, identification and remedial measures; overcoming dyscalculia and dysgraphia problems in mathematics and their remediation.
Creation of visual aids-charts, models, graphs; usage of graphical tools- calculator, logo, cabri, geogebra, sketch pad, ready reckoners; selection and integration of tools in relation to content and learning environment; Audio-visual aids- animations, film shows; mathematics lab; mathematics club; e-resources and open and free software; community resources-library, museum, theatre, knowledgeable person or experts

Unit IV: Assessment of learning in mathematics
Selection of appropriate tools for formative and summative assessment; diagnosing the learning difficulties of learners ( Error analysis- procedural errors, conceptual errors, computational errors) and providing remedial measures ( Peer tutoring, direct instruction, mentoring); creation of rubric, portfolios, Criterion reference test, Norm referenced test based on set criteria; construction, administration, scoring, interpretation of a unit test and providing feedback to learners.
For all the Pedagogical transactions the following content knowledge (8th, 9th, 10th, 11th, and 12th standard syllabus) to be made use of, and these can be revised as per the change in curriculum of respective state or changes in CMSE syllabus or in NCERT text books.
Arithmetic: Number system, Ratio and Proportion, Fractions, Commercial mathematics and Data handling, sets, Matrices
Algebra: Polynomials, Graphical representations of various equations, trigonometry,
Geometry: Lines and angles; Triangles and its related theorems; polygons; analytical geometry,
Differential calculus; Integration, Trigonometry; graph theory; computing using ICT.

Sessional work:
Selecting any one of the theorem and teaching it by adopting the strategies of teaching proof
Selecting any one kind of problem in mathematics and demonstrate its procedure of solving
Selecting a topic in algebra or in geometry and teaching it using appropriate learning resources
Construction of unit test (administration, scoring, statistical analysis and reporting) on a selected unit
Analysing the errors committed by learners at secondary level, in regular test (FA1or FA2) and analysing its causes and suggesting various remedial measures for it
References:
3. Focus Group Report (2005), Teaching of Mathematics, New Delhi, NCERT
4. Iglewiez, Boris and Stoyle, Judith (1973), An Introduction to Mathematical Reasoning, New York, the McMillan company
6. NCERT, A textbook of Content-Cum-Methodology of Teaching Mathematics, New Delhi, NCERT
7. NCERT(2012), Pedagogy of Mathematics- textbook for Two year B.Ed course, New Delhi
8. Polya george (1957), How to solve it, Garden city, New York, Doubleday
10. Servas W and T Varga, Teaching school Mathematics, UNESCO source book

MSE VI.7 :School Attachment Programme 4

Credits : 3
Duration : 3
2 weeks SAP + 1 week Community living

Marks: *100
C1 +C2 :50
C3:50

Objectives:

The student teachers will
- Understand the dynamics of class room processes.
- Understand the diversity in learning based on student responses to learning tasks
- Understand the role of planning, preparation and transaction in the teaching learning process.
- Understand the different strategies and approaches used in teaching based on the nature of content and the skills to be developed.
- Analyse the assessment tools and techniques employed with respect to their purpose, learner friendly, and quality.
- Develop lesson plans in the respective subject areas of specialization
- Understand the strategies adopted for developing art and creative sensibilities in learners

Course Content
The student teachers will perform the activities listed below and prepare reflective diary and the reports on the tasks performed separately. They will present their reports in the seminar organized after the completion of school attachment programme.
During this phase student teachers are expected to begin developing their own understanding about classroom dynamics, diversity in learning, role of planning, preparation, execution by adopting various strategies and approaches along relevant assessment strategies. Student teachers gain understanding being into actual classroom transaction by observation, gathering information and interaction with students, teachers and school Head.

The following tasks centered on classroom transactions are suggested to be carried out by student teachers in this phase.

- Understand the dynamics of classroom processes and multiple roles of teacher & learners.
- Understand the Classroom management strategies employed by the teacher.
- Interact with teachers to understand how unit and lesson planning are done in their subjects
- Understand school policies and practices to address student learning difficulties- remediation, extra study hours etc. - at macro level- across subjects and at micro level within the class room.
- Develop 2 lessons (one lesson in each pedagogy) with the use of learning materials/teaching aids and one unit plan.
- Analyze test- question papers in subjects to understand what is assessed; types of questions/items used; and with reference to the objectives of the unit/lesson
- Reflect on the processes employed in CCE and the observed outcomes.

Records to be submitted for assessment

- Submission of 1 lesson plan in each pedagogy. (one in each pedagogy).
- Observation records (3 lessons) in each pedagogy. (one in each pedagogy)
- Report on class room transactions and learning processes

Community Based Activities:

Objectives

- To develop an awareness and understanding of educational status of the community.
- To create an awareness of the implementation of various programmes of the government related to school education through field experiences and community participation.

Activities

- The student teachers will visit the local community to study the drop out/ out of school children and the modes of alternative education received by them.
- Organize awareness programmes in the selected community on literacy, human rights, gender sensitization, environmental conservation etc through street play, role play and dramatization.
- To interact with community members like zilla parishat members, SDM and PTA members to study about their participation in school development programmes

Evaluation:* all the assessment are internal

- C1 ñ Report 1
- C2 ñ Report 2
- C3 ñ PPT
SEVENTH SEMESTER

DISCIPLINE SPECIFIC ELECTIVE

DSE 1 A : Physics

MSEVII.1 : NUCLEAR AND PARTICLE PHYSICS

Credits: 3 (1L + 1T +1P)  
Marks: 100
Contact hrs per week: 5  
C1 + C2: 50
Exam Duration: 2 hrs  
C3: 50

Objectives:
To enable students to apply the basic knowledge of classical and quantum mechanics at the atomic and molecular level.

COURSE CONTENT:

Unit I: Atomic Nucleus
Nuclear structure, Failure of proton-electron hypothesis, neutron, its discovery and properties, Proton-neutron hypothesis, Constituents of nucleus and their Intrinsic properties, Basic properties of nucleus - charge, spin, radii, mass, magnetic moment. Nuclear forces and their characteristics. Yukawa’s Theory (Qualitative), Packing fraction and binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, Nuclear stability, Segre chart.

Unit II: Nuclear Models
Nuclear Models - Liquid drop model approach, semi empirical mass formula and significance of various terms, condition of nuclear stability. Two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force.

Unit III: Radioactivity

Unit IV:

Particle Accelerators and Detectors: Cockroft Walton voltage multiplier, LINAC, Cyclotron, Betatron.
**Nuclear Detectors:** GM counter, scintillation detector, bubble chamber, principle of semiconductor detector.

**Particle Physics:** Particles and anti-particles, Classification of particles, Symmetries and Conservation Laws, Qualitative introduction to quarks, Structure of hadrons.

**References:**

1. I. Kaplan, Nuclear Physics, Narosa, 2002.
4. Subramanyam and Brijlal, Atomic and Nuclear Physics, S. Chand & Company Ltd. 2013.

**PRACTICALS**

Exam Duration : 3 hrs  

C3 : 50

**Objectives:**

- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

**COURSE CONTENT:**

(A minimum of TEN experiments to be selected from the following)

1. GM Counter characteristics.
2. GM Counter – Absorption coefficient.
4. Simulation experiment on radioactive decay.
5. Verification of inverse square law for beta rays.
6. Verification of inverse square law for gamma rays.
7. Rutherford model – Simulation technique.
8. Ionization potential of Xenon.
10. Spectrometer-Quartz prism-Refractive indices of quartz for the ordinary and extraordinary rays.
11. LCR Parallel resonance
12. LCR Series resonance.
13. FET characteristics.

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References:
2. E Armitage, Practical Physics, John Murray.
3. PSSC Physics Laboratory Guide.

DSE 2AChemistry

MSEVIL.2 : ELECTROCHEMISTRY AND PHOTOCHEMISTRY

Credits: 3 (1L + 1T +1P)  Marks: 100
Contact hrs per week: 5  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:
- Explain the nature of Electrolytic conduction involving theories of electrolytes.
- Understand the processes that occur at electrodes and in electrolytes and to apply emf methods to study different types of reactions.
- To have knowledge about the commercial cells and their applications
- To obtain information about the basic photophysical and photochemical processes

COURSE CONTENT:

Unit I: Electrochemistry – I
To study the behaviour and reactions of ions in a variety of environments through the laws that govern them. Electrical transport in conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution.

Migration of ions Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald’s dilution law, its uses and limitations. Debye-Hückel-Onsager’s equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method.
Applications of conductivity measurements: Determination of degree of dissociation, determination of $K_a$ of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

**Unit II: Electrochemistry – II**
Types of reversible electrodes – gas-metal ion, metal-metal ion, metal-metal insoluble salt, Amalgam and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode-reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance. To draw up a scheme for discussing the equilibrium position for an ionic reaction in terms of the electrode potential. Electrolytic and Galvanic cells reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements. Computation of cell EMF, Calculation of thermodynamic quantities of cell reactions ($\Delta G$, $\Delta H$ and $K$), Chemical cells with and without transport.

**Unit III: Electrochemistry – III**

**Unit IV: Photochemistry**
Discussing the Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus–Drapper law, Stark–Einstein law, Jablonski diagram showing various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radioactive processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions – energy transfer processes (simple examples), Chemiluminescence.

**References:**
1. Photochemistry Gurudeep Raj Goel Publishing House
3. Elements of Electrochemistry by Samuel Glasstone and Lewis
4. Principles of Physical Chemistry -Marron and prutton
PRACTICAL

Exam Duration : 3 hrs

Objectives:
- To study the electrical behaviour of weak and strong electrolytes
- Quantitative estimation of electrolytes by conductometric and potentiometric titration

COURSE CONTENT:
1. To determine the equivalent conductance of a strong electrolyte at several concentrations and verify Onsager's equation.
2. Conductometric titration of a strong acid Vs. strong base, strong base Vs. weak acid, strong base Vs mixture of acids (strong and weak) to determine the concentration of acids in a given solution and in mixture.
3. To determine the concentration of the given acid solution and concentration of acids in a mixture by potentiometric titration using sodium hydroxide solution.
4. Determination of Pka value of a weak acid by potentiometry.
5. Determination of the dissociation constant of a weak acid by conductometry.
6. To determine the equivalent conductance of a weak electrolyte at different concentrations and verify Ostwald's dilution law. Also to find out the dissociation constant of a weak electrolyte.
7. To determine the solubility and solubility constant of a weak electrolyte conductometrically.
8. To find the composition of the complex formed between iron(III) and salicylic acid by Job's method.
9. To find out the amount of copper sulphate in the given solution by titrating with standard alkali by conductometry.
10. To determine the amount of FAS in the given solution by potentiometric titration with standard potassium dichromate and potassium permanganate solutions.
11. Estimation of Silver nitrate by potentiometric titration with standard potassium chloride solution.

References:
DSE 3A Mathematics
MSEVII.3 : LINEAR ALGEBRA

Credits: 3 (1L + 2T +0P)  
Contact hrs per week: 5  
Exam Duration: 2 hrs  
Marks: 100  
C1 + C2: 50  
C3: 50

Objectives:
To enable the students to understand and apply the concepts of linear algebra in solving appropriate problems.

COURSE CONTENT:

Unit I:
Vector spaces, Subspaces, Linear Combinations, Linear span, Linear dependence and Linear independence of vectors, Basis and Dimension, Finite dimensional vector space ñ some properties. Quotient spaces, Homomorphisms and Isomorphisms of vector spaces, Direct sums.

Unit II:

Unit III:
Matrices of Linear maps, Change of basis and the effect of associated matrices, Kernel and Image of a linear transformation, Rank and Nullity theorems.

Unit IV:
Singular and non-singular linear transformations, Elementary matrices and transformations, Similarity, Eigen values and Eigen vectors, Diagonalisation, Characteristic polynomial, Cayley - Hamilton Theorem, Minimal Polynomial.

References:
2. Introduction to Linear Algebra by Stewart, Van Nostrand Co. Ltd.
4. Brief Survey of Modern Algebra, Brikhoff and Maclane, IBH
5. Linear Algebra by Serge Lang, Addison Wesley Publishing company Inc.
6. Vector Algebra, Shantinarayan and P K Mittal, S Chand and Co. Ltd.
7. Linear Algebra by Larry Smith, Spinger Verlag.
8. Elementary Linear Algebra with Applications, Keith Nicholson, PWS ï Kent Publishing Company
10. Modern Algebra by Vasishta, Krishna Prakashan Media Ltd.
11. Linear algebra ï a geometric approach by Kumaresan. S
PROFESSIONAL EDUCATION COURSES

MSEVI.4 : CREATING AN INCLUSIVE SCHOOL

Credits: 4 (2L+ 2T +1P)  
Marks: 100

Contact hrs per week: 6  
C1 + C2: 50

Exam Duration: 2 hrs  
C3: 50

Objectives
The student teacher will be able to:

- Understanding the meaning and significance of inclusive education.
- Appreciate the special needs of Individuals with diverse needs.
- Get Familiarized themselves with the concept of Inclusive Education.
- Understand the nature and needs of different categories of disabled children.
- Understand the concept of Special Education, Integration and Inclusion.
- Understand the different considerations and provisions for facilitating inclusion.
- Understand and Acquire the Skills of Adapting Curriculum to meet the need of the Students with Diverse needs

COURSE CONTENT

Unit I : Basic Concepts and Introduction to Inclusive Education
Meaning of Impairment, Disability and Handicap; Concept of Special Educational Needs and Diverse Needs, Difference between Special Education, Integration and Inclusive Education. Significance of Inclusive Education; Factors Affecting and Promoting Inclusion.

Unit II : Nature and Needs of Diverse Learners-Identification of Diverse Learners in the Classroom
Sensory Impairment: Hearing impairment and Visual impairment
Physical Disabilities: Orthopaedic impairment, Cerebral Palsy, Special Health Problems, Congenital defects; Slow Learners and Under Achievers; Intellectual Disability; Learning disabilities and ADHD; Autism Spectrum Disorders; Multiple disabilities ; Emotional and Behavioural Problems; Gifted and Creative; Socially Disadvantaged, Economically Deprived, Religious and Linguistic Minorities, Inhabitants of Geographically Difficult Areas

Unit III: Preparing Schools for Inclusion-General Considerations and Provisions
Concept of Inclusive School, Competencies and Characteristics of inclusive Teacher Physical Consideration, Socio-Emotional Considerations, Curricular Considerations
Provision of Assistive devices, equipment and technological support. Special provisions in Evaluation

Unit IV : Inclusive Practices in Classroom
Making learning more meaningful: Responding to special needs by developing strategies for differentiating content, curriculum adaptation and adjustment, lesson planning and TLM.
Pedagogical strategies to respond to needs of individual students: Cooperative learning strategies in the classroom, peer tutoring, buddy system, reflective teaching, multisensory teaching. Use of ICT suitable for different disabilities.
Practicum

- Collection of data regarding children with special needs.
- Visit to Inclusive Schools and to observe classroom transaction of any one of such school and make a report of the same.
- Identifying one/two pupils with special needs in the primary schools and preparing a profile of these pupils.
- Preparation of teaching aids, toys, charts, flash cards for children having any one type of disability. (Visit to Resource Room)
- Preparation of Lesson Plan, instruction material for teaching students with disability in inclusive school.
- Developing list of teaching activities of CWSN in the school.

Visits to different institutions dealing with different disabilities and observation of their Classroom.
* In addition, school and community based activities may be organized.

References:


19. Ramaa S : Website: s-ramaa.net ( for various publications)


**Web Resources**


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MSEVII.5 : HEALTH AND PHYSICAL EDUCATION

Credits: 2 (1L+ 0T +1P)  Marks: 100
Contact hrs per week: 3  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives
The student teacher will be able to:

- to build a scenario of Health Education in India.
- to develop a Knowledge Base of the Most Common and Uncommon Diseases in India; their Diagnosis & Remediation.
- Prospective Teacher Educators to learn the Techniques Related to Health Risks & Learn How to Fix these.
- Prospective Teacher Educators to study the Health Education Vision & Mission of India.
- To acquire the skills for physical fitness, correct postures, habits and activities for development
- Acquire skills to practice yogasanas and meditation and learn the skills of concentration, relaxation, dealing with stress and strain
- Understand and develop psychological abilities as life skills to deal with growing up issues like HIV and AIDS and prevention of substance issues
- Understand the process of assessment

COURSE CONTENT

Unit I: Health Education Scenario in India
Introduction to the concept of health, significance and importance in the context of ancient and modern Indian perspective

Unit II: Tech-related Health Risks
Unit III: Approaches to Sound Health

Games, Sports & Athletics.
Physical fitness, strength, endurance and flexibility, its components, sports skills, indigenous
and self-defence activities.
Games and sports in athletics (general physical fitness exercises), games (lead-up games,
relays and major games) rhythmic activities, gymnastics and their impact on health.
Fundamental skills of games and sports; Sports for recreation and competition; Rules and
regulation of sports; sports ethics; sports awards and scholarships, sportsmanship.
Yoga—Raja Yoga, Karma Yoga, Bhakti Yoga, Jnana Yoga.
Safety and security in disasters in and outside schools, ways of prevention, safety from snake
and dog bites, animal attacks, prevention and treatment.
Occupational health hazards and its prevention; Commonly-abused substance and drugs and
ways of prevention and inhabitation. Safety measures to be taken in Libraries, Laboratories,
Classrooms, Halls, Play Fields, Water Tanks, Swimming Pools, Community Pools, Roads
Human Development Index (HDI), Health: Vision, Goals and Objectives of Government of
India, Experiments on Influence of Surroundings & Thought, Science of Laughter & Smiles,
Health observation Programs, Impact of TV Serials.
Role of Institutions (schools, family and sports), health services, policies and major health
and physical education-related programme, blood banks, role of media.

Unit IV: First Aid – Principles and Uses
Structure and function of human body and the principles of first aid., First aid equipments.
Fractures-causes and symptoms and the first aid related to them, Muscular sprains cause,
symptoms and remedies, First aid related to hemorrhage, respiratory discomfort, First aid
related to Natural and artificial carriage of sick and wounded person, Treatment of
unconsciousness, Treatment of heat stroke, General disease affecting in the local area and
measures to prevent them.

Practicum
Surfing to know the diseases in India.
Preventive & Ameliorative measures for health hazards.
Playing Games.
Athletics.
Yoga.
Reflective Dialogues on Serials, such as, Satyamev Jayate on Health of the People.
Preparation of inventories on myths on exercises and different type of food.
Make an inventory of energy rich food and nutritious food (locally available) indicating its
health value.
Make an inventory of artificial food and provide critical observations from health point of
view.
Home remedies as health care.
Role of biopolymers (DNA) in health of child.
Medicinal plants and child health.
Strategies for positive thinking and motivation.
Preparation of first aid kit.

* In addition, school and community based activities may be organised.
References:

1. Arora, P. (2005) Sex Education in schools, Prabhat Prakashan
3. NCERT (2013). Training and Resource materials on Adolescence Education, NCERT, New Delhi (This material is also available on www.aeparc.org/www.ncert.nic.in

Physical Education


Yoga

Web Resources
Position Paper National Focus Group on Health and Physical Education, NCERT
www.FalunDafa.org

MSEVII.6 : READING AND REFLECTING ON TEXT

Credits: 2 (1L+ 1T +0P) Marks: 100
Contact hrs per week: 3 C1 + C2: 50
Exam Duration: 2 hrs C3: 50

Objectives
The student teacher will be able to:
- Understand the meaning, process, importance and characteristics of reading.
- Understand and apply different levels, types, techniques and methods of reading.
- Acquaint with the skills of reading different types of texts.
- Develop different types of reading skills through various activities and met cognition
- Learn the skills of reading comprehension and to enhance vocabulary.
- Acquaint with the problems of reading across curriculum.

COURSE CONTENT
Unit I: Introduction to Reading
Reading Î Meaning and Process, Importance of Reading across Curriculum, Characteristics of Reading, Developing reading skills.Role of libraries in promoting reading habits

Unit II: Techniques and Methodology of Reading
Levels of reading Î literal, interpretative, critical and creative, Types of reading Î intensive and extensive reading, oral & silent reading, Reading techniques Î skimming and scanning. Methodology of reading
Unit III: Reading the Text
Types of Texts – Narrative, expository, descriptive, suggestive, empirical, conceptual, ethnography, policy documents, field notes; Importance of Different Texts in Curriculum

Unit IV: Developing Reading Skills and Reading Comprehension
Developing Critical Reading Skills, Developing Reflective Skills, Activities for Developing Reading Skills, Developing Metacognition for Reading, Developing Reading Comprehension, Developing Vocabulary for Reading, Problems of Reading

Practicum
• Divide the class in small group and provide different kinds of texts and instruct them to read and reflect according to the nature of text.
• Divide the group and provide one text and suggest students to make different interpretations.
• Design vocabulary games to enhance vocabulary.
• Read the text and provide a five words summary to each paragraph.
• Reading and comprehension exercises.
• Skim through the text and give suitable title to the text.
• Complete given text in stipulated time and summarize it in 6/7 lines with a suitable title.
• Making an oral presentation
• Organising a debate, discussion based on their reading
• Preparation of a poster
• Making a collage
• Displaying appropriate texts/graphic on bulletin board
• Addressing morning assembly during their internship in schools
• Making a power point presentation on selected topic
• Submission of written articles/assignments
• Writing maintaining reflective journals

* In addition, school and community based activities may be organized with provisions for visits to innovative centres of pedagogy and learning, innovative schools, educational resource centres, etc. Action research based on teaching learning and school and community could be conducted.

References:
Discovery Publishing house.
16. My experiments with the truth ï€š My experiments with the truth ï€š *Autobiography of Mahatma Gandhi*
17. The Little Prince ï€š *Antain de Saint ï€š Exupery*
18. Cultural Heritage ï€š Dr. S. Radhakrishnan
20. Recognizing Different Types of Text

**Web Resources**


**Models of Reading Process**

- [http://people.ucalgary.ca/~mpeglar/models.html](http://people.ucalgary.ca/~mpeglar/models.html)
- [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3001687/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3001687/)
- [http://www.tarleton.edu/Faculty/gentry/reading%20models.html](http://www.tarleton.edu/Faculty/gentry/reading%20models.html)

**Reflective Skills**

MSE VII.7A Internship in School Subject 1 – Physical Science (SAP-5)
&
MSE VII.7B : Internship in School Subject 2 – Mathematics (SAP-5)
OR
MSE VII.7C : Internship in School Subject 2 – Biological Science (SAP-5)

(Evaluation in each school subject shall be as per the break up shown below and all are internal*)

Credits : 12 ( 6+6 )
Duration : 11 Weeks

Marks: *100
C1 + C2 : 50
C3 : 50

The activity is divided into three phases:
- Pre-internship - 2 weeks
- Internship - 8 weeks
- Post internship- 1 week

• Pre internship

Objectives:
- To facilitate student teachers in designing and executing lessons in each pedagogy.
- To develop in student teachers the skills of observation and evaluating teaching of their peers

Activities
The student teachers will
- plan and teach minimum 3 lessons in each pedagogy
- observe minimum 5 lessons of their peers in each pedagogy
- participate in the mentoring sessions to plan lessons under the guidance of mentors.

• Internship

Objectives:
To provide the student teachers with the field experience of getting attached to a school for a long duration and develop professional skills of teaching, participate in various day to day functions of schools, and in organizing various activities.

Activities
- The student teachers will teach 20 lessons (excluding lesson given during pre-internship) at secondary level in each pedagogy.
- The student teachers will organize various activities- co-curricular and extended subject based in the school.
- The student teachers will participate in various academic and administrative activities including monitoring and supervising students in school conducted tests and examinations.
• The student teachers will diagnose the learning difficulties of students and provide remedial instruction.
• The student teachers will conduct CCE and unit tests and prepare evaluation records

• **Post Internship**

  **Activities:**

  • Submission of internship records - evaluation records, activity record, observation records, reflective diary
  • PPT Presentation of reflections

  Evaluation in each pedagogy is as follows:
  C1 Pre-internship activities
  C2 Internship records and post-internship presentation
  **C3 – Internship in teaching**
EIGHTH SEMESTER

DISCIPLINE SPECIFIC ELECTIVE

PHYSICS

MSEVIII.1 : SOLID STATE PHYSICS

Credits: 3 (1L + 1T +1P)  
Marks: 100
Contact hrs per week: 5  
C1 + C2: 50
Exam Duration: 2 hrs  
C3: 50

Objectives:
To enable students to apply the basic knowledge of classical and quantum mechanics for an understanding of physics of nuclei and of solids.

COURSE CONTENT:

Unit I: Crystal Structure

Unit II:

Unit III:
Unit IV: Superconductivity

Reference Books:

PRACTICALS

Exam Duration: 3 hrs C3: 50 Marks

Objectives:
- To provide training in the broad methodology of science through investigatory type and open-ended laboratory exercises.
- To validate the theoretical basis of the experiments.

COURSE CONTENT:
(A minimum of TEN experiments to be selected from the following)
1. Measurement of susceptibility of a paramagnetic solution (Quinck’s Tube Method)
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. Determination of Hall coefficient in semiconductors.
5. Determination of Curie temperature of ferromagnet.
6. Determination of work function of a metal using R-D equation.
7. To measure the Dielectric Constant of a dielectric Materials with frequency.
8. To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR).
9. To determine the refractive index of a dielectric layer using SPR.
10. To study the PE Hysteresis loop of a Ferroelectric Crystal.
11. To draw the B- H curve of iron using a Solenoid and determine the energy loss from Hysteresis.
12. To measure the resistivity of a semiconductor (Ge) crystal with temperature by four-probe method (from room temperature to $150^\circ$ C) and to determine its band gap. Franck-Hertz experiment.

13. Powder XRD pattern of KCl.

14. Powder XRD pattern of NaCl.

15. Powder XRD pattern of CaCl$_2$.


17. Frequency resonance of LR circuit.


References:


2. E Armitage, Practical Physics, John Murray.

3. PSSC Physics Laboratory Guide.


DSE 2BChemistry

MSEVIII.2: SPECTROSCOPY, NATURAL PRODUCTS AND HETEROCYCLICS

Credits: 3 (1L + 1T + 1P) Marks: 100
Contact hrs per week: 5 C1 + C2: 50
Exam Duration: 2 hrs C3: 50

Objectives:

To develop an understanding of the

- basic principles of Spectroscopy and apply the principles in the structural elucidation of simple organic compounds.
- chemistry of natural products, dyes and drugs, macromolecules and heterocyclic compounds
COURSE CONTENT:

Unit I: Spectroscopy

**UV and Visible spectroscopy:** Introduction, absorption laws, instrumentation, formation of absorption bands, types of electronic transitions, chromophores, auxochromes, absorption and intensity shifts, solvent effects, Woodward – Fieser rules for calculating absorption maximum in dienes and Ũβ-unsaturated carbonyl compounds.

**IR spectroscopy:** Introduction, theory of molecular vibrations, vibrational frequency, factors influencing vibrational frequencies, finger print region and applications of IR spectroscopy.

**NMR spectroscopy:** Introduction, instrumentation, number of signals, position of signals (Chemical shift), shielding and deshielding effects, factors influencing chemical shifts, inductive effect, anisotropic effect and hydrogen bonding. Splitting of signals, spin-spin coupling, chemical exchange and coupling constant. Structural determination of simple organic compounds using UV, IR and NMR spectral data.

Unit II: Natural Products


**Alkaloids:** Introduction, general methods of structural determination, structural elucidation of Conine, Nicotine and piperine

**Terepinoids:** Introduction, isoprene rule, structural elucidation of Citral and Menthol

**Amino acids, Peptides, Proteins and Nucleic acids**

**Nucleic acids:** Introduction, constituents of nucleic acids. Ribonucleosides and Ribonucleotides. The double helical structure of DNA. Types of different RNA and their functions in the synthesis of protiens. Genetic code.

Unit III: Dyes, Drugs and Macromolecules

**Dyes:** Introduction, Classification of dyes, Colour and constitution (electronic concept), synthesis and uses of Methyl orange, Phenolphthalein, Fluorescein and Indigo.

**Drugs:** Introduction, classification, structure and synthesis of sulpha drugs- sulphapyridine, sulphathiazole, sulphadiazine and sulphaguanidine, mechanism of action. Antimalarials i.e. plasmaquin, mepacrine and chloroquin.

**Macromolecules:** Introduction, Classification, Types of polymerization i.e. chain polymerization, step polymerization, free radical polymerization, co-polymerisation, Ionic

**Unit IV: Heterocyclic Compounds**

**References:**
1. Organic Spectroscopy by P S Kalsi
2. Organic Chemistry : I L Finar Vol II
3. Application of absorption Spectroscopy to Organic Compounds : John R Dyer
4. Organic Spectroscopy : William Kemp
5. Fundamentals of Molecular Spectroscopy : C N Banwell

**PRACTICAL**

Exam Duration : 3 hrs  C3 : 50

**Objective:**
To develop skills of synthesis and Estimation of organic compounds

**COURSE CONTENTS:**

1. Two step organic synthesis
   1. Synthesis of p-bromoaniline from acetanilide
   2. Preparation of o-iodobenzoic acid from anthranilic acid
   3. Preparation of m-nitrobenzoic acid from methyl benzoate
   4. Preparation of Paracetamol
   5. Synthesis of Quinoline

2. Quantitative organic analysis
   1. Estimation of aniline/ phenol by bromate-bromide method
   2. Estimation of glucose by Fehlings method/ Spectrophotometry using 3,5 dinitro salicylic acid
   3. Determination of iodine value of an oil by Wijka method/ Chloramine-T method
   4. Determination of saponification value of an ester / oil
   5. Estimation of amino acid by formal titration method
6. Estimation of ascorbic acid in Vitamin C tablets by Volumetry
7. Estimation of Paracetamol by titrimetric and spectro photo metric methods.
8. Colorimetric Estimation of proteins by Biuret method

References :
2. Organic Synthesis A.I. Vogel

DSE 3BMathematics

MSE VIII.3: COMPLEX ANALYSIS & NUMERICAL ANALYSIS

Credits: 3 (1L + 2T + 0P)  Marks: 100
Contact hrs per week: 5  C₁ + C₂: 50
Exam Duration: 2 hrs  C₃: 50

OBJECTIVES:
To develop the understanding & application of the concepts of complex analysis in problem solving situations. To enable and apply Numerical methods in solving problems related to real life situations with help of computers, which have become indispensable in modern world.

COURSE CONTENT:

Unit I:

Unit II:

Unit III:

Unit IV:
Integration: General quadrature formula, Trapezoidal Rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Weddle's rule, Newton-Cotes quadrature formula, Gauss quadrature.

References:
3. Complex Analysis by Serge Lang, Springer Verlag
4. Theory of Functions of a Complex Variable by Shanthinarayan, S. Chand and Co. Ltd.
6. An Introduction to the Theory of Functions of a Complex Variable by Copson, Oxford University Press.
11. Numerical Analysis by Guptha, S. Chand and Co. Ltd.
13. Introductory Methods of Numerical Analysis by Shstry, PHI.
20. Introduction to Numerical Methods by Peter A. Stark, MacMillan Co. Ltd.

**GENERIC ELECTIVE 2**

**MSEVIII.4 : INDIAN CONSTITUTION AND HUMAN RIGHTS**

Credits 2 (2L+0T+0P)  
Max. Marks: 100
Contact Hours per week: 2  
C1+ C2: 50
Exam duration: 2 Hrs  
C3: 50

**Objectives:**
On completion of this course, the student teacher will be able to
- know the importance, preamble and salient features of Indian Constitution
- appreciate the significance of Fundamental Rights, Duties and Directive Principles of State Policy.
- develop an understanding of the strength of the Union Government.
- understand the functioning of the State Government for the unity and the strength of the Democracy.
know the importance of local self-Government and Panchayati Raj Institutions in India.
know the meaning, significance, the growing advocacy of Human Rights.

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

**COURSE CONTENT:**

**Unit I: Meaning and Importance of the Constitution**
Preamble, Salient features, Constituent Assembly and the Spirit of the Indian Constitution.

**Unit II: Fundamental Rights, Duties and Directive Principles**

**Unit III: Union, State and Local Self Governments**

**Unit IV: Human Rights**

**References:**
2. Granveille Austin, *Indian Constitution*, OUP, New Delhi
3. Rajani Kotari, *Politics in India*, OUP, New Delhi
5. S R Maheswari, *Local Governments in India (Latest Edition)*
PROFESSIONAL EDUCATION COURSES

MSEVIII.5 : KNOWLEDGE AND CURRICULUM

Credits: 4 (2L + 2T + 0P)  Marks: 100
Contact hrs per week: 6  C1 + C2: 50
Exam Duration: 2 hrs  C3: 50

Objectives:

This course is designed to help student teachers to
- Understand the concept and the need for curriculum in schools.
- Explore the influences of the knowledge categories, social, cultural, economic and the technological aspects in shaping the present school curriculum and the text books.
- Analyze the principles employed in sequencing the school curriculum and the syllabus at different levels.
- Identify various learning sites and resources operating as curriculum supports in the system.
- Analyze the multiple roles of schools in implementation of curriculum.
- Discuss the roles and responsibilities of curriculum stakeholders.
- Analyse the role of teachers in operational sing the curriculum.
- Examine the processes and criteria commonly used to evaluate curriculum in pursuit of improvement.
- Explore the evaluation approaches adopted to revise the curriculum at the national and state levels.
- Analyze the national curriculum frameworks for necessary reforms proposed and their implications at school level.
- Develop an image of oneself as a curriculum informant, designer, agent, and evaluator.

COURSE CONTENT:

Unit I: Concept and the nature of curriculum
a) Meanings of curriculum; different perspectives of curriculum; need for curriculum in schools.
b) Educational policy reforms leading to curriculum reforms; Relationship between curriculum framework, curriculum, syllabus and text books- their significance in school education.
c) Meaning and concerns of core curriculum-its need and significance in Indian context; Meaning and concerns of Hidden curriculum and spiral curriculum and their relevance to learning.
d) Types of curriculum: subject-centered, activity-centered, environmental centered, and community-centered and their relevance.

Unit II: Foundations of Curriculum Development

a) Forms of knowledge & Curriculum: Forms of knowledge and structure of a Discipline, and their characterization in different school subjects; Logical grammar of different school subjects
b) **Nature of learner & learning:** Nature of learner - needs and interests, and different perspectives on learning (behaviourists, cognitivists and social constructivists) and their implications to curriculum development

c) **Socio-cultural:** Importance of society-school relationships; Societal factors that affect the curriculum; Multiculturalism, multilingual aspects, and societal aspirations; Social reconstruction, social efficiency, inequality in educational standards, need for common goals and standards;

d) **Technological determinants:** Science and technological advancements, Using the resources of the information society in curriculum development

e) **Some of the critical issues:** environmental concerns, gender concerns, inclusiveness, value concerns, social sensitivity, and globalization.

**Unit III: Process of curriculum Development**

a) Understanding shifts in emphasis in approach to curriculum; from subject centered and behaviouristic learning to integrated approach involving development of perspectives, activity centered and constructivist orientation;

b) **Behaviouristic orientation:** Formulating aims and objectives (general, specific - subject wise and level wise); Selecting content and learning experiences (Principles involved; Organizing the content and learning experiences- Principles (continuity, sequence and integration: organizing elements- concepts, skills, and values); breadth of coverage and depth of understanding; applicability and relevance to school curriculum planning

c) **Constructivists orientation:** curriculum embedded in real life contexts; authentic learning in real life contexts leading to knowledge construction; applicability and relevance to school curriculum planning

**Unit IV Curriculum Implementation and Curriculum evaluation**

a) Operationalising curriculum into learning situations; Planning and converting curriculum into syllabus and curriculum engagement activities.

b) **Role of teachers in operationalising curriculum in generating dynamic curricular experiences through i) flexible interpretation of curricular aims ii) concept mapping iii) contextualization of learning v) selecting varied experiences and long range and daily planning, choice of resources, planning assessment etc.**

c) **Planning and use of curricular materials:** Text book; teachers hand book, source book, work book, manuals, and other learning materials such as kits, AV and software materials.

d) **School culture and climate in implementing the curriculum.**

e) **Supports to curriculum engagement:** available infrastructure and curriculum sites and resources (library, laboratory, playground, neighbourhood etc); Use of community resources in curriculum engagement.

f) **Role of external agencies:** National, Regional and State in developing the learning supports (including training of teachers) for curriculum implementation.

g) **Meaning of curriculum evaluation; Need for curriculum evaluation**

h) **Process of curriculum evaluation and renewal:** collecting opinions and views on school curriculum and text books from different stakeholders; students' attainability of curricular standards as one of the criterion; evaluation of the discrepancies observed between anticipated and observed inputs, transactions and outputs; critical analysis of text books; evaluation of other curricular materials;

i) **Role of National, Regional and State bodies in empowering the teachers in evaluating**
Sessional Work:
- Review of national curriculum frameworks and write a report for presentation and discussion
- Analysis of teachers’ handbooks, textbooks, workbooks, source books followed by presentations.
- Readings of certain curriculum reviews and articles bearing significance to the course outlined and reflections on them

References:
MSEVIII.6 : GUIDANCE AND COUNSELLING IN SCHOOLS

Credits: 4 (3L+ 1T +0P)  
Marks: 100

Contact hrs per week: 5  
C1 + C2: 50

Exam Duration: 2 hrs  
C3: 50

Objectives
The student teacher will be able to:

- appreciate the nature, purpose and need for guidance and counselling;
- sensitise the student-teachers with the need and relevance of Guidance and counselling;
- demonstrate an understanding of educational, vocational and personal guidance;
- develop an understanding of the process of Guidance and Counselling;
- understand the process of organization of guidance services in schools;
- develop capacity of applying the techniques and procedures of guidance and counselling;
- describe various testing and non-testing techniques;
- develop the skill of administration and interpretation of psychological tests;
- understand the concept and importance of career development;
- analyse the role of the teacher in the provision of Guidance and Counselling;
- know the qualities required for good Counsellor

COURSE CONTENT

Unit I: Meaning and Nature of Guidance

Guidance: Concept, aims, objectives, functions and principles.
Need & Procedure for (Educational, Psychological and Social) guidance.
Purposes and Principles of organization of different Guidance Services
Organization of guidance services at Secondary Level: Need and Importance
Role of Guidance Personnel in organization of guidance services in School: Counsellor, Career Master, Psychologist, Doctor, Teacher Counsellor, Head of the Institution, Teacher, Social Worker

Unit II: Meaning and Nature of Counselling

Counselling: Meaning and nature; Difference between Guidance & Counselling; Principles and approaches of counselling, Individual and Group Counselling; Skills in Counselling-Skills for Listening, Questioning, Responding, & Communicating, Listening Attentively to the concerns of the counselee, Negotiating Self Discovery, Decision Making, Problem Solving etc and values such as Patience, Empathy etc.; Methods and Process of Counselling Academic, Personal, Career and Behaviour problems of students with special needs, viz. socio-emotional problems of children with disabilities and deprived groups such as SC, ST and girls, need for Counselling; Professional Ethics and Code of Conduct; Qualities and Qualifications of an effective Counsellor
Unit III: Tools and Techniques of Guidance

Role of the teacher in Assessment and Testing.

Unit IV: Career Guidance and Counselling
Educational and Career Information in Guidance and Counselling: Meaning, Importance, collection, types, classification of occupational information; Dissemination of Occupational Information: Class talk, career talk, Group discussion, Preparation of Charts and Poster, Career Exhibition, Career conference; Guidance for gifted, slow learner, socio-economically disadvantaged children; Career development: Meaning and Importance; Teacher’s role in Career planning, Vocational training and placement opportunities for CWSN. Broad outline with respect to the emerging courses and career options available in India; Guidelines for Establishment of Guidance Cell or Career Corners in Schools

Suggestive List of Activities:
- Group Guidance—Preparation of Class Talk and One Career Talk
- Visit to different Guidance Centre
- Design a checklist/Questionnaire to collect information on students and classify them under educational, psychological or social problem.
- Preparation of Cumulative Record
- To prepare a Case study and Analysis of Case study
- Administration, Scoring & interpretation of at least two tests: One Mental Ability Test and One Aptitude Test
- Job Analysis of a Counsellor
- Preparation of list of problem behaviours based on observation. Detailed study of the Guidance and Counselling Services available in a given School
- Prepare a Chart and Poster for dissemination of Career Information
- Familiarise and write a report of any one of the Personality Tests used in Guidance and Counselling

References:
11. Joneja G. K. (1997); Occupational Information in Guidance, NCERT publication

Web resources

- Introduction to Guidance and Counseling African Virtual university
  http://oer.avu.org/bitstream/handle/123456789/153/GUIDANCE%20AND%20COUNSELLING.pdf?sequence=1
- Ethical Principles of Psychologists and Code of Conduct by APA,
- Guidance and Counselling,
- http://www.egyankosh.ac.in/
MSEVIII.7 : VALUE AND PEACE EDUCATION

Credits: 2 (1L+ 1T +0P)  
Marks: 100
Contact hrs per week: 3  
C1 + C2: 50
Exam Duration: 2 hrs  
C3: 50

Objectives
The student teacher will be able to:

- Understand the need and importance of education for peace and values.
- Understand the nature, characteristics and types of human values.
- Understand the five core values of Truth, Righteous conduct, Peace, Love and Non-Violence.
- Appreciate the developments in Peace Education in India and Abroad.
- Understand various methods, techniques and approaches of value development.
- Appreciate the preamble to the constitution and values inherent in it.
- Understand various models of value education.
- Appreciate the importance of living together and imbibe in their attitude and behaviour.

COURSE CONTENT

Unit I: Concept, Meaning and Nature of value
Concept and meaning of value and Peace:
Indian and Western perspectives on value and Peace.
Reflections of great Indian thinkers on values and Peace (Gandhiji, Swami Vivekananda, Sri Aurobindo, Rabindratha Tagore, J. Krishnamurthi)
Understanding Peace in the individual, Social, National and International context
Nature and characteristics of values
Sources and selection of values - culture and human needs

Unit II: Concept, Meaning and Nature of Peace
Historical development of Peace education in India and in the world
Preamble to the Indian Constitution and values inherent in it
Exposition of the five human values of Truth, Righteous Conduct, Peace, Love and Non-Violence with illustrations from life and literature.
Creation of United Nations, UNESCO, UNICEF and their role in promoting value and Peace Education.

Unit III: Concept and need for Value-based Education and Education for Peace
Concept of value based education and Education for Peace with special reference to peace to Indian view of life;
Paradigm shift from Peace education to Education for Peace.
Need for and importance of value based education and Education for Peace in the present scenario.
Recommendations of Sri Prakash Committee (1959) on value education.
Recommendations of Parliamentary Committee of HRD on Values Education (1996-90)
headed by Shri S.B. Chauhan.


**Curriculum development and Models of Value Education.**
Models of value education; Rationale building model, the consideration model, valuing process and clarification model.

Aims and objectives of Value based Education and Education for Peace in the Curriculum. Integration of human values with all (school) academic subjects.

**Unit IV : Pedagogy of Value Education and Education for Peace**
- Approaches and Techniques of teaching human values:
  - Direct approach: value based Story-telling, Group activities (dramatization, literary activities, games and sports, service activities), Counselling, organizing value based co-curricular activities.
  - Indirect Approach; Incidental Approach with illustrations
    - Integrated approach: Integration into curricular, co-curricular activities and subjects (with illustrations of integration from Language, Mathematics, science and social science, art and aesthetics, Yoga and health education,
- Teacher as Role Model.
- Role of school ambience and environment in development of values.

**Practicum**
- Develop / compile stories with values from different sources and cultures, organize value based co-curricular activities in the classroom and outside the classroom, develop value based lesson plans, integrating values in school subjects.
- Study of any Model of integrated value education - case study of models expressed by Sri Sathya Sai, J. Krishnamurti, etc.
- Visit to Ramakrishna Institute of Moral and spiritual Education

In addition, school and community based activities may be organised.

**Evaluation Strategies**
1. Reflective reading based presentations.
2. Unit tests.
3. Quiz based evaluation
4. Seminar presentation
5. Submission of case reports on violation of peace as reported through mass-media.

**References:**
Programmes, New Delhi, Ministry of Human Resource Development.

Web resources
Education for values in schools- a framework, NCERT
http://www.ncert.nic.in/pdf_files/Framework_educationCOMPLETEBOOK.pdf

Values Education A Handbook for Teachers (2012), CMSE
http://cMSEacademic.in/web_material/ValueEdu/Value%20Education%20Kits.pdf

Position Paper National Focus Group on Education for Peace, NCERT
## NINTH SEMESTER

### MSE(M)-IX.1: ABSTRACT ALGEBRA

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**COURSE CONTENT:**

**Unit I:** Introduction to Groups (Review); Lagrange’s theorem and its applications, cyclic groups, homomorphism and isomorphism, Normal subgroups, Quotient groups, class equations, Fundamental theorem of group homomorphism. Isomorphism theorems.

**Unit II:** Cauchy’s theorem, Permutation groups, Cycles and transpositions, Alternative groups, Cayley’s theorem, Sylow’s theorems, p-Sylow subgroups, structure of abelian groups.

**Unit III:** Rings, Integral domains, Fields (Review). Homomorphism, Ideals and quotient rings, prime and maximal ideals, ED, PID, UFD, Polynomial rings, factorization, irreducibility criteria.

**Unit IV:** Extension fields, Algebraic extension, Finite fields, separable extensions, perfect fields, primitive element theorem, Introduction to Galois Theory.

**References:**

6. Fraleigh B, *A First course in Abstract Algebra*, Addison-Wesley,

### MSE(M)-IX.2: LINEAR ALGEBRA

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**COURSE CONTENT:**

**Unit I:** Vector Spaces, Subspaces, Linear Dependence and Linear Independence, Bases and Dimension, Quotient Spaces.


Unit III: The adjoint of a Linear Operator, Normal and Self-Adjoint Operators, Unitary and Orthogonal Operators and Their Matrices, Orthogonal Projections and the Spectral Theorem; Bilinear and Quadratic Forms.

Unit IV: Canonical forms - Triangular form; Nilpotent form, Jordan Form; Minimal Polynomial; The Rational Canonical Form.

Books for Reference:

MSE(M)-IX.3 : ANALYSIS I

Credits :5 (4L + 1T +0P)  
Marks: 100
Contact hrs per week: 6  
C1+ C2: 50
Exam Duration : 2 hrs  
C3 : 50

COURSE CONTENT:
Unit I: Extended Real number System, Countable and Uncountable sets, Topology of Real line- open, closed, compact and connected sets and properties; Continuity and properties, Uniform Continuity, Discontinuities, Monotonicity.

Unit-II: Numerical sequences, convergent sequences, Cauchy sequences, limit inferior and limit superior. Continuity of a function - sequencial approach. Series of real numbers, series of non-negative terms, the number tests of convergence.

Unit III: Sequences and series of functions, Uniform convergence, Uniform convergence and continuity, Uniform convergence and integration, Uniform convergence and differentiation. Power series, The exponential and logarithmic functions, The trigonometric functions.

References:

MSE(M)-IX.4 : DISCRETE MATHEMATICS

Credits :5 (4L + 1T +0P)  Marks: 100  
Contact hrs per week: 6  C₁+ C₂ : 50  
Exam Duration : 2 hrs  C₃ : 50

COURSE CONTENT:

Unit I: Partially ordered sets, Lattices, Complete lattices, Distributive lattices, Complements, Boolean Algebra, Boolean expressions, Application to switching circuits.

Unit II: Permutations and Combinations, Pigeon-hole principle, Principle of inclusion and exclusion.

Unit III: Graphs, Vertices of graphs, Walks and connectedness, Degrees, Operations on graphs, Blocks - Cutpoints, bridges  Block graphs and Cutpoint graphs.

Unit IV: Trees - Elementary properties of trees, Center, Connectivity, Connectivity and line connectivity, Menger's theorem, Partitions, Coverings, Coverings and independence number.

References:
MSE(M)-IX.5 : FOUNDATIONS OF HIGHER SECONDARY EDUCATION

Credits : 3(2L + 1T +0P)  Max.Marks :100
Contact Hrs per week : 4  C₁ + C₂ : 50
Exam. Duration: 2 Hrs  C₃ : 50

Objectives:
- Understand the concept of Education and its Epistemological premises
- Analyses the Discipline categories and their Logical distinctions
- Understands Education as a Discipline and its contribution to curriculum courses
- Analyses the societal problems and the necessity for Peace Education in schools
- Explores the possible sources of value conflicts, crisis among Higher secondary learners and teacher’s role in helping to resolve value conflicts
- Analyses various perspectives and thoughts on Peace and Peace Education
- Analyses the role of Education in a Pluralistic society like India and a need for culture-specific pedagogy in School Education
- Reflects on the social discriminations, inequalities and the oppressed groups, as a teacher, as well as a member of the society and develops responsible attitude and commitment
- Understands the school as a sub system of society and its responsibilities in reflecting the cultural and social ethos in its aims and functions
- Examines the concerns and issues of contemporary Indian Society and their bearing upon Education

Transaction Mode:
Lectures followed by Discussions; Group Discussions; Seminars; Collaborative Presentations; Assignments

COURSE CONTENT:
Unit I:
Education as a critical concept and criteria of educative process; Knowledge and disciplines; Logical distinction between Scientific and Mathematical Knowledge; Education as a discipline; Multidisciplinary nature of education; Concept and nature of value and value education; Factors contributing to value development; Value shifts; Need for education for peace; Value crises in adolescent learners; Methods of resolving value conflicts; Human rights; Role of education in promoting peace; Use of curricular and co-curricular areas in promoting peace as a value; Rationality as a value to be developed in learners.

Unit II:
a) Styles of learning and thinking implications for understanding the adolescent learner; Sociocultural factors influencing learning.
b) The process of adult learning cognitive changes (Praget and Elkind); role of feedback and incentives; learner’s experience in the construction of knowledge.
c) Personality and development of self; The intra and interpersonal realm self perception, self-defeating behaviour, self presentation, impression and management, self-monitoring; search for identity (Erikson), time of turmoil.
d) Mental health and management Issues and concerns; adjustment and adjustment mechanisms; role of teacher in management.
Unit III:

a) Characteristic of Indian society: Multicultural, Multilingual and Multireligion system and role of senior Secondary Teacher

b) Socialization and acculturation, etc. influence on personality development in education.

c) Modernisation, its attributes and effect on present system of education.

d) Democratic values, equality and social justice, its importance in classroom teaching at higher secondary level.

Unit IV: Issues and Concerns of Senior Secondary Education


References:

7. Peters, R, S: The concept of Education
8. Peters, R, S: Education and Education of Teachers
10. Introduction: Life at School, need for critical enquiry Ch. 2 Sociology of School Knowledge Ch 3. Looking Beyond Texts, culture of school and formation of consciousness
13. Bhattacharjee, Nandini, Through the Looking Glass: Gender Socialization in a Primary School (Ch14)
14. Krishnamurti, J., Education and the Significance of Life, KFI Publications (Ch. 6)
15. Readings from 'The Social Character of Learning' by Krishna Kumar and from 'Inner World' by Sudhir Kakar could also be considered
TENTH SEMESTER

MSE(M)-X.1 : ANALYSIS II

Credits : 5 (4L + 1T +0P)  Marks: 100
Contact hrs per week: 6  C₁+ C₂: 50
Exam Duration : 2 hrs  C₃ : 50

COURSE CONTENT:

Unit I: Differentiability, mean value theorems, L'Hospital rule, Taylor's theorem, maxima and minima, Functions of bounded variation.

Unit II: The Riemann-Stieltjes integral, criterion for integrability. Properties of the integral, classes of integrable functions. The integral as the limit of a sum. First and second mean value theorems. Integration and differentiation.

Unit III: Functions of several variables, partial derivatives, continuity and differentiability, the chain rule, implicit differentiation, homogeneous functions, Jacobians.

Unit IV: The Implicit function theorem, Inverse function theorem, Taylor's theorem, the Maxima and Minima, Lagrange's multipliers.

References:
MSE(M)-X.2 : COMPLEX ANALYSIS I

Credits :5 (4L + 1T +0P) Marks: 100
Contact hrs per week: 6 C1+ C2: 50
Exam Duration : 2 hrs C3 : 50

COURSE CONTENT:

Unit I: Algebra of complex numbers, geometric representation of complex numbers. Riemann sphere and Stereographic projection, Lines, Circles. Limits and Continuity.

Unit II: Analytic functions, Cauchy-Riemann equations, Harmonic functions, Polynomials and Rational functions. Elementary theory of power series - sequences, series, uniform convergence of power series, Abel's limit theorem, the elementary functions.


Unit IV: Cauchy's theorem for a rectangle. Cauchy's theorem in a Circular disk, Cauchy integral formula. Local properties of analytic functions.

References :
2. Conway J B, Functions of one complex variable, Narosa, New Delhi.

MSE(M)-X.3 : THEORY OF NUMBERS

Credits :5 (4L + 1T +0P) Marks: 100
Contact hrs per week: 6 C1+ C2: 50
Exam Duration : 2 hrs C3 : 50

COURSE CONTENT:


Unit II: Arithmetical Functions ï The Mobius function, The Euler' function and Sigma function, The Dirichlet product of Arithmetical functions, Multiplicative functions. Averages of Arithmetical functions ï Euler summation formula, Some elementary asymptotic formulas, The average orders of d(n), Û(n), Û(n), µ(n). An application to the distribution of lattice points visible from the origin.
Unit III: Approximation of Irrational numbers, Hurwitz's Theorem, Representation of a number by two or four squares, Definition of g(k) and G(k), Proof of g(4)<50, Perfect numbers. The series of Fibonacci and Lucas.

Unit IV: Continued fractions - Finite continued fractions, Convergence of a continued fraction, Continued fractions with positive quotients. Simple continued fractions, The representation of an irreducible rational fraction by a simple continued fraction. The continued fraction algorithm and Euclid's algorithm. The difference between the fraction and its convergents, Infinite simple continued fractions, the representation of an irrational number by an infinite continued fraction, Equivalent numbers and periodic continued fractions, some special quadratic surds.

References:

MSE(M)-X.4 : TOPOLOGY I

Credits : 5 (4L + 1T +0P)  Marks: 100
Contact hrs per week: 6  C_1 + C_2: 50
Exam Duration : 2 hrs  C_3 : 50

COURSE CONTENT:

Unit I: Set theoretic preliminaries. Topological spaces and continuous maps - topological spaces, basis for a topology, the order topology, the product topology on X x X, the subspace topology.

Unit II: Closed sets and limit points, continuous functions, the product topology, the metric topology, the quotient topology.

Unit III: Connectedness - connected spaces, connected sets on the real line, path connectedness.

Unit IV: Compactness - compact spaces, compact sets on the line, limit point compactness, local compactness.

References:
2. G. F. Simmons (1968), *Introduction to Topology and Modern Analysis*, McGraw-Hill,
Kogakusha.

MSE(M)-X.5 : TEACHING OF MATHEMATICS

Credits : 3(2L + 1T+0P)  
Max.Marks :100  
Contact Hrs per week : 4  
C₁ + C₂ : 50  
Exam. Duration: 2 Hrs  
C₃ : 50

COURSE CONTENT:

Unit I:
Foundations of Teaching Mathematics: Teaching Mathematics; Reflections and Directions; Exploring what it means to do mathematics, Developing Understanding in Mathematics, Building Assessment into instruction.

Unit II:
Advanced Mathematical thinking and the role of mathematical structure.

Unit III:
Complex Mathematical cognition, Emergence of an alternative paradigm, Basic conceptualisation, sequential processes, general problem of flexibility, metaphor and isomorphism.

Unit IV:

References:
4. Learning Mathematics by Robert B. Davis
ELEVENTH SEMESTER

MSE(M)-XI.1 ELEMENTS OF FUNCTIONAL ANALYSIS

Credits :5 (4L + 1T +0P)  Marks: 100
Contact hrs per week: 6  C₁+ C₂: 50
Exam Duration : 2 hrs  C₃ : 50

COURSE CONTENT:


Unit II: Linear spaces and linear operators, Norm of a bounded operator, The Hahn Ŷ Banach extension theorem, Stone - Weirstrass theorem.

Unit III: Open mapping and Closed Graph theorems. The Banach - Steinhaus Principle of Uniform Boundedness.

Unit IV: Hilbert spaces- The orthogonal projection, Nearly orthogonal elements, Riesz's lemma, Riesz's representation theorem.

References:
MSE(M)-XI.2 : THEORY OF ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS

Credits: 5 (4L + 1T +0P)  Marks: 100
Contact hrs per week: 6  C1+ C2: 50
Exam Duration: 2 hrs  C3: 50

COURSE CONTENT:
Unit I: Linear Second Order Equations - Initial value problem, Existence and Uniqueness by Picard’s Theorem, Wronskian, separation and comparison theorems, Poincare phase plane, variation of parameters.
Unit II: Power series solutions - Solution near ordinary and regular singular point. Convergence of the formal power series, applications to Legendre, Bessel, Hermite, Laguerre and hypergeometric differential equations with their properties.
Unit III: Partial differential equations - Cauchy problems and characteristics, Classification of Second order PDEs, reduction to canonical forms, derivation of the equations of mathematical physics and their solutions by separation of variables.
Unit IV: Boundary value problems - Transforming Boundary value problem of PDE and ODE, Sturm - Liouville system, eigen values and eigen functions, simple properties, expansion in eigen functions, Parseval's identity, Green's function method.

References:

MSE(M)-XI.3 : COMPLEX ANALYSIS II

Credits: 5 (4L + 1T +0P)  Marks: 100
Contact hrs per week: 6  C1+ C2: 50
Exam Duration: 2 hrs  C3: 50

COURSE CONTENT:
Unit I: The Calculus of Residues The residue theorem, argument principle, Evaluation of definite integrals.
Unit II: Harmonic functions Definition and basic properties, mean value property, Poisson’s formula, Schwarz’s theorem, reflection principle.


References:
2. Conway J B, Functions of one complex variable, Narosa, New Delhi.

MSE(M)-XI.4 : TOPOLOGY II

Credits : 5 (4L + 1T + 0P)                  Marks: 100
Contact hrs per week: 6                  C₁+ C₂: 50
Exam Duration: 2 hrs                    C₃: 50

COURSE CONTENT:

Unit I: Countability and Separation axioms - the countability axioms, the separation axioms, normality of a compact Hausdorff space.

Unit II: Urysohn's lemma, Tietze's extension theorem, Urysohn's metrization theorem, Partitions of unity.

Unit III: Tychonoff's theorem on the product of compact spaces. Local finiteness, Paracompactness, Normality of a paracompact space.


References:
MSE(M)-XI.5 : INTERNSHIP PROGRAMME

Credits: 4  
Duration: 4 weeks  
Max Marks: 100  
C1 + C2 : 50  
C3 : 50

Objectives:
To provide field experience to the students to develop competencies and skills required for effective classroom teaching at the senior secondary level; class management; evaluation of student learning; organization of cocurricular activities; to enable students to develop proper professional attitudes, values and interests; to establish a closer professional link between RIE Mysore and schools in the region.

COURSE CONTENT:
The course is organized into activities distribution over two phases.

Phase 1 :  Internship (3 weeks)

Phase 2 :  Post-Internship and Critical Reflection of Internship Experience

Activities:
- Student teachers will teach 12 lessons (including 2 practicals) at Senior Secondary level
- Student teachers will observe a minimum of 5 lessons of their peers
- The student teachers will organize various activities- co-curricular and extended subject based in the school.
- The student teachers will participate in various academic and administrative activities including monitoring and supervising students in school conducted tests and examinations.
- The student teachers will diagnose the learning difficulties of students and provide remedial instruction.
- The student teachers will conduct CCE and unit tests and prepare evaluation records
- The student teachers will carry out action research project, analyse and write the report

(C1 : Observation, Evaluation and Activity Records;  C2 : Action Research Report & Post-Internship Activities; C3 : Teaching and C1, C2 and C3 are internal evaluation only)
## TWELFTH SEMESTER

### MSE(M)-XII.1 : COMMUTATIVE ALGEBRA

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<td>Exam Duration : 2 hrs</td>
<td>C₃ : 50</td>
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**COURSE CONTENT:**

**Unit I:** Rings and ideals - Rings and ring homomorphisms, Ideals, Quotient rings, zero-divisors, nilpotent elements, units, prime ideals and maximal ideals.

**Unit II:** The prime spectrum of a ring, the nil radical and Jacobson radical, operation on ideals, extension and contraction.

**Unit III:** Modules - Modules and modules homomorphisms, submodules and quotient modules, Direct sums, Free modules Finitely generated modules, Nakayama Lemma, Simple modules, Exact sequences of modules.

**Unit IV:** Modules with chain conditions - Artinian and Noetherian modules, modules of finite length, Artinian rings, Noetherian rings, Hilbert basis theorem.

**References :**

### MSE(M)-XII.2 : MEASURE THEORY

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**COURSE CONTENT:**

**Unit I:** Lebesgue measure ‒ outer measure, measurable sets and Lebesgue measure, a non-measurable set, measurable functions, Ergroff theorem, Littlewoodâ€™s three principles, Lusinâ€™s theorem.

**Unit II:** The Lebesgue integral ‒ the Lebesgue integral of a bounded function over a set of finite measure, the integral of non-negative function, the general Lebesgue integral.
Unit III: Differentiation and Integration ï differentiation of monotonic functions, functions of bounded variation, differentiation of an integral, absolute continuity.

Unit IV: Measure and Integration ï measure spaces, measurable functions, integration, signed measures, the Radon-Nikodym theorem, measure and outer-measure, outer measure and measurability, the extension theorem, product measures.

References:
1. Royden H L, Real Analysis, Prentice Hall, 3rd Ed.

MSE(M)-XII.3 : ALGORITHMS AND COMPUTATION

Credits :5 (4L + 1T +0P)  
Marks: 100
Contact hrs per week: 6  
C1+ C2: 50
Exam Duration : 2 hrs  
C3 : 50

COURSE CONTENT:


Unit II: Interpolation algorithms - equal, unequal intervals, central difference and inverse interpolation. Numerical differentiation and integration and their error calculations.

Unit III: Graph theoretical algorithms - Connectivity, finding shortest path between two vertices, enumeration of all paths, construction of minimum spanning tree, cutest cut vertex, coding and decoding.


References :
2. Deo Narsingh (1987), Graph Theory With Applications to Engineering and Computer Science, Prentice Hall of India.
MSE(M)-XII.4: DIFFERENTIAL GEOMETRY

Credits :5 (4L + 1T +0P)  
Contact hrs per week: 6  
Exam Duration : 2 hrs  
Marks: 100  
C_1+ C_2 : 50  
C_3 : 50

COURSE CONTENT:

Unit II: The First Fundamental form – The lengths of curves on surfaces, Isometries of surfaces, Conformal mappings of surfaces, Surface area, Equi-area Maps and a theorem of Archimedes.


Unit IV: Geodesics- Definition and basic properties, Geodesics equations, Geodesics on surfaces of revolution, Geodesics as shortest paths, Geodesic co-ordinates.

References :

MSE(M)-XII.5 : RESEARCH IN MATHEMATICS EDUCATION

Credits: 3 (2L+1T+0P)  
Max.Marks :100  
Contact Hrs per week : 4  
C_1 + C_2 : 50  
Exam. Duration:  2 hrs  
C_3 : 50

COURSE CONTENT:
Unit I: Research methods in Mathematics Education. Contrasts and oblique connections in historical conceptual developments and classroom learning in Mathematics.

Unit II: Complex interplay between theory in Mathematics Education and Teacher’s Practice. Reflections and examples.
Unit III:
Linking researching with Teaching. Towards synergy of scholarly and craft knowledge.

Unit IV:
Linking Research and curriculum development. Making productive contributions to policy and practice.

References:

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