



**COUNCIL OF  
HIGHER SECONDARY EDUCATION  
ODISHA, BHUBANESWAR**

**COURSES OF STUDIES  
IN  
SCIENCE STREAM**

**FOR THE  
HIGHER SECONDARY EXAMINATION  
2015 AD**

**ADMISSION BATCH 2013-14**

**Rs.20.00**

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## **SCHEME OF STUDIES**

The following combinations in two years +2 Science course of 2013-14 admission batch under CHSE(O) are allowed. Any deviation to this shall not be entertained.

### **1. Compulsory Subjects**

- a) English
- b) M.I.L. (Oriya / Telugu/ Bengali/ Urdu / Hindi/ Sanskrit/Alternative English)

Compulsory subjects( English and M.I.L.) carry 200 marks each

(100 Marks in 1st year and 100 marks in 2nd year)

### **2. Compulsory( For college level examination only)**

Three compulsory subjects, Environmental Education(EE),Yoga and Basic Computer Education(BCE) carry 100 marks each(1<sup>st</sup> year-Theory-70 marks and 2<sup>nd</sup> year-project/practical 30 marks) will be assessed at the college level and the grades (A+, A, B, C, D, in order of merit) are to be awarded by the College and the same shall be recorded in the body of the pass certificate given by the council subsequently. The grade secured in (EE/Yoga/BCE) will not affect the result of the candidate. The grade secured in individual subject shall be as follows.

<b><u>Marks</u></b>	<b><u>Grade</u></b>
70% and above	Gr A+
60% to 69%	Gr A
50% to 59%	Gr B
35% to 49%	Gr C
Below 35%	Gr D

### **3. Elective Subjects**

- a) First Elective: Physics
- b) Second Elective: Chemistry
- c) Third Elective : Mathematics / Biology / Geology
- d) Fourth Elective: Mathematics/Biology/Geology/Electronics/ Statistics/  
Geography / Computer Science/Information Technology /  
Biotechnology/ Economics/Sanskrit

Elective Subjects carry 200 marks each (100 marks in 1<sup>st</sup> year and 100 marks in 2<sup>nd</sup> year)

A student has to offer four elective subjects (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> & 4<sup>th</sup> Elective) in addition to compulsory subjects ( English, MIL ,EE,YOGA and BCE),provided that same subject can not be opted as 3<sup>rd</sup> & 4<sup>th</sup> Electives.

## **COURSE STRUCTURE & DISTRIBUTION OF MARKS IN SUBJECTS**

With the introduction of the new Course structure from the academic session 2006-07 basically to de-stress the students joining +2 courses under the CHSE, Odisha, there will be yearly examinations at the end of 1<sup>st</sup> year and 2<sup>nd</sup> year classes. 1<sup>st</sup> year and 2<sup>nd</sup> year courses have been separated accordingly. The 1<sup>st</sup> Year examination will be conducted at the college / H.S. School level for 100 marks in each subject and the 2<sup>nd</sup> year examination will be conducted at the Council level for 100 marks in each subject and 600 marks in total. Marks secured in the 1<sup>st</sup> year examination shall be considered only for promotion of students to the 2<sup>nd</sup> year class and it will have no bearing on the terminal examination, conducted by the Council at the end of the 2<sup>nd</sup> year. To become eligible for filling up of form for A.H.S examination, a student must have completed 2<sup>nd</sup> year course, sent up in the college level Test examination, secured minimum “ D” grade in the college level examination of each subject i.e EE,YOGA and BCE, secured minimum 75% attendance in individual subject( Theory and practical separately). However a student may be allowed in Alternative English and MIL other than MIL(o) without classes being held.

Pass certificates will be awarded to successful candidates basing on the performance in the Council examination at the end of the 2<sup>nd</sup> year only as follows.

Pass mark (Theory=30%,Practical=40%,Aggregate=35%)

Division (1<sup>st</sup>=60% or above, 2<sup>nd</sup>=50% or above, 3<sup>rd</sup>=35% or above)

## **QUESTION PATTERN & DISTRIBUTION OF MARKS IN SUBJECTS WITH PRACTICAL**

**(Except Biology)**

**FOR H.S EXAMINATION 2015**

**Total Marks-100 (Theory - 70 Marks & Practical- 30 Marks)**

**Theory(Total mark:70 ,Time: 3 hrs)**

**Group – A (Objective Type - Compulsory)**

**Q.1.** Multiple Choice (10 bits from all units) 1 mark each × 10 = 10 marks

**Q.2.** One word answer / Very Short Answer/  
Correct the Sentence / Fill in the blanks. 1 mark each × 10 = 10 marks

**Group – B (Short Answer Type)**

**Q.3..** Answer within two - three sentences 2 marks each × 10 = 20 marks  
(out of 12 bits, one has to answer 10 bits)

**Q.4.** Answer within six sentences 3 marks each × 3 = 9 marks  
(Out of five bits, one has to answer three bits)

**Group C (Long Answer Type)**

**Q5. to Q7** Out of six Questions from all units

one has to answer three question unit wise 7 marks each × 3 = 21 marks

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**QUESTION PATTERN & DISTRIBUTION OF MARKS IN**  
**BIOLOGY FOR H.S EXAMINATION-2015**

**Botany** –(Theory- 35 marks, Practical -15 marks)

**Zoology** –(Theory- 35 marks, Practical -15 marks)

**(Theory:35 marks, Time:2hrs)**

**Group - A: Objective Type- Compulsory**

- |      |  |                           |
|------|--|---------------------------|
| Q.1. | Multiple choice / One word answer          | 1 mark each x 5 = 5 marks |
| Q.2. | Correct the sentences / Fill in the blanks | 1 mark each x 4 = 4 marks |

**Group - B: Short Answer Type**

- |      |  |                            |
|------|--|----------------------------|
| Q.3. | Answer within two / three sentences<br>(Out of 8 bits - one has to answer 5 bits)                | 2 marks each x 4 = 8 marks |
| Q.4. | Short answer type. (Out of 4 bits, 2 bits<br>to be answered within 5 sentences<br>with diagram.) | 3 marks each x 2 = 6 marks |

**Group - C: Long Answer Type**

- |            |   |                             |
|------------|---|-----------------------------|
| Q.5 to Q.8 | Out of 4 questions from all units,<br>one has to answer 2 questions | 6 marks each x 2 = 12 marks |
|------------|---|-----------------------------|

**QUESTION PATTERN AND DISTRIBUTION OF MARKS IN SUBJECT WITHOUT  
PRACTICAL**

**For H.S. Examination 2015 (Total Marks – 100, Time:3hrs)**

**Group – A (Objective Type – Compulsory)**

- |     |   |                            |
|-----|---|----------------------------|
| Q.1 | Multiple choice (15 bits from all units)  | 1 mark each x 15 =15 marks |
| Q.2 | One word answer / Very short answer/<br>correct the sentence / fill in the blanks | 1 mark each x 15=15 marks  |

**Group B (Short Answer Type)**

- |      |  |                             |
|------|--|-----------------------------|
| Q.3  | Answer within Two/three sentences<br>(out of 14 bits, one has to answer 11 bits) | 2 marks each x 11 =22 marks |
| Q.4. | Answer within six sentences<br>(Out of eight bits, one has to answer six bits)   | 3 marks each x 6 = 18 marks |

**Group C(Long Answer type)**

- |                    |  |                               |
|--------------------|--|-------------------------------|
| Q.5.<br>to<br>Q.10 | Out of six Questions from all units, one has to answer<br>4 questions. | 7.5 marks each x 4 = 30 marks |
|--------------------|--|-------------------------------|

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**ENGLISH**  
**+2, 1<sup>st</sup> year Science**  
**(Detailed syllabus)**

**No of perids: Yearly-80**

**Unit-I : PROSE**

- |  |                        |
|--|------------------------|
| i. Standing Up for Yourself                    | Yevgeny Yevtushenko    |
| ii. The Legend behind a Legend                 | Hariharan Balakrishnan |
| iii. The Golden Touch                          | Nathaniel Hawthorne    |
| iv. In London In Minus Fours                   | Louis Fischer          |
| v. The Cancer Fight, from Hiroshima to Houston | Ritsuko Komaki         |

**Unit-II : POETRY**

- |   |                    |
|---|--------------------|
| i. Stopping by Woods on a Snowy Evening | Robert Frost       |
| ii. Oft, in the Stilly Night            | Thomas Moore       |
| iii. The Inchcape Rock                  | Robert Southey     |
| iv. To My True Friend                   | Elizabeth Pinard   |
| v. Fishing                              | Gopa Ranjan Mishra |

**Unit-III : NON DETAILED STUDY**

- |                              |                     |
|------------------------------|---------------------|
| i. Three Questions           | Leo Tolstoy         |
| ii. After Twenty Years       | O. Henry            |
| iii. The Open Window         | Saki                |
| iv. The One and only Houdini | Robert Lado         |
| v. Childhood                 | Jawaharlal Nehru    |
| vi. Marriage                 | Dr. Rajendra Prasad |

**Unit-IV: WRITING SKILLS**

- (i) Writing a Paragraph
- (ii) Developing Ideas into Paragraphs
- (iii) Writing Personal Letters and Notes
- (iv) Writing Applications, Official Letters and Business letters
- (v) Writing Telegrams, E-mails, Personal Advertisements and Short Notices
- (vi) Using Graphics

**Unit- V : GRAMMAR**

- |                                    |                    |
|------------------------------------|--------------------|
| I. Countable and Uncountable Nouns |                    |
| II. Tense Patterns                 | III. Modal Verbs   |
| IV. Prepositions                   | V. The Imperatives |

**Books prescribed :** Invitation to English- 1, 2, 3 & 4, published by Odisha State Bureau of Textbook Preparation & Production, Bhubaneswar.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**ENGLISH**

**+ 2, 1<sup>st</sup> year Science (For College Level Examination)**

**Full Mark : 100**

**Time : 3 Hrs.**

- 1. Reading Comprehension**
  - (a) Prescribed Prose Pieces. (5 questions to be answered, each carrying 2 marks) 10 marks
  - (b) Prescribed Poems (5 questions to be answered each carrying 2 marks) 10 marks
  - (c) Prescribed Extensive Reading Texts (2 questions to be answered carrying 5 marks each; only global, inferential and evaluative questions to be set) 10 marks
- 2. Reading - related skills**
  - (a) Vocabulary skills 5 marks
  - (b) Information Transfer (Converting verbal information to non-verbal forms, such as diagrams, charts and tables) 5 marks
  - (c) Reordering/sequencing sentences 5 marks
  - (d) Dictionary/Reference skills (2 marks on using a dictionary, and 3 marks meanings of a word) 5 marks
  - (e) Cohesive Devices 5 marks
- 3. Writing skills**
  - a) Letter Writing (personal/official/commercial: Word limit: 150) 10 marks
  - b) Description of object/event /process (Word limit: 150) 10 marks
  - c) Slogan/telegram/caption writing (Word limit: 10) 5 marks
- 4. Grammar in context** 10 marks
- 5. Translation/story-developing** 10 marks

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**ENGLISH**  
**+2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**No. of periods: Yearly-80**

**Unit-I : PROSE**

- |      |                               |   |
|------|-------------------------------|---|
| i.   | My Greatest Olympic Prize     | Jesse Owens   |
| ii.  | On Examinations               | Winston S. Churchill  |
| iii. | The Portrait of a Lady        | Khushwant Singh   |
| iv.  | The Magic of Teamwork         | Sam Pitroda<br>Bonnie A. M. Okonek and Linda<br>Morganstein |
| v.   | Development of Polio Vaccines |   |

**Unit – II : POETRY**

- |      |                               |                            |
|------|-------------------------------|----------------------------|
| i.   | Daffodils                     | William Wordsworth         |
| ii.  | The Ballad of Father Gilligan | William Butler Yeats       |
| iii. | A Psalm of Life               | Henry Wadsworth Longfellow |
| iv.  | Television                    | Roald Dahl                 |
| v.   | Money Madness                 | D.H. Lawrence              |

**Unit – III : NON-DETAILED STUDY**

- |      |                              |                 |
|------|------------------------------|-----------------|
| I.   | The Doctor's Word            | R K Narayan     |
| II.  | The Nightingale and the Rose | Oscar Wilde     |
| iii. | Mystery of the Missing Cap   | Manoj Das       |
| iv.  | The Monkey's Paw             | W.W Jacobs      |
| v.   | My Mother                    | Charlie Chaplin |
| vi.  | Stay Hungry. Stay Fit.       | Steve Jobs      |

**Unit – IV : WRITING SKILLS**

- (i) Interpreting Graph, Charts Tables and diagrams etc
- (ii) Reporting Events and Business Matters
- (iii) Note-making and summarizing
- (iv) Extended Writing:

**Unit – V : GRAMMAR**

- I. Revision of 'Tense Pattern's' and 'Modal verbs'
- II. Conditionals
- III. The Passive
- IV. Direct and Reported Speech
- V. Interrogatives
- VI. Phrasal Verbs

**Books prescribed :** Invitation to English -1, 2, 3 & 4, published by Odisha State Bureau of Textbook Preparation & Production, Bhubaneswar.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**

**ENGLISH**

**+2, 2<sup>nd</sup> year Science (For H.S. Examination 2015)**

**Full Mark : 100**

**Time : 3 Hrs.**

**1. Reading Comprehension**

- |     |  |          |
|-----|--|----------|
| (a) | Prescribed prose Pieces<br>(5 questions to be answered carrying 2 marks each)  | 10 marks |
| (b) | Prescribed Poems (5 questions to be answered carrying 2 marks each)  | 10 marks |
| (c) | Prescribed Extensive Reading Texts<br>(2 questions to be answered carrying 5 marks each, only global,<br>inferential and evaluative questions to be set on a passage of about 250 words) | 10 marks |
| (d) | Unseen Prose passage (5 questions including inferential ones,<br>carrying 2 marks each)  | 10 marks |

**2. Reading- related skills**

- |     |  |         |
|-----|--|---------|
| a)  | Vocabulary skills (to be tested on the unseen passage)                               | 5 marks |
| (b) | Information transfer (70 words) (Converting non-verbal information into verbal form) | 5 marks |
| (c) | Dictionary/Reference skills  | 5 marks |

**3. Writing skills**

- |     |   |          |
|-----|---|----------|
| (a) | Report writing (200 words)                    | 10 marks |
| (b) | Guided Note making on a given passage         | 7 marks  |
| (c) | Summarizing on the same passage               | 8 marks  |
| (d) | Essay writing (250 words - on given outlines) | 10 marks |

**4. Grammar in context**

10 marks

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ଆଧୁନିକ ଭାରତୀୟ ଭାଷା – ଓଡ଼ିଆ  
+୨ ପ୍ରଥମ ବର୍ଷ – ବିଜ୍ଞାନ  
(ସବିଶେଷ ପାଠ୍ୟକ୍ରମ)

ପିରିଅଡ ସଂଖ୍ୟା – ବାର୍ଷିକ-୮୦

ପ୍ରଥମ ଏକକ – ଗଦ୍ୟ (୨୦ ପିରିଅଡ)

୧. ଅସୁର ଦୀଘି – ଫକୀର ମୋହନ ସେନାପତି
୨. ମୋ ସମୟର ଭାରତ ଓ ଓଡ଼ିଶା – ଡ. କୃଷ୍ଣଚନ୍ଦ୍ର ପାଣିଗ୍ରାହୀ
୩. ଆମେରିକାର ବିଶ୍ୱବିଦ୍ୟାଳୟମାନେ – ହୃଦାନନ୍ଦ ରାୟ
୪. ଜୈବ ଭାସ୍କର୍ଯ୍ୟର ଅନୁପମ ବିନ୍ଦାଣି ଜିନ୍ – ଶୈଳଶୂର ନନ୍ଦ

ଦ୍ୱିତୀୟ ଏକକ – ପଦ୍ୟ (୨୦ ପିରିଅଡ)

୧. ସତ୍ୟ ଆତ୍ମ କଥା – ସାରଳା ଦାସ
୨. ଛାଟ ପକାଇ କଲେ ଚିନ୍ତା – ଜଗନ୍ନାଥ ଦାସ
୩. ସରସୀରେ ରାଜକନ୍ୟା – କବି ସମ୍ରାଟ ଉପେନ୍ଦ୍ରଭଞ୍ଜ
୪. ଗଲାଣିତ ଗଲାକଥା – କବି ସୂର୍ଯ୍ୟ ବଳଦେବ ରଥ
୫. ସତ୍ୟରେ ମରିବି ସତ୍ୟର ତରିବି – ଭୀମ ଭୋଇ

ତୃତୀୟ ଏକକ – ଏକାଙ୍କିକା (୨୦ ପିରିଅଡ)

୧. ଦୂର ପାହାଡ – ପ୍ରାଣବନ୍ଧୁ କର
୨. ମକଦ୍ଦମା – ଗୋପାଳ ଛୋଟରାୟ
୩. ଛଦ୍ମବେଶୀ – ବିଶ୍ୱଜିତ୍ ଦାସ

ଚତୁର୍ଥ ଏକକ – ବ୍ୟାକରଣ (୨୦ ପିରିଅଡ)

୧. ପ୍ରବନ୍ଧ ରଚନା / ଭାବ ସଂପ୍ରସାରଣ
୨. ରୂପ ପ୍ରୟୋଗ
୩. ପଦ ନିର୍ଣ୍ଣୟ

ପାଠ୍ୟଗ୍ରନ୍ଥ : ସାହିତ୍ୟ ସରଣୀ – ପ୍ରଥମ ଭାଗ (ଓଡ଼ିଶା ରାଜ୍ୟ ପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ୱର)

ପ୍ରଶ୍ନପତ୍ର ଜାଣି ଓ ମାର୍କ ବିନ୍ୟାସ  
ଆଧୁନିକ ଭାରତୀୟ ଭାଷା – ଓଡ଼ିଆ  
+୨ ପ୍ରଥମ ବର୍ଷ – ବିଜ୍ଞାନ (କଲେଜ ସ୍ତରୀୟ ପରୀକ୍ଷା)

ପୂର୍ଣ୍ଣ ସଂଖ୍ୟା-୧୦୦

ସମୟ-୩୦ମିନିଟ୍

ପ୍ରଥମ ଭାଗ (ଅତି ସଂକ୍ଷିପ୍ତ ଉତ୍ତରମୂଳକ ପ୍ରଶ୍ନ)

ପ୍ରଶ୍ନ ୧. ପ୍ରତ୍ୟେକ ପ୍ରଶ୍ନର ୪ଟି ସମ୍ଭାବ୍ୟ ଉତ୍ତର ମଧ୍ୟରୁ ଠିକ୍ ଉତ୍ତରଟି ବାଛି ।

ଗନ୍ଧ	-	୧ x ୪ = ୪	( ୧ x ୧୪ = ୧୪ ନମ୍ବର )
ପଦ୍ୟ	-	୧ x ୪ = ୪	
ଏକାଙ୍କିକା	-	୧ x ୪ = ୪	

ପ୍ରଶ୍ନ ୨. ଗୋଟିଏ ବାକ୍ୟରେ ଉତ୍ତର ଲେଖ । ( ୧ x ୧୩ = ୧୩ ନମ୍ବର )

ଗନ୍ଧ-ମାଟିରୁ ୨ ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ - ୧ x ୨ = ୨

ପଦ୍ୟ-ମାଟିରୁ ୨ ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ - ୧ x ୨ = ୨

ଏକାଙ୍କିକା-ମାଟିରୁ ୨ ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ - ୧ x ୨ = ୨

ବ୍ୟାକରଣ-ଏକ ଗନ୍ଧ ଅନୁଚ୍ଛେଦର ୧୦ଟି ରେଖାଙ୍କିତ

ପଦ୍ୟ ମଧ୍ୟରୁ ୭ଟିର ପଦ ଚିହ୍ନିତ ଦେବାକୁ ହେବ - ୧ x ୭ = ୭

ଦ୍ୱିତୀୟ ଭାଗ (ସଂକ୍ଷିପ୍ତ ଉତ୍ତରମୂଳକ ପ୍ରଶ୍ନ)

ପ୍ରଶ୍ନ ୩. ୧୪ଟି ପ୍ରଶ୍ନ ମଧ୍ୟରୁ ୧୧ଟିର ଉତ୍ତର ପ୍ରତ୍ୟେକ ୨ଟି ବାକ୍ୟରେ ଲେଖ ।

( ୨ x ୧୧ = ୨୨ ନମ୍ବର )

ଗନ୍ଧ- ମାଟିରୁ ୨ ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ - ୨ x ୨ = ୪

ପଦ୍ୟ- ମାଟିରୁ ୨ ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ - ୨ x ୨ = ୪

ଏକାଙ୍କିକା- ମାଟିରୁ ୨ ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ - ୨ x ୨ = ୪

ବ୍ୟାକରଣ- ରାତି ପ୍ରୟୋଗରୁ ୮ଟି ପ୍ରଶ୍ନରୁ ୫ଟିର

ଉତ୍ତର ଦେବାକୁ ହେବ । - ୨ x ୫ = ୧୦

ପ୍ରଶ୍ନ ୪. ୩୦ଟି ଶବ୍ଦରେ ଉତ୍ତର ଲେଖ ।

(୩ x ୬ = ୧୮ ନମ୍ବର)

ପଦ୍ୟ — ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ ।

ଗଦ୍ୟ — ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ ।

ଏକାଙ୍କିକା — ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ ।

### ତୃତୀୟ ଭାଗ (ଦୀର୍ଘ ଉତ୍ତରମୂଳକ ପ୍ରଶ୍ନ)

ପ୍ରଶ୍ନ ୫. ରୁ ୮. ପ୍ରତ୍ୟେକ ପ୍ରଶ୍ନର ଉତ୍ତର ୧୫୦ଟି ଶବ୍ଦ ମଧ୍ୟରେ ଦେବାକୁ ହେବ ।

(୮ x ୪ = ୩୨ ନମ୍ବର)

ଗଦ୍ୟ : ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (୮ x ୧ = ୮ ନମ୍ବର)

ପଦ୍ୟ : ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (୮ x ୧ = ୮ ନମ୍ବର)

ଏକାଙ୍କିକା : ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (୮ x ୧ = ୮ ନମ୍ବର)

ପ୍ରବନ୍ଧ/ଭାବସଂପ୍ରସାରଣ : ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (୮ x ୧ = ୮ ନମ୍ବର)

ଆଧୁନିକ ଭାରତୀୟ ଭାଷା – ଓଡ଼ିଆ

+୨ ଦ୍ଵିତୀୟ ବର୍ଷ – ବିଜ୍ଞାନ

(ସବିଶେଷ ପାଠ୍ୟକ୍ରମ)

ପିରିଅଡ୍ ସଂଖ୍ୟା – ବାର୍ଷିକ-୮୦

ପ୍ରଥମ ଏକକ – ଗଦ୍ୟ (୨୦ ପିରିଅଡ୍)

୧. ଜାତୀୟ ଜୀବନରେ ସାହିତ୍ୟର ସ୍ଥାନ – ବିଶ୍ଵନାଥ କର
୨. କ୍ଷମା – ମାୟାଧର ମାନସିଂହ
୩. ଭୁଲ – ଭୁବନେଶ୍ଵର ବେହେରା
୪. ଜାତିର ଜୀବନ ଓ ସଂସ୍କୃତି – ଗୋଲୋକ ବିହାରୀ ଧଳ

ଦ୍ଵିତୀୟ ଏକକ – ପଦ୍ୟ (୨୦ ପିରିଅଡ୍)

୧. ଚନ୍ଦ୍ରଭାଗା – ରାଧାନାଥ ରାୟ
୨. ସ୍ଥୂଳ କଳେବର ନୁହଇ ଅମର – ଗଙ୍ଗାଧର ମେହେର
୩. ଧର୍ମପଦର ଆତ୍ମଲିପି – ଗୋପବନ୍ଧୁ ଦାସ
୪. ଗ୍ରାମ ଶ୍ଳୁଷାନ – ସଚ୍ଚିଦାନନ୍ଦ ରାଉତରାୟ
୫. ବିଶ୍ଵଜୀବନ ପଥେ – ରାଧାମୋହନ ଗଡନାୟକ

ତୃତୀୟ ଏକକ – ଗଳ୍ପ (୨୦ ପିରିଅଡ୍)

୧. ଏବେ ମଧ୍ୟ ବଞ୍ଚିଛି – ଗୋଦାବରୀଶ ମହାପାତ୍ର
୨. ବିଚ୍ଛନ୍ନ ଓ ରେଳଗାଡ଼ି – କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ
୩. ଅନେକ ସ୍ମୃତ ହସ – ମନୋଜ ଦାସ
୪. ଦର୍ଶନ – ବୀଣାପାଣି ମହାନ୍ତି

ଚତୁର୍ଥ ଏକକ – ବ୍ୟାକରଣ (୨୦ ପିରିଅଡ୍)

୧. ଦରଖାସ୍ତ ଲିଖନ ।
୨. ଅବରୋଧ ପରୀକ୍ଷଣ ।
୩. ବିପରୀତ ଅର୍ଥ ବୋଧକ ଶବ୍ଦ ।
୪. ସମୋଚ୍ଚାରିତ ଭିନ୍ନାର୍ଥବୋଧକ ଶବ୍ଦ ।
୫. ଏକପଦୀକରଣ ।

ପାଠ୍ୟଗ୍ରନ୍ଥ : ସାହିତ୍ୟ ସରଣୀ – ଦ୍ଵିତୀୟ ଭାଗ (ଓଡ଼ିଶା ରାଜ୍ୟ ପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ପ୍ରକାଶନ ସଂସ୍ଥା, ଭୁବନେଶ୍ଵର)

ପ୍ରଶ୍ନପତ୍ର ଜାଣି ଓ ମାର୍କ ବିନ୍ୟାସ  
ଆଧୁନିକ ଭାରତୀୟ ଭାଷା – ଓଡ଼ିଆ  
+୨ ଦ୍ଵିତୀୟ ବର୍ଷ – ବିଜ୍ଞାନ (ଉଚ୍ଚ ମାଧ୍ୟମିକ ପରୀକ୍ଷା – ୨୦୧୫)

ପୂର୍ଣ୍ଣ ସଂଖ୍ୟା-୧୦୦

ସମୟ-୩୦ମିନିଟ୍

**ପ୍ରଥମ ଭାଗ (ଅତି ସଂକ୍ଷିପ୍ତ ଉତ୍ତରମୂଳକ ପ୍ରଶ୍ନ)**

ପ୍ରଶ୍ନ ୧. ୧୫ଟି ପ୍ରଶ୍ନର ୪ଟି ଲେଖାଏଁ ସମ୍ଭାବ୍ୟ ଉତ୍ତର ମଧ୍ୟରୁ ଠିକ୍ ଉତ୍ତରଟି ବାଛି । (୧ x ୧୫ = ୧୫ ନମ୍ବର)

ଗଦ୍ୟ — ୧ x ୫ = ୫

ପଦ୍ୟ — ୧ x ୫ = ୫

ଗଳ୍ପ — ୧ x ୫ = ୫

ପ୍ରଶ୍ନ ୨. ୧୫ଟି ପ୍ରଶ୍ନର ଗୋଟିଏ ବାକ୍ୟରେ ଉତ୍ତର / ଶୂନ୍ୟସ୍ଥାନ ପୂରଣ / ଭ୍ରମ ସଂଶୋଧନ । (୧ x ୧୫ = ୧୫ ନମ୍ବର)

ଗଦ୍ୟ-୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ - ୧ x ୨ = ୨

ପଦ୍ୟ-୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ - ୧ x ୨ = ୨

ଗଳ୍ପ - ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ - ୧ x ୨ = ୨

ବ୍ୟାକରଣ-ବିପରୀତ ବୋଧକଶିଦ୍ଧ (୫ଟିରୁ ୩ଟିର) - ୧ x ୩ = ୩

ସମୋଚ୍ଚାରିତ ଭିନ୍ନାର୍ଥବୋଧକ ଶବ୍ଦ (୫ଟିରୁ ୩ଟିର) - ୧ x ୩ = ୩

ଏକପଦିକରଣ (୫ଟିରୁ ୩ଟିର) — ୧ x ୩ = ୩

**ଦ୍ଵିତୀୟ ଭାଗ (ସଂକ୍ଷିପ୍ତ ଉତ୍ତରମୂଳକ ପ୍ରଶ୍ନ)**

ପ୍ରଶ୍ନ ୩. ୧୫ଟି ପ୍ରଶ୍ନ ମଧ୍ୟରୁ ଯେକୌଣସି ୧୧ଟିର ଉତ୍ତର ପ୍ରତ୍ୟେକ ୨ଟି ବାକ୍ୟରେ ଲେଖି ।

( ୨ x ୧୧ = ୨୨ ନମ୍ବର)

ଗଦ୍ୟ- ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ — ୨ x ୨ = ୪

ପଦ୍ୟ- ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ — ୨ x ୨ = ୪

ଗଳ୍ପ - ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ — ୨ x ୨ = ୪

ବ୍ୟାକରଣ- ଅବବୋଧ ପରୀକ୍ଷଣ ନିମନ୍ତେ ଏକ

ଗଦ୍ୟ ଅନୁଲେଖ ଦିଆଯିବ ଓ ସେଥିରୁ ୫ଟି ପ୍ରଶ୍ନ ପଡ଼ିବ । - ୨ x ୫ = ୧୦

ପ୍ରଶ୍ନ ୪. ସମସ୍ତ ଏକକ ମଧ୍ୟରୁ  $\Gamma$  ଟି ପ୍ରଶ୍ନରୁ ୬ଟିର ପ୍ରତ୍ୟେକ ପ୍ରଶ୍ନର ଉତ୍ତର ୩୦ଟି ଶବ୍ଦରେ ଲେଖ ।

(୩ x ୬ = ୧୮ ନମ୍ବର)

(୯ଟି ପ୍ରଶ୍ନରୁ ୬ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ)

ପଦ୍ୟ — ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ ।

ଗଦ୍ୟ — ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ ।

ଗଛ — ୩ଟିରୁ ୨ଟିର ଉତ୍ତର ଦେବାକୁ ହେବ ।

### ତୃତୀୟ ଭାଗ (ଦୀର୍ଘ ଉତ୍ତରମୂଳକ ପ୍ରଶ୍ନ)

ପ୍ରଶ୍ନ ୫. ରୁ  $\Gamma$ . ପ୍ରତ୍ୟେକ ପ୍ରଶ୍ନର ଉତ୍ତର ୧୫୦ଟି ଶବ୍ଦ ମଧ୍ୟରେ ଦେବାକୁ ହେବ ।

(୩୦ ନମ୍ବର)

ଗଦ୍ୟ : ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (୮ x ୧ = ୮ ନମ୍ବର)

ପଦ୍ୟ : ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (୮ x ୧ = ୮ ନମ୍ବର)

ଗଛ : ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (୮ x ୧ = ୮ ନମ୍ବର)

ଦରଖାସ୍ତ ଲିଖନ : ୨ଟି ପ୍ରଶ୍ନରୁ ଗୋଟିକର ଉତ୍ତର ଦେବାକୁ ହେବ । (୬ x ୧ = ୬ ନମ୍ବର)

**M.I.L. (HINDI)**  
**+2 1<sup>st</sup> Year Science**  
**(Detailed Syllabus)**

**No. of Periods : Yearly - 80**

- |                             |            |
|-----------------------------|------------|
| 1. Unit – I (गद्य)          | 20 Periods |
| सम्पूर्ण (All)              |            |
| 2. Unit – II (काव्य)        | 20 Periods |
| सम्पूर्ण (All)              |            |
| 3. Unit – III (भाषा अध्ययन) | 20 Periods |
| सम्पूर्ण (All)              |            |
| 4. Unit – IV (निबन्ध)       | 20 Periods |
| शमसामयिक विषय (All)         |            |

**Books Prescribed :**

- |                              |                          |
|------------------------------|--------------------------|
| पाठक पुस्तक : साहित्य विविधा | - सं.प्र. एम. वेंकटेश्वर |
|                              | - डा. स्मरप्रिया मिश्र   |
|                              | - सोनम प्रकाशन,          |
|                              | बादामबाडी, कटक           |

**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**MIL (HINDI)**

**+2 1<sup>st</sup> Year Science (For College Level Exam.)**

**Full Mark : 100**

**Time : 3 Hrs.**

**GROUP-A (OBJECTIVE TYPE)**

- |  |                 |
|--|-----------------|
| 1. Multiple Choice (5 questions from units I, II & III each) | [1x15=15 Marks] |
| 2. One word answer (from units I, II & III) /                | [1x15=15 Marks] |
| Correct the sentences (from units I, II & III)               |                 |
| Fill up the Blanks from units I, II & III                    |                 |

**GROUP-B (SHORT ANSWER TYPE)**

- |  |                 |
|--|-----------------|
| 3. Write notes on any five (From Unit-I, II & III)                   | [2x11=22 Marks] |
| (out of 14 bits, one has to answer 11 bits in 2 to 3 sentences each) |                 |
| 4. Explain only (From Unit – I & II)                                 | [3x6=18 Marks]  |
| (out of 8 bits, one has to answer 6 bits in 6 sentences each)        |                 |

**GROUP-C (LONG ANSWER TYPE)**

- |   |                  |
|---|------------------|
| 5. to 10. Long answer type questions from units I, II, III & IV             | [7½ x4=30 Marks] |
| (out of 6 questions, one has to answer 4 questions in about 150 words each) |                  |



**M.I.L. (HINDI)**  
**+2 2nd Year Science**  
(Detailed Syllabus)

**No. of Periods : Yearly - 80**

- |  |            |
|--|------------|
| 1. Unit – I (गद्य)                       | 20 periods |
| सम्पूर्ण (All)                           |            |
| 2. Unit – II (काव्य)                     | 20 periods |
| सम्पूर्ण (All)                           |            |
| 3. Unit – III (कहानी)                    | 20 periods |
| सम्पूर्ण (All)                           |            |
| 4. Unit – IV                             | 20 periods |
| (क) पत्र लेखन (व्यक्तिगत एवं आवेदन पत्र) |            |
| (ख) पल्लवन                               |            |

**Books Recommended :**

- |                                  |                          |
|----------------------------------|--------------------------|
| पाठक पुस्तक : साहित्य विविधा- II | - सं.डा. शंकरलाल पुरोहित |
|                                  | - डा. कमलप्रभा कपानी     |

**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**MIL (HINDI)**

**+2 2nd Year Science (For HS Exam. 2015)**

**Full Mark : 100**

**Time : 3 Hrs.**

**GROUP-A (OBJECTIVE TYPE)**

- |  |                 |
|--|-----------------|
| 1. Multiple Choice (5 questions from units I, II & III each) | [1x15=15 Marks] |
| 2. One word answer (from units I, II & III) /                | [1x15=15 Marks] |
| Correct the sentences (from units I, II & III)               |                 |
| Fill up the Blanks from units I, II & III                    |                 |

**GROUP-B (SHORT ANSWER TYPE)**

- |  |                 |
|--|-----------------|
| 3. Write notes on any five (From Unit-I, II & III)                   | [2x11=22 Marks] |
| (out of 14 bits, one has to answer 11 bits in 2 to 3 sentences each) |                 |
| 4. Explain only (From Unit – I & II)                                 | [3x6=18 Marks]  |
| (out of 8 bits, one has to answer 6 bits in 6 sentences each)        |                 |

**GROUP-C (LONG ANSWER TYPE)**

- 5 to 10. Long answer type questions from units I, II, III & IV [7½ x4=30 Marks]  
(out of 6 questions, one has to answer 4 questions in  
about 150 words each)

## M.I.L (BENGALI)

+ 2, 1<sup>st</sup> Year Science  
(Detailed syllabus)

No. of Periods: Yearly-80

### Unit – I : Prose :

20 perids

- |    |                    |   |                             |
|----|--------------------|---|-----------------------------|
| 1. | Bangladeshe Nilkar | - | Pyarichand Mitra            |
| 2. | Sitar Banabas      | - | Iswarchandra Vidyasagar     |
| 3. | Bisarjan           | - | Bankimchandra Chattopadhyay |
| 4. | Sudra Gagan        | - | Swami Vivekananda           |

### Unit – II : Poetry :

20periods

- |    |                  |   |                      |
|----|------------------|---|----------------------|
| 1. | Srigoura Chandra | - | Gobindra Das Kabiraj |
| 2. | Bhabollas        | - | Vidyapati            |
| 3. | Premier Tulana   | - | Durija Chandidas     |
| 4. | Avigir Akshep    | - | Gyandas              |

### Unit – III : Novel (Non-Detailed)

20 periods

- |                             |   |                             |
|-----------------------------|---|-----------------------------|
| Srikanta (Chapter – 1 to 7) | – | Sarat Chandra Chattopadhyay |
|-----------------------------|---|-----------------------------|

### Unit – IV : Grammar

20 periods

Proverbs and Idioms, Sentence and Word formation, Anonyms and Synonyms

### Books Prescribed :

- A. Prose : Uchha Madhayamik Bangia Sankalan (Gadya) for XI & XII, Published by Paschim Banga Uchha Madhyamik Sikshya Sansad, Viswa Vharati.
- B. Poetry : Madhukari – Kalidas Ray, Published by Orient Book Company, Kolkata – 12

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## QUESTION PATTERN AND DISTRIBUTION OF MARKS

### MIL (BENGALI)

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Mark : 100

Time : 3 Hrs

### Group – A (Objective Type – Compulsory)

- Q.1** Multiple choice (15 bits from all units) 1 mark each x 15 =15 marks
- Q.2** One word answer / Very short answer/  
correct the sentence / filling up the blanks 1 mark each x 15=15 marks

### Group B (Short type Answer)

- Q.3** Answer within Two/three sentences 2 marks each x 11 =22 marks  
(out of 14 bits, one has to answer 11 bits)
- Q.4.** Answer within six sentences 3 marks each x 6 = 18 marks  
(Out of eight bits, one has to answer six bits)

### Group C(Long answer type)

- Q5.** Out of six Questions from all units, one has to 7.5 marks each x 4 = 30 marks  
**to** answer 4 questions.
- Q.10**

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**M.I.L (BENGALI)**  
**+2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**No. of perids:Yearly-80**

**Unit – I : Prose :**

**20 periods**

- |    |               |   |                              |
|----|---------------|---|------------------------------|
| 1. | Bangia Bhasa  | - | Haraprasad Sastri            |
| 2. | Tota Kahini   | - | Rabindra Nath Tagore         |
| 3. | Naisha Avijaa | - | Sarat Ch. Chattopadhyay      |
| 4. | Aranya        | - | Bibhuti Bhushan Bandopadhyay |

**Unit – II : Poetry :**

**20 periods**

- |    |                    |   |                        |
|----|--------------------|---|------------------------|
| 1. | Baisakh            | - | Oebendra Nath Sen      |
| 2. | Lohar Byatha       | - | Jatindra Nath Sengupta |
| 3. | Swarga Haite Viday | - | Rabindra Nath Tagore   |
| 4. | Rupai              | - | Jasimuddin             |

**Unit – III : Novel – (Non – detailed Study)**

**20 periods**

Srikanta (Chapter 8 to 12) - Sarat Chandra Chattopadhyay

**Unit – IV : Grammar and Essay**

**20 periods**

1. Pada Paribartan
2. Somas
3. Somo charita – Bhinna Thark Sobda and its application in sentences.

**Books Prescribed :**

**Prose :** Uchha Madhyamik Bangia Sankal an (Gadya) for Class XI & XII, Published by Paschim Banga Uchha Madhyamik Siksha Sansad, Viswa Varati.

**Poetry :** Madhukari – Kalidas Ray, Published by Orient Book Company, Kolkata – 12

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**

**MIL (BENGALI)**

**+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)**

**Full Mark : 100**

**Time : 3 Hrs**

**Group – A (Objective Type – Compulsory)**

**Q.1** Multiple choice (15 bits from all units) 1 mark each x 15 =15 marks

**Q.2** One word answer / Very short answer/

correct the sentence / filling up the blanks 1 mark each x 15=15 marks

**Group B (Short Answer Type)**

**Q.3** Answer within Two/three sentences 2 marks each x 11 =22 marks  
(out of 14 bits, one has to answer 11 bits)

**Q4.** Answer within six sentences 3 marks each x 6 = 18 marks  
(Out of eight bits, one has to answer six bits)

**Group C(Long Answer Type)**

**Q5.** Out of six Questions from all units, one has to answer 4 questions. 7.5 marks each x 4 = 30 marks

**Q.10**

## **M.I.L (TELUGU)**

**+ 2, 1<sup>st</sup> Year Science**

**(Detailed syllabus)**

**No. of periods:Yearly-80**

### **UNIT – I Poetry : (20 periods)**

- |    |                      |   |                          |
|----|----------------------|---|--------------------------|
| 1. | Ekalavyudu           | - | Nannaya Bhattu           |
| 2. | Balivamana Samvadamu | - | Bammera Potana           |
| 3. | Subhashitamulu       | - | Enugu Lakshmana Kavi     |
| 4. | Tokachukka           | - | Gurajada Apparao         |
| 5. | Gongali Purugulu     | - | Balagangadhara Tilak     |
| 6. | Pushpa Vilapamu      | - | Jandhyala Papayya Sastri |

### **UNIT – II Prose : (20 periods)**

- |    |                               |   |                             |
|----|-------------------------------|---|-----------------------------|
| 1. | Mitra Labhamu                 | - | Paravastu Chinnayasuri      |
| 2. | Vemana                        | - | Dr G.V.Krishna Rao          |
| 3. | C.P. Brown Sahitya Seva       | - | Prof. K. Sarvothama Rao     |
| 4. | A I D S                       | - | Dr. Singupuram Narayana Rao |
| 5. | Telugu Patrikala Purva Rangam | - | Namala Visveswara Rao       |

### **UNIT – III Non – Detailed Study : (16 periods)**

- |                    |   |                   |
|--------------------|---|-------------------|
| Raja Raja Prasasti | - | Prof. S. Gangappa |
|--------------------|---|-------------------|

### **UNIT – IV (A) Grammar : (16 periods)**

Vibhaktulu - Pratyayalu, Prakruti - Vikrutulu, Vyatireka Padamulu, Paryaya Padamulu, Jateeyalu - Padabandhalu

### **B) Letter Writing / General Essay:**

#### **BOOKS PRESCRIBED :**

1. Poetry & Prose : Sahitee Vipanchi by Dr. Singupuram Narayana Rao
2. Non-Detailed Study : Raja Raja Prsasti by Prof. S. Gangappa
3. Grammar : Vyakarana Parijatamu by Dr. Singupuram Narayana Rao.

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**QUESTION PATTERN & DISTRIBUTION OF MARKS**

**M.I.L (TELUGU)**

**+ 2, 1<sup>st</sup> Year Science (For College Level Exam)**

**Full Marks: 100**

**Time: 3 hours**

**Group- A (Objective Type - Compulsory)**

- |  |                |
|--|----------------|
| 1. Thirty very short questions (from unit I, II & III) | 1×30 =30 Marks |
| 2. Ten very short questions (from unit IV- A)          | 1×10=10 Marks  |

**Group- B (Short Answer Type)**

- |  |              |
|--|--------------|
| 3. Six short questions(from Unit I, II & III)          | 2×6=12 Marks |
| 4. Four explanations (only Bhavartha from unit I & II) | 2×4=8 Marks  |
| 5. Five short questions (from Unit IV-A)               | 2×5=10 Marks |

**Group -C (Long Answer Type)**

- |   |              |
|---|--------------|
| 6. Three long questions with alternative                  | 7×3=21 Marks |
| 7. Letter writing /essay with alternative(from unit iv-B) | 9×1=9 Marks  |

TOTAL	100 marks
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**M.I.L (TELUGU)**  
**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**No. of periods:Yearly-80**

**UNIT – I Poetry : (20 periods)**

- |                          |   |                                |
|--------------------------|---|--------------------------------|
| 1. Sanjaya Rayabharamu   | - | Tikkana Somayaji               |
| 2. Hanumatsandesamu      | - | Atukuri Molla                  |
| 3. Piradausi Lekha       | - | Gurram Jashuwa                 |
| 4. Manchi Mutyala Saralu | - | Sri Sri                        |
| 5. Jateeyata             | - | Dr. Nagabhairava Koteswara Rao |
| 6. Panjaramlo Amma       | - | Dr. Bhusurapalli Venkateswarlu |

**UNIT – II Prose : (20 periods)**

- |                                       |   |                               |
|---------------------------------------|---|-------------------------------|
| 1. Mitra Bhedamu                      | - | Paravastu Chinnayasuri        |
| 2. Rayaprolu streevada drupadham      | - | Prof K.Yadagiri               |
| 3. Ahalya Sankrandanam Patra Chitrana | - | Dr. Nagabhairava Adinarayana  |
| 4. Veyipadagalu Samajika Drukpadham   | - | Dr. Singupuram Nayayana Rao   |
| 5. Goutama Budhudu                    | - | Dr. V. Rajagopala Chakravarty |

**UNIT – III Non – Detailed Study : (16 periods)**

- |              |   |                    |
|--------------|---|--------------------|
| Rudrama Devi | - | Smt. P.B. Kausalya |
|--------------|---|--------------------|

**UNIT – IV A) Grammar : (16 periods)**

Paribhashika padamulu  
Chandssu : Utpalamala, Champakamala,  
Sardhulamu, Mathebhamu, Ataveladi, Tetageeti  
Alankaramulu :Upama, Rupaka, Utpreksha, Ardhantaranyasa, Atisiyokti

**B) Re-Translation (English to Telugu) :( 08 periods)**

**BOOKS PRESCRIBED :**

- |                              |          |   |
|------------------------------|----------|---|
| <b>1) Poetry &amp; Prose</b> | <b>:</b> | <b>Sahitee Mandaram</b><br>- By Dr. Singupuram Narayana Rao     |
| <b>2) Non-Detailed study</b> | <b>:</b> | <b>Rudramadevi</b><br>- By Smt. P.B. Kausalya                   |
| <b>3) Grammar</b>            | <b>:</b> | <b>Vyakarana Parijatamu</b><br>- By Dr. Singupuram Narayana Rao |

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**QUESTION PATTERN & DISTRIBUTION OF MARKS**

**M.I.L (TELUGU)**

**+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam 2015)**

**Full Marks: 100**

**Time: 3 hours**

**Group- A (Objective Type - Compulsory)**

- |  |                |
|--|----------------|
| 1. Thirty very short questions (from unit I, II & III) | 1×30 =30 Marks |
| 2. Ten very short questions (from unit IV- A)          | 1×10=10 Marks  |

**Group- B (Short Answer Type)**

- |  |              |
|--|--------------|
| 3. Six short questions(from Unit I, II & III)          | 2×6=12 Marks |
| 4. Four explanations (only Bhavartha from unit I & II) | 2×4=8 Marks  |
| 5. Five short questions (from Unit IV-A)               | 2×5=10 Marks |

**Group -C (Long Answer Type)**

- |   |              |
|---|--------------|
| 6. Three long questions with alternative                  | 7×3=21 Marks |
| 7. Letter writing /essay with alternative(from unit iv-B) | 9×1=9 Marks  |

<b>TOTAL</b>	<b>100 marks</b>
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**M.I.L (URDU)**  
**+2, 1<sup>st</sup> Year Science**  
**(Detailed syllabus)**

**No. of periods: Yearly-80**

**Unit – I : Prose :**

**20 Periods**

- i. Sair Pahle Darwesh Ki--- Mir Amman
- ii. Lakhnaw Ki Raisana Zindagi Ki Ek Jhalak---Sharar
- iii. Khutut---Mirza Ghalib
- iv. Kalim Daulat A bad mein--- Nazir Ahmed
- v. Ghalib Ki Shairi--- Hali
- vi. Bahaduron ke Karname --- Hasan Nizami
- vii. Namak Ka Darogha --- Premchand

**Unit – II : (a) Poetry :**

**24 Periods**

- i. Qaid Khane Ki Rat--- Mir Anis
- ii. Jogan Aur Chandni Rat--- Mir Hasan
- iii. Tazhiq- E- Rozgar--- Sauda
- iv. Israaf--- Hali
- v. Ahd-E-Wafa--- Akhtarul Iman

[

**(b) Ghazaliyat :**

First two Ghazals from the following poets i. Wali, ii. Meer, iii. Ghalib, iv. Momin, v. Atish

**Unit – III : Non Detailed Study :-**

**16 Periods**

- Only first half of any one of the following books prescribed
- i. Taubatun Nasooch :-  
By Deputy Nazeer Ahemad  
To be had from Maktab – E-Jamiya Ltd Jamia Nagar New Delhi- 110025
  - ii. Musaddas Hali  
By Altaf Husain Hali  
To be had from Educational Book House Aligarh (U.P) 5.

**Unit – IV : Letter writing :**

There shall be Letter Writing / Application Writing

**5 Periods**

**Unit – V : Grammar**

**15 Periods**

1. Ism Ki Quismen
2. Fail Ki Quismen
3. Sabqueour Laahque
4. Mutashaba Alfaz

**Books Prescribed:**

1. **Prose & poetry:** MEYAR-E-ADAB, compiled by Prof. Suraiya Husain, (To be had from Education Book House, Aligarh, U.P)
2. **Grammar:** Urdu Zaban –o– Quwaid Part – I, By Shafi Ahmed Siddiqui

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**M.I.L (URDU)**

**+ 2, 1<sup>st</sup> Year Science (For College Level Exam)**

**Full Marks:100**

**Time: 3hrs**

**Group-A (Objective Type - Compulsory)**

- Q.1 Objective type questions from all units prose, Poetry and non-detailed 1 5 =15 marks
- a. Five objective type questions from prose 1 x 5=5 marks
- b. Five objective type questions from poetry 1 x 5=5 marks
- c. Five objective type questions from Non-detailed 1 x 5 =5 marks
- Q.2 Grammar
- a. One word answer five questions 1 x 5 = 5 marks
- b. Very short answer five questions 1 x 5 = 5 marks
- c. Fill up the Blanks five questions 1 x 5= 5 marks

**Group- B (Short Answer Type)**

- Q.3 Answer within two/three sentences
- a. Prose- Six questions to be answered out of eight questions 2 x6=12 Marks
- b. Poetry- Five questions to be answered out of six questions 2x5= 10 marks
- Q.4 Answer with in six sentences.
- a. Prose- Three questions to be answered out of four questions 3x3=9marks
- b. Ghazaliyat- Three Ashaar explanation to be answered out of four Ashaar 3x3=9marks

**Group- C (Long Answer Type)**

- Q.5
- a. Prose : One long answer type question about 150 words with an alternative from prose portion. 7½ Marks
- b. Poetry : One long answer type question about 150 words with an alternative from poetry portion 7½ Marks
- c. Non detailed- one long answer type question about 150 words with an alternative from non-detailed portion 7½ Marks
- d. Letter/Application : one Letter writing/application writing about 100 words. 7 ½ Marks

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## M.I.L (URDU)

+ 2, 2<sup>nd</sup> Year Science  
(Detailed syllabus)

No. of periods: Yearly-80

### Unit – I : Prose :

20 Periods

- |                            |                     |
|----------------------------|---------------------|
| i. Ek- Khat                | : Abul Kalam Azad   |
| ii. Kutte                  | : Patras Bokhari    |
| iii. Nazir Ahmad Ki Kahani | : Farhatullah Baig  |
| iv. Acchi Kitab            | : Abdul Haque       |
| v. Hali                    | : Aale Ahmad Suroor |

### Unit – II : (a) Poetry

25 Periods

- |                      |                      |
|----------------------|----------------------|
| i. Bazmein Anjum     | : Iqbal              |
| ii. Kashmir          | : Chakbast           |
| iii. Badli Ka Chand  | : Josh Malleeh Abadi |
| iv. Pairahane Sharar | : Sardar Jafri       |

(b) Ghazaliyat : First two Ghazals of the following poets

- i. Hasrat, ii. Faani, iii. Shaad, iv. Firaq, v. Faiz

### Unit – III : Non detailed study :

15 Periods

- The remaining 2<sup>nd</sup> half portion of any one of the following books :
- a. Taubatun Nasooh  
By Deputy Nazeer Ahemad  
To be had from Maktab- E-Jamiya Ltd
- b. Musaddas Hali:  
By:- Altaf Husain Hali  
To be had from Educational Book House Aligarh ( U.P)

### Unit – IV : (a) Essay :

5 Periods

There shall be one general Essay with three alternatives  
(b) Comprehension

### Unit – V : Grammar :

15 Periods

- i. Tazkir-O-Tanis, ii. Wahid-O-Jama, iii. Mutazad Alfaz, iv. Mahaware

### Book Prescribed :

1. **Prose & Poetry** : MEYAR-E-ADAB, compiled by Prof. Suraiya Husain.
2. **Grammar**: Urdu Zaban- O – Qawaid Part-1 - By Shafi Ahmed Siddiqui

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**M.I.L (URDU)**

**+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)**

**F.M-100**

**Time- 3hrs**

**Group-A (Objective Type - Compulsory)**

- Q.1 Objective type questions from all units prose, Poetry and non-detailed
- |  |                |
|--|----------------|
| a. Five objective type questions from prose        | 1 x 5=5 marks  |
| b. Five objective type questions from poetry       | 1 x 5=5 marks  |
| c. Five objective type questions from Non-detailed | 1 x 5 =5 marks |
| Total = 15 marks                                   |                |
- Q.2 Grammar
- |                                      |                 |
|--------------------------------------|-----------------|
| a. One word answer five questions    | 1 x 5 = 5 marks |
| b. Very short answer five questions  | 1 x 5 = 5 marks |
| c. Fill up the Blanks five questions | 1 x 5= 5 marks  |

**Group- B (Short Answer Type)**

- Q.3 Answer within two/three sentences
- |   |               |
|---|---------------|
| a. Prose- Six questions to be answered out of eight questions | 2 x6=12 Marks |
| b. Poetry- Five questions to be answered out of six questions | 2x5= 10 marks |
- Q.4 Answer with in six sentences.
- |   |            |
|---|------------|
| a. Prose- Three questions to be answered out of four questions            | 3x3=9marks |
| b. Ghazaliyat- Three Ashaar explanation to be answered out of four Ashaar | 3x3=9marks |

**Group- C (Long Answer Type)**

- Q.5
- |  |           |
|--|-----------|
| a. Prose : One long answer type question about 150 words with an alternative from prose portion.             | 7½ Marks  |
| b. Poetry : One long answer type question about 150 words with an alternative from poetry portion            | 7½ Marks  |
| c. Non detailed- one long answer type question about 150 words with an alternative from non-detailed portion | 7½ Marks  |
| d. Letter/Application : one Letter writing/application writing about 100 words.                              | 7 ½ Marks |

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**MIL (SANSKRIT)**  
**+2 1<sup>st</sup> Year Science**  
**(Detailed Syllabus)**

**No. of Periods : Yearly - 80**

**Unit – I : Prose**

**20 Periods**

1. मनुमत्स्याख्यानम् (Manumatsyakhyanam)
2. चतुरशृगालः (Caturasrgalah)
3. शंस्कृते किं नास्ति (Samskrte kim nasty)
4. जाबालः सत्यकामः (Jabalah Satyakamah)

**Unit – II : Poetry**

**20 Periods**

1. सुभाषितावली (Subhasitavali)
2. भाति मे भारतम् (Bhati me Bharatam)
3. वसन्तः (Vasantah)

**Unit – III**

**12 Periods**

**(A) Grammar from the text**

1. सन्धि (Sandhi)
2. सन्धिविच्छेद Sandhi Viccheda
3. कारक-विभक्ति Karaka-Vibhakti
4. प्रकृति-प्रत्यय Prakrti Pratyaya

**(B) Grammar from outside the text / General**

1. स्त्रीप्रत्यय (Stripratyaya)
2. समास (Samasa)
3. एकपदीकरण (Formation of single word from Stripratyaya and Samasa)

**Unit – IV : Translation and Comprehension**

**18 Periods**

A) Comprehension – Sanskrit passage for the comprehension (Passages) of  
संस्कृतप्रभा, Part-I

B) Translation of unseen Sanskrit sentences into Odia / English

**Unit – V**

**10 Periods**

The art of Writing Letters, Applications, Textual Explanations, Textual  
Questions and Precis writing. Long

**Books Recommended :**

**1. For prose and poetry :**

**Sanskrita Prabha, Part-I – संस्कृतप्रभा – (प्रथमो भागः)**

**Published by Odisha State Bureau of Textbook Preparation and Production.**

**2. For Grammar :**

**Vyakarana-darpanah – व्याकरण दर्पणः**

**Published by Odisha State Bureau of Textbook Preparation and Production.**

## QUESTION PATTERN AND MARK DISTRIBUTION

M.I.L. ( SANSKRIT )  
+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Marks – 100

Time:3 Hrs

### GROUP –A (Objective Type – Compulsory)

Q.1. Multiple Choices :

1 × 15 = 15 Marks

<i>Mark-Division</i>	: Prose	1×3 = 3
	: Poetry	1×2 = 2
	: Sandhi	1×3 = 3
	: Sandhiviccheda	1×3 = 3
	: Karaka - vibhakti	1×4 = 4

Q.2. One word Answer / Correction / Fill up the Blanks :

1×15 =15 Marks

<i>Mark Division</i>	: Prose	1×2 =2
	: Poetry	1×3 =3
	: Prakruti-pratyaya	1×3 =3
	: Samasa	1×3 =3
	: Ekapadikarana	1×4 = 4
	( from Stripratya and Samasa)	

### GROUP -B (Short Answer Type)

Q.3. Short Answer Type (within 2/3 sentences / 12words) :

2×11 = 22 Marks

*Mark Division* : (a) Comprehension- 2×6 = 12  
( 6 out of 07Qs.) (passages from 1to 8 of Samskrataprabha)  
(b) Translation Sanskrit Sentences into Odia / English  
( 5 out of 07Qs.) - (2×5 = 10)

Q.4. Short Type Answer ( within 06 sentences / 25words) :

3×6 = 18 Marks

*Mark Division* : (a) Prose - 3×3 = 09 (3 out of 04 Qs.)  
(b) Poetry - 3×3 = 09 (3 out of 04 Qs.)

### GROUP – C (Long AnswerType )

Q.5. 04 Long Questions out of 06 Qs, (within 08 sentences / 40 words )

7 ½ × 4 = 30 Marks

- Letter /Application writing.
- Long Question (PROSE)
- Long Question (POETRY)
- Explanation (PROSE/ POETRY)
- Translation into Odia/English from Prose/Poetry
- Precise Writing (OF UNSEEN PASSAGE)

N. B. Answers in Sanskrit are to be written either in Odia Script or in Devanagari Script.

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**MIL (SANSKRIT)**  
**+2 2<sup>nd</sup> Year Science**  
**(Detailed Syllabus)**

**No. of Periods : Yearly - 80**

**Unit – I : Prose**

**20 Periods**

1. कपोतलुब्धककथा (Kapotalubdhakakatha)
2. सुश्रुतस्य यन्त्रकर्मशस्त्रकर्माणि (Susrutasya Yantrakarma Sastrakarmani)
3. गुणिगुणाहीनविवेकः (Gunigunahinavivekah)
4. रामतपोवनाभिगमनम् (Ramatapovanabhigamanam)

**Unit – II : Poetry**

**20 Periods**

1. दशावतारस्तुतिः (Dasavatarastutih)
2. गीतासौरभम् (Gitasaurabhavam)
3. रघुवंशम् (Raghuvansam)

**Unit – III**

**12 Periods**

**(A) Grammar from the text**

1. कारक-विभक्ति Karaka – Vibhakti
2. सन्ध Sandhi
3. सन्धिविच्छेद Sandhi Viccheda

**(B) Grammar from outside the text / General**

1. शब्दरूप – Sabdarupa – (नर, फल, लता, मुनि, वारि, नदी, पितृ, मातृ, गच्छत्, मनस्, आत्मन्, तद्, किम्, इदम्, अस्मद्, युष्मद्, द्वि, त्रि, चतुर)
2. धातुरूप – Dhaturupa – (भू, गम्, पठ्, कृ, अस्, लभ्, पूज्)
3. समास – (Samasa)
4. स्त्रीप्रत्यय – (Stripratyaya)

**Unit – IV : Translation and Comprehension**

**18 Periods**

A) **Comprehension** – Sanskrit passage for the comprehension (Passages) of संस्कृतप्रभा, Part-II

B) Translation of Odia / English sentences into Sanskrit.

**Unit – V**

**10 Periods**

The art of Writing of Letters, Applications, Textual Explanations, Textual Long Questions and Precise writing.

**Books Recommended :**

**1. For prose and poetry :**

**Samskrta Prabha, Part-II – संस्कृतप्रभा – द्वितीयो भागः**

**Published by Odisha State Bureau of Textbook Preparation and Production.**

**3. For Grammar :**

**Vyakarana-darpanah – व्याकरणदर्पणः**

**Published by Odisha State Bureau of Textbook Preparation and Production.**

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## QUESTION PATTERN AND MARK DISTRIBUTION

M.I.L. ( SANSKRIT )  
+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam 2015)

Full Marks – 100

Time:03 Hrs

### GROUP –A (Objective Type – Compulsory)

Q.1. Multiple Choices :

1 × 15 = 15 Marks

<i>Mark-Division</i>	: Prose	1×3 = 3
	: Poetry	1×2 = 2
	: Samasa	1×4 = 4
	: Sabdarupa	1×3 = 3
	: Dhaturupa	1×3 = 3

Q.2. One word Answer / Correction / Fill up the Blanks :

1×15 =15 Marks

<i>Mark Division</i>	: Prose	1×2 =2
	: Poetry	1×3 =3
	: Sandhi	1×2 =2
	: Sandhivichheda	1×2 =2
	: Karaka Vibhakti	1×3 = 3
	: Stripratya	1×3 = 3

### GROUP -B (Short Answer Type)

Q.3. Short Answer Type (within 2/3 sentences / 12words) :

2×11 = 22 Marks

*Mark Division* : (a) Comprehension- 2×6 = 12  
( 6 out of 07Qs.) ( passages from 1to 8 of Samskrtaprabha)  
(b) Translation Sanskrit Sentences into Odia / English  
( 5 out of 07Qs.) - (2×5 = 10)

Q.4. Short Type Answer ( within 06 sentences / 25words) :

3×6 = 18 Marks

*Mark Division* : (a) Prose - 3×3 = 09 (3 out of 04 Qs.)  
(b) Poetry - 3×3 = 09 (3 out of 04 Qs.)

### GROUP – C (Long AnswerType )

Q.5. 04 Long Questions out of 06 Qs, (within 08 sentences / 40 words )

7 ½ × 4 = 30 Marks

- g) Letter /Application writing.
- h) Long Question (PROSE)
- i) Long Question (POETRY)
- j) Explanation (PROSE/ POETRY)
- k) Translation into Odia/English from Prose/Poetry
- l) Precise Writing (OF UNSEEN PASSAGE)

O. B. Answers in Sanskrit are to be written either in Odia Script or in Devanagari Script.

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**ALTERNATIVE ENGLISH**  
**+ 2, 1<sup>st</sup> Year Science**  
**(Detailed syllabus)**

**No. of periods: Yearly-80**

**Unit – I : Prose**

- i. The Adventure of Learning
- ii. Men and Women
- iii. Modern Living
- iv. Food for Thought

**Unit – II : Poetry**

- i. Ecology (A.K.Ramanujan)
- ii. Dog's Death (John Updike)
- iii. The Fog (W.H.Davies)
- iv. Girl Lithe and Tawny (Pablo Neruda)
- v. Ballad of the Landlord (Langston Hughes)

**Unit – III : Short Stories**

- i. The Rainbow-Bird (Vance Palmer)
- ii. The Eyes Have it (Ruskin Bond)
- iii. The little Wife (William March)

**Unit – IV : One-Act Plays**

- i. Mother's Day (J.B. Priestley)
- ii. The Unexpected (Ella Adkins)

**Unit – V : Grammar & Usage**

- i. Tense and Aspect
- ii. Modals
- iii. Non-finite verb forms
- iv. The passive
- v. Prepositions and Phrasal Verbs

**Books Prescribed :**

- (a) Approaches to English, Book-I
- (a) Approaches to English, Book-II  
Published by the Orissa State Bureau of Textbook Preparation and Production, Pustak Bhavan, Bhubaneswar.
- (b) Reference Books for Grammar and Usage :
  - (i) A University Grammar of English (Quirk, Greenbaum et al)
  - (ii) English Grammar Practice (Bijoy Kumar Bal)

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## QUESTION PATTERN AND DISTRIBUTION OF MARKS

ALTERNATIVE ENGLISH  
+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Marks – 100

Time:3 Hrs

### 1. Reading Comprehension :

- a) A prescribed prose piece or extract (5 questions - including inferential questions-are to be answered) 10 marks
- b) A prescribed poem/extract (5 questions including inferential questions and those on poetic devices, figures of speech, mood, tone and style etc.) 10 Marks
- c) A prescribed story / one-act play or its extract (5 questions including inferential questions and those on literary devices, tone etc.) 10 Marks
- d) An unseen passage of at least 200 words (5 questions including Inferential ones) 10 Marks

### 2. Reading related skills.

- a) Guided note making based on the passage 1 (d) 5 Marks
- b) Cohesive devices 10Marks

### 3. Writing skills.

- a) Summarising an unknown passage as given in 1 (d) with caption 10 Marks
- b) Reconstruct a story from a given set of questions/fillers/outlines or completion of a story.10Marks
- c) Essay writing (including brainstorming, organizing, outlining, writing first draft and revising)10 Marks

### 4. Grammar and usage (in context) (3 questions on the prescribed grammar units) 15 Marks

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# **ALTERNATIVE ENGLISH**

**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**No. of periods: yearly-80**

## **Unit – I : Prose**

- i. The Wonder World of Science
- ii. Our Environment
- iii. The World of Business
- iv. The Changing World

## **Unit – II : Poetry**

- i. Indian Children Speak (Juanita Bell)
- ii. The Goat Paths (James Stephen)
- iii. Of a Questionable Conviction (Jayanta Mahapatra)
- iv. Mirror (Sylvia Plath)
- v. Toads (Philip Larkin).

## **Unit – III : Short Stories**

- i. The Happy Man (W.S.Maugham)
- ii. The Tree (Manoj Das)
- iii. The Watch Man (R.K.Narayan)

## **Unit – IV : One Act Plays**

- i. The Hour of Truth (Percival Wilde)

## **Unit : V : GRAMMAR & USAGE**

- i. Revision of 'Tense and Aspect'
- ii. Revision of Prepositions and Phrasal Verbs
- iii. Clause-types
- iv. Linking Devices
- v. Word Order and Emphasis

## **Books Prescribed :**

- (b) Approaches to English, Book-I
- (c) Approaches to English, Book-II  
Published by the Orissa State Bureau of Textbook Preparation and Production, Pustak Bhavan, Bhubaneswar.
- (d) Reference Books for Grammar and Usage :
  - (i) A University Grammar of English (Quirk, Greenbaum et al)
  - (ii) English Grammar Practice (Bijoy Kumar Bal)

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## QUESTION PATTERN AND DISTRIBUTION OF MARKS

ALTERNATIVE ENGLISH  
+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

Full Marks – 100

Time:03 Hrs

### 1. Reading Comprehension.

- a) A prescribed prose piece or extract (5 questions including inferential questions are to be answered). 10Marks
- b) A prescribed poem / extract (5 questions including inferential questions and those on poetic devices, figures of speech, mode, tone and style etc.) 10Marks
- c) A prescribed story / one-act play or its extract (5 questions including Inferential questions and those on literary devices, tone etc.) 10Marks
- d) An unseen passage of at least 200 words (5 questions including inferential ones) 10Marks

### 2. Reading related skills.

- Unguided note making (based on the passage given in 1 (d). 10Marks

### 3. Writing skills.

- a) Designing and writing a brochure / pamphlet 10Marks
- b) Writing dialogues of a face-to-face / telephonic conversation. 10Marks
- c) Rewriting a poem/short story as a different form of discourse i.e. a page of a diary, a newspaper report/article or a script for a play etc. 10 Marks
- d) Adding a suitable beginning/ending/title to a given poem/story. 5Marks

### 4. Grammar and usage (in context)

- (3 questions on the prescribed grammar units including modified close tests). 15 Marks

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**Environmental Education**  
**(Theory)**  
**+2, 1<sup>st</sup> Year Science**  
**(Detailed syllabus)**

No. of periods: Yearly-30

**UNIT - I**

**8 Periods**

**(A) Man and Environment : Environment : Components: -**

Atmosphere, Lithosphere, Hydrosphere and Biosphere- Human being as a rational social partner in environmental action - Impact of human activities on environment -Environmental Problems of urban and rural areas- Stress on civic amenities: supply of water, electricity, transport and health services.

**(B) Natural Resources :**

**6 Periods**

Land, water, forest as primary natural resources- Fresh water and Marine resources- Natural resources of Orissa - Concept of Biodiversity and its conservation - Renewable and non-renewable resources - Conventional and non - conventional energy.

**UNIT - II**

**6 Periods**

**Environmental Pollution :**

Types of pollution and pollutants - Causes, effects and control of air pollution, water pollution, soil pollution and noise pollution, Green house effect, Global Warming, Eutrophication, Ozone layer depletion.

**UNIT - III**

**5 Periods**

**(A) Environmental Management :**

Scope of Environmental Management -Management of solid, liquid and gaseous wastes - Resource Management- disaster Management (flood, cyclone and earthquake) -Concept of sustainable development-Management of agricultural produce.

**(B) Environmental Laws :**

**5 Periods**

Constitutional Provisions -Major provisions of Environmental Laws and Pollution Control Laws with particular reference to the Water Act, 1974, the Air Act, 1981, the E(P) Act 1986, CPCB and SPCB- Central and State Pollution Control Boards.

**PROJECT WORK**

Each student has to submit a project work positively to the Principals of the respective colleges before Annual Examination.

There shall be 10 project work titles specified in the course and students are free to choose anyone of them. A group of teachers will be assigned to guide them. The project shall be evaluated in the respective colleges.

1. To study the changes that have taken place in the given land area of a city/village/locality/market during the last five years in respect of at least five parameters like number of houses, residents and families; food habits, number of household goods in a family, consumption of water, electricity and fuel including that of personal vehicles by a family, sources of noise (public address systems being used, television, radio and vehicles on the road), common facilities like number of schools, hospitals, shops, theatres, public conveyance, public utilities, public transport, number of factories, industries and/or the facilities for production and processing of goods, loss of water bodies, types and quantity of wastes, their disposal and treatment facilities with a view to discuss the patterns of changes and impact on the environment and quality of life. One specific project on these aspects may be selected to study the changes that have taken place in a given area during the last five years in respect of the number of houses, residents and families and to prepare a report on the effects on civic amenities like availability of water, electricity and fuel; the drainage system, disposal of wastes including night soil.
2. To study the environmental profile of a town/ locality/village in respect of population density, green cover, educational level of residents, social problems and sources of pollution and their effect on air, water and soil.

3. To collect data on monthly consumption of electricity and fuel from at least five families, any two commercial establishments and four public utilities in a given locality. To plan strategies for educating consumers to economise on the consumption of electricity and fuel by reducing their over-use, misuse and improper use.
4. To study, for a period of one month, the status of sanitary conditions and methods of waste disposal of a given locality vis-a-vis the role of Panchayat, Municipality or Corporation and to prepare an action plan for making the conditions more environment friendly.
5. To investigate the impact of an industry or a large manufacturing unit on the local environment. The parameters could be land use, the ratio of the covered area and the open space, the raw materials used for production, inputs like electricity and water, the types of waste generated and the modes of waste disposal, use of environment friendly and efficient technology, types of pollutants emitted or discharged, the average health status of the employees and residents in the area.
6. To study the impact of changes in agricultural practices or animal husbandry including poultry, piggery, fishery and apiculture over a period of time on the local environment of a given locality or village. The components for analysis may include: types of crops, land area under cultivation, mechanisation, use of electricity, mode of irrigation and agrochemicals, agro-waste and their disposal, types of animal breed and their feed, types of shelter and healthcare, methods of preservation and processing of products and animal wastes and their disposal. To suggest an action plan for modifying the prevailing practices so as to make them environment friendly and sustainable.
7. To collect samples of water from different sources and study their physical characteristics like turbidity, colour, odour, the measure of pH, the nature of suspended and dissolved impurities and pollutants, the presence of toxic materials like mercury, lead, arsenic, fluorine and the presence of living organisms. For testing the presence of toxic materials and living organisms, the help of a local laboratory or institution may be taken, if available. To identify the most polluted sample of water and locate the sources of its pollution. To devise an action plan for mobilising public opinion for checking the pollution.
8. To study the practices followed in the region for storage, preservation, transportation and processing of perishable or non-perishable farm products and to assess the extent of their wastage due to faulty practices.
9. To prepare a status report on the prevalence of child labour in a given area through sample surveys on children engaged as domestic help and as workers in farms, commercial establishments and manufacturing units. The survey may be in respect of age group, education, wages, working hours, working conditions, safety in works place, health, handling hazardous materials and the like. Units dealing with hazardous materials and processes may be identified and an action plan for mobilising public opinion against the practice of child labour may be prepared.
10. To conduct a survey of plants in a locality and to collect information about their cultural, economic and medicinal values from the local people and the available literature. To prepare an action plan for their propagation.

#### **BOOK PRESCRIBED :**

Bureau's Higher Secondary (+2) Environmental Education *Published by* Odisha State Bureau of Textbook Preparation & Production, Bhubaneswar.

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**YOGA**  
**(THEORY)**  
**+ 2, 1<sup>st</sup> Year Science**  
**(Detailed syllabus)**

**No. of periods: Yearly-30**

**Unit – I : CONCEPT YOGA**

**6 Periods**

Meaning. Definition and Scope of yoga, Importance and aim of yoga for the students, Misconception of Yoga

Yoga and Spirituality

**Unit – II : BASIC PRINCIPLES OF YOGA PRACTICE**

**6 Periods**

Place, Time, Age, Diet, Dress, Do's and Don'ts Power of Silence

**Unit - III : BRANCHES OF YOGA**

**6 Periods**

Karma Yoga, Bhakti Yoga, Raja Yoga, Jnana Yoga, Yoga in Srimad Bhagavat Gita

**Unit – IV : CONCEPT OF ASTHANGA YOGA**

**6 Periods**

Yama, niyama, asana, pranayama, pratyahara, dharana, dhyana and samadhi

**Unit – V : YOGA AND PERSONALITY DEVELOPMENT**

**6 Periods**

Meaning, Definition of Personality, Dimension of Personality: physical, mental, emotional, intellectual and spiritual. Personality Development in relation to external world civic, social, patriotic and global consciousness. Concept of Personality According to swami Vivekananda and Sri Aurobindo.

**Books Prescribed :** An Introduction to Yoga, Joga Parichaya

Published by Odisha State Bureau of Textbook Preparation and Production

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**YOGA (Practical)**  
**+ 2 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**Unit – I : ASANA**

**2 Periods**

PRILIMINARY PRACTICES : Greeva Sanchalana, skandha chakra (shoulder rotation), purna, titali asana (full butterfly), marjari asana (cat stretch pose), Surya Namaskara

**STANDING POSTURE :** Tadasana, tiryak tadasana, katichakrasana pada-hastasana, ardha chakrasana, ardhakati chakrasana, ekapada pranasmasana, garudasana, natarajasana.

**SITTING POSTURE :**

Padmasana janusirasana, paschimottanasana, supta vajrasana, shashankasana, ustrasana, ardhmatsyendrasana.

**PRONE LYING POSTURE :**

Shalabhasana, bhujangasana, dhanurasana.

**SUPINE POSTURE :**

Uttanapadasana, supta pawanamuktasana, naukasana, halasana, sarvangasana, matsyasana, chakrasana.

**Unit-II : RELAXATION :**

**2 Periods**

Savasana, yoganidra

**Unit – III : PRANAYAMA :**

**2 Periods**

Preliminary practices: abdominal, thoracic, clavicular and full yogic breathing kapalabhati, nadisodhana, bhramari seetali/seetkari

**Unit - IV : MEDITATION :**

**2 Periods**

Antarmouna - sensorial awareness : (sound, touch, vision, smell, taste), breath awareness, awareness of the spontaneous thought process.

**Unit-V : KRIYA**

**2 Periods**

Trataka (internal and external)

**Books Prescribed :** An Introduction to Yoga, Joga Parichaya

Published by Odisha State Bureau of Textbook Preparation and Production

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## **BASIC COMPUTER EDUCATION (THEORY)**

**+ 2, 1<sup>st</sup> Year Science  
(Detailed syllabusaaaaaaaaaaaaa0**

**No. of periods: Yearly-30**

### **UNIT- I : Computer Fundamentals :**

**8 Periods**

Necessity and uses of computer, what is computer?, Computer as a system, problem and problem solving technique, Important terminology, Input-Output devices, types of computer, (Digital, Analog, Hybrid, Super computer, Main Frame, Mini, PC, Note Book, and Laptop). Generation of Computer, Computer Memory, (Main, Secondary, Virtual. Buffer, Cache,) Computer Languages and its types.

### **UNIT-II : Operating System:**

**15 Periods**

Types, software, Dos and Windows : Fundamentals and Commands , Security and Anti-virus  
Introduction to MS\_OFFICE:  
MS- WORD: Creating a File, setting and typing text, page formatting, editing, printing, saving the files, creating Folders , Insertion tables and objects, Bulleted, Page Numbering, spell check, indenting , paragraph setting and mail merge, CD writing.

MS-EXCEL: Spread sheet and its uses , an introduction, formatting work sheet, setting columns/Rows, range, Format, protect, sorting, types of graphs, functions and formula, printing text, copying and saving the document.

MS-POWER POINT : Features, Uses, Menus, Toolbars, creating a presentation through auto context wizard, templates, manual slides show, saving, deleting, opening a presentation, Editing.

MS-ACCESS: Data base, data base Management system, RDBMS, advantages and limitations of MS-Access, parts, tables, integrity constraints, relationship and designing tables.

### **UNIT-III : INTERNET AND COMPUTER SECURITY:**

**7 Periods**

Introduction to Internet, net browsing, Emails, Networking and its types, topology, computer crime, components required for internet, saving and printing the web files.

APPLICATIONS: in Education, Medical Science, Business, Entertainment, Social services and Research etc.

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## **BASIC COMPUTER EDUCATION (PRACTICALS)**

**+ 2, 2<sup>nd</sup> Year Science  
(Detailed syllabus)**

**10 Periods**

DOS, Windows, MS-Office, web page, browsing, sending and creating a mail

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**PHYSICS**  
**(Theory)**  
**+ 2, 1st Year Science**  
**(Detailed syllabus)**

**No. of Periods: Yearly-100**

**Unit I : UNITS, DIMENSIONS, MECHANICS OF PARTICLE AND PROPERTIES OF MATTER. 33 Periods**

**I (A)**

**1. UNITS AND DIMENSIONS : (6 Periods)**

Physics and its scope. Measurement: need for measurement, units of measurement. Fundamental and derived units. SI units. Advantages of SI units. Practical units for measurement of microscopic and macroscopic lengths (A.U, Light year, Parsec, micrometer, nanometer, Angstrom and fermi ). Metric prefixes. Dimension of physical quantities, dimensional analysis and its applications. Errors in measurement: absolute and relative error, percentage of error, combination of errors.

**2. TYPES OF MOTION : (6 periods)**

Rest and motion. Frame of reference. Translational and rotational motion. Motion in one, two and three dimensions.

Distance and displacement. Scalars and vectors. Unit vector. Components of a vector along the co-ordinate axes. Addition and subtraction of vectors. Triangle, parallelogram and polygon law method of vector addition. Dot and cross product of two vectors.

**3. KINEMATICS OF A PARTICLE (6 Periods)**

Simple introduction to elementary concepts of differentiation and integration for describing motion. Average and instantaneous speed and velocity. Average and instantaneous acceleration. Displacement-time and velocity- time graph. Area under velocity-time graph. Equations of motion for uniformly accelerated rectilinear motion by both graphical and calculus method. Relative velocity.

**II – (B)**

**4. LINEAR MOMENTUM, FORCE (9 Periods)**

Concept of force. Newton's 1st law. Inertia. Momentum and Newton's 2nd law. Impulse. Impulse-momentum theorem. Newton's 3rd law. Statement of law of conservation of linear momentum and its applications. Equilibrium of concurrent forces.

Work done by a constant force and a variable force. Conservative and non-conservative forces. Kinetic energy. Work- energy theorem. Power.

Potential energy, conservation of mechanical energy (K.E & P.E ). Elastic collision in one dimension and elementary idea of inelastic collision. Frictional forces. Static and kinetic friction. Rolling friction. Laws of friction.

**5. PROJECTILE MOTION : (3 Periods)**

Equation of trajectory of a projectile. Range, time of flight and maximum height of a projectile fired i) at an angle with horizontal and ii) horizontally from a height.

**6. DEFORMABLE BODIES AND ELASTIC DEFORMATION (3 periods)**

Elasticity and plasticity. Stress and strain. Hook's law. Elastic limit. Stress- strain diagram. Young's modulus, Bulk's modulus and modulus of rigidity. Poisson's ratio.

**Unit II : CIRCULAR AND ROTATIONAL MOTION, GRAVITATION, OSCILLATIONS AND WAVES.**

**33 Periods**

**II (A)**

**1. CIRCULAR MOTION (5 Periods)**

Angular displacement and velocity. Angular acceleration. Relation of angular displacement, velocity and acceleration with corresponding linear parameters. Uniform circular motion in a horizontal plane. Centripetal and centrifugal forces. Banking of tracks (without friction). Motion in a vertical circle.



**2. ROTATIONAL MOTION OF A RIGID BODY. (6 Periods)**

Centre of mass of a two-particle system. Centre of mass and centre of gravity of rigid bodies. Torque. Angular momentum. Conservation of angular momentum with some examples. Equilibrium of rigid bodies, Couple. Principle of moments. Equations of rotational motion. Comparison between linear and rotational motion. Rotational K.E. Moment of inertia. Radius of gyration. Parallel and perpendicular axis theorems (statement only). Moment of inertia of thin ring and disc.

**3. GRAVITATIONAL MOTION (6 Periods)**

Newton's law of gravitation. Kepler's laws of planetary motion (statement only). Gravitational field and potential. Gravitational potential energy. Acceleration due to gravity and its variation with altitude and depth. Escape velocity. Orbital velocity of a satellite. Geo-stationary satellites.

**II (B)**

**4. OSCILLATORY MOTIONS. (6 Periods)**

Periodic motion: period, frequency, periodic function. Simple Harmonic Motion and its equation. Expression for displacement, velocity and acceleration in SHM. Oscillation of a spring. Restoring force and force constant. Kinetic and potential energy in SHM. Simple pendulum and derivation for its time period. Free, damped, Forced vibration and Resonance (simple ideas).

**5. TRANSVERSE AND LONGITUDINAL WAVES. (10 Periods)**

Wave motion: Displacement, amplitude, frequency, wavelength and speed of propagation. Characteristics of wave motion. Transverse and longitudinal waves. Equation of a progressive wave. Speed of longitudinal wave in an elastic medium and speed of transverse wave in a stretched string (dimensional

analysis). Principle of superposition. Stationary waves. Nodes and antinodes. Standing waves in strings and organ pipes, fundamental mode & harmonics. Beats. Doppler's effect.

**Unit III : LIQUIDS, HEAT AND THERMODYNAMICS.**

**34 Periods**

**III (A)**

**1. LIQUID AT REST (4 Periods)**

Pressure due to a liquid column. Pascal's law and its application (hydraulic lift and hydraulic brakes). Surface tension. Surface energy. Angle of contact. Excess pressure within a droplet and soap bubble. Capillary action. Expression for capillary rise.

**2. FLOW OF LIQUIDS AND VISCOSITY (6 Periods)**

Streamline and turbulent flow. Equation of continuity. Bernoulli's theorem and its applications. Viscosity. Co-efficient viscosity. Reynold's number. Critical velocity. Terminal velocity. Stoke's law (dimensional analysis method).

**3. HEAT PHENOMENA (6 Periods)**

Concepts of heat and temperature. Scales of temperature (Celsius, Fahrenheit, Kelvin). Thermal expansion of solids. Relation between the co-efficients of expansion. Specific heat and heat capacity. Change of state: latent heat.

**III (B)**

**4. HEAT TRANSFER (5 Periods)**

Heat transfer (conduction, convection and radiation). Thermal conductivity. Determinations of Thermal conductivity of a good conductor by Serle's method Properties of heat radiation. Reflectance, absorptance and transmittance, Black body. Kirchhoff's and Stefan's law (statement only). Newton's law of cooling and its derivation from Stefan's law.

**5. KINETIC THEORY OF GASES. (5 Periods)**

Postulates of kinetic theory of gases. Derivation for pressure due to an ideal gas. Mean and RMS speed. Kinetic interpretation of temperature. Degrees of freedom. Law of equipartition of energy (statement only) and its application to specific heat capacities of gases.

6. **THERMODYNAMICS. (8 Periods)**

Thermal equilibrium and definition of temperature (zeroth of law of thermodynamics). Heat, work and internal energy. Mechanical equivalent of heat. First law of thermodynamics. Molar specific heat. Relation between  $C_p$  &  $C_v$ . Thermodynamic variables. Indicator diagram. Adiabatic and isothermal processes. Work done due to isothermal, isobaric and adiabatic process. Second law of thermodynamics. Reversible and irreversible processes. Carnot's engine and refrigerator (basic idea). Efficiency of Carnot's engine (statement only).

**Text Book Recommended :**

Bureau's Higher Secondary (+2) Physics, Vol-I

Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**PHYSICS (THEORY)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Mark : 70**

**Time : 3 Hrs.**

**Group-A (Objective Type)**

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type Questions with alternatives):**

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**PHYSICS (Practical)**  
**+ 2, 1st Year Science**  
**(Detailed syllabus)**

**Unit I : Measurement:**

1. Measurement of volume of a solid/hollow cylinder by a slide calipers.
2. Measurement of  $\pi$  value by graphical method
3. Use of physical balance for measurement of mass by resting point method and equal oscillation method.

**Unit II : Properties of Matter**

1. Verification of laws of parallelogram of forces.
2. To find the weight of a given body using the parallelogram law of forces.
3. Determination of specific gravity of solids and liquids using Nicholson hydrometer.
4. Measurement of co-efficient of static friction.

**Unit III : Heat**

1. To determine the latent heat of fusion of ice.
2. To determine the latent heat of vaporization of water.
3. To determine the co-efficient of linear expansion of metal.
4. To determine the water equivalent of a calorimeter by method of mixtures.

**Unit IV Optics**

1. To verify the laws of reflection by using a plane mirror.
2. To find angle between two straight lines by using optical method.
3. To determine the focal length of a concave mirror by direct and p-q method.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**PHYSICS (PRACTICAL)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Mark : 30**

**Time : 3 Hrs.**

1.	Experiment	:	18 Marks
2.	Viva- voce	:	7 Marks
3.	Record	:	5 Marks

**PHYSICS**  
**(Theory)**  
**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**No. of Periods: Yearly-100**

**UNIT- I : ELECTROSTATICS, CURRENT ELECTRICITY AND MAGNETISM**

**(33 periods)**

**I (A)**

**1. ELECTROSTATICS. (8 periods)**

Electric charge and its quantization. Coulomb's law: force between two point charges. Electric permittivity.

Electric field, electric field lines, electric field due to a point charge, field due to a dipole at an axial and equatorial point. Torque on a dipole in a uniform electric field.

Electric flux, Gauss's law (statement only) and its application to uniformly charged infinite plane sheet. Derivation of Coulomb's law from Gauss's law.

**2. ELECTRIC POTENTIAL (4 periods)**

Electric potential, potential difference, electric potential due to a point charge, potential due to a dipole at both axial and equatorial point. Electrical potential energy of a point charge in an electrostatic field. Electron volt. Relation between electric field and potential difference.

**3. CAPACITANCE (4 periods)**

Capacitance and capacitors, capacitance of an isolated sphere, parallel plate capacitor, combinations of capacitors in series and in parallel. Dielectric and electric polarization. Capacitance of a parallel plate capacitor with a dielectric medium between the plates. Energy stored in a capacitor.

**I (B) CURRENT ELECTRICITY AND MAGNETISM**

**4. ELECTRIC CURRENT (8 periods)**

Electric current, drift velocity and mobility and their relation with electric current. Current density, relation between current density and electric field intensity. Ohm's law, resistance, conductance, resistivity and conductivity, V-I graph (ohmic and non-ohmic), effect of temperature on resistance.

EMF and potential difference, internal resistance of a cell, combination of cells in series and parallel. Combinations of resistances in series and parallel. Kirchhoff's laws and application to Wheatstone bridge.

**5. THERMAL EFFECT OF CURRENT (2 periods)**

Heating effect of electric current, Joule's law of heating (statement only). Electrical energy and power. Kilo-watt Hour.

**6. MAGNETISM (7 periods)**

Concept of magnetic field, magnetic field intensity due to a magnetic dipole (bar magnet) at end-on and broad-side-on position. Magnetic lines of force, field induction B, magnetic field intensity H, intensity of magnetization, susceptibility, permeability. Qualitative idea of para-, dia- and ferro-magnetism. Magnetic elements of earth.

**Unit II : MAGNETIC EFFECT OF CURRENT, ELECTRO-MAGNETIC INDUCTION, ALTERNATING CURRENT, ELECTRONICS, ELECTROMAGNETIC WAVE & SPACE COMMUNICATION.**

**34 Periods**

**II (A)**

**1. MAGNETIC EFFECT OF ELECTRIC CURRENT (7 periods)**

Biot-Savart law, magnetic field at the centre and on the axis of a circular loop carrying current and due to a long straight current carrying conductor. Force on a charged particle moving in uniform magnetic field and electric field (Lorentz force).

Force on a current carrying conductor in a uniform magnetic field, force between two parallel current carrying conductors, definition of ampere. Torque experienced by a current loop in an external magnetic field, moving coil dead beat galvanometer (pivoted type), conversion of galvanometer to

ammeter and voltmeter.

**2. ELECTROMAGNETIC INDUCTION (4 periods)**

Induced emf, Faraday's law of electromagnetic induction, Lenz's law, eddy currents. Self and mutual inductance, emf induced in a rotating coil in uniform magnetic field.

**3. ALTERNATING CURRENT (5 periods)**

Alternating current, average, peak and rms value of alternating current and voltage. A.C circuits containing resistance only, capacitance only and inductance only, phasor diagram. Power in A.C circuits, wattles & current. Principle and uses of Transformer.

**II (B) ELECTRONICS**

**4. VACUUM TUBES (3 periods)**

Thermionic emission, idea of work function, statement of Richardson's and Child's law, vacuum diode and triode; their construction, action and characteristics, relation among valve constants.

**5. SOLIDS AND SEMICONDUCTOR DEVICES (10 periods)**

Energy band in solids, difference between metals, semiconductors and insulators on the basis of energy band theory, intrinsic and extrinsic semiconductors, p-type and n-type semiconductors, p-n junction, forward and reverse biasing of a junction, characteristics of p-n junction, junction diode as a half and full wave rectifier(center-tap circuit), efficiency of half and full wave rectifier (no derivation for efficiency), Transistor, n-p-n and p-n-p transistor, transistor configurations (CB and CE mode), input and out put characteristics of a transistor.

Elementary idea about decimal and binary number system (no conversion). Logic gates: OR, AND, NOT, NAND and NOR, their symbol and truth table. Circuit of only OR and AND gates.

**6. ELECTROMAGNETIC WAVE (2 periods)**

Qualitative idea about nature of electromagnetic wave, electromagnetic spectrum (radio waves, microwaves, infrared, visible, x-ray, gamma ray) including elementary idea about their uses.

**7. SPACE COMMUNICATION. (3 periods)**

Need of modulation, Qualitative idea about amplitude and frequency modulation & detection. Space communication: sky and space wave propagation. Satellite communication (elementary idea).

**UNIT III OPTICS, ATOMIC PHYSICS & NUCLEAR PHYSICS.**

**33 Periods**

**III (A) OPTICS:**

**1. REFLECTION AND REFRACTION OF LIGHT (8 periods)**

Reflection of light, reflection by spherical mirrors, mirror formula, lateral and longitudinal magnification, laws of refraction of light, refractive index and its relation with velocity of light (formula only), critical angle total internal reflection and its uses. Refraction at a spherical surface, thin lens formula, lens maker's formula, magnifying power of lenses, two thin lenses in contact.

**2. REFRACTION THROUGH A PRISM AND OPTICAL INSTRUMENTS. (5 periods)**

Refraction through a prism, I-D curve and expression for refractive index of the material of the prism. Dispersion produced in a prism.

Optical instruments: magnifying glass, compound microscope, astronomical telescope (refracting type) and their magnifying powers.

**3. WAVE OPTICS (5 periods)**

Wave optics: wave front, Huygen's principle, interference of light, coherent sources, conditions of interference, idea of path difference, Young's double slit experiment and expression for fringe width.

**III (B)**

**4. ATOMIC PHYSICS (8 periods)**

Rutherford's model of atom and its limitations, Bohr's atomic model, expression for radius of nth orbit and energy in the nth orbit, hydrogen spectra, energy level diagram. Photoelectric effect, laws of photoelectric effect, Einstein's photoelectric equation, idea of work function, applications of

- photoelectric effect. Dual nature of radiation and matter. Matter waves, de Broglie wavelength.
5. **NUCLEAR PHYSICS (7 Periods)**  
Atomic nucleus, its composition, size, nuclear mass. Isotopes, isobars and isotones. Nature of nuclear force. Mass defect, Mass energy equivalence relation( $E = mc^2$ ). Binding energy per nucleon and its variation with mass number, nuclear reaction, nuclear fusion, nuclear fission. Cyclotron. Radioactivity (natural), properties of alpha, beta and gamma rays. Decay laws, half life and decay constant.

**Text Book Recommended :**

+2 Bureau's Higher Secondary (+2) Physics, Vol - II  
Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**PHYSICS (THEORY)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam 2015)

**Full Mark : 70**

**Time : 3 Hrs.**

**Group-A (Objective Type)**

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type Questions with alternatives):**

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**PHYSICS (Practical)**  
**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**Unit- I : Measurement**

1. Measurement of the volume of an irregular lamina by using screw gauge.
2. Measurement of curvature of convex and concave surfaces of a watch glass by using spherometer.

**Unit II : Properties of matter**

1. Comparison of density of two liquids by using Hare's apparatus.
2. Determination of "g" by using simple pendulum.

**Unit III : Heat and Sound**

1. To determine the melting point of wax/ naphthalene by method of cooling.
2. To determine the velocity of sound by using resonance air column.

**Unit IV : Optics**

1. To find out a relation between the angle of rotation of plane mirror and the corresponding angle between the reflected rays.
2. To verify the laws of refraction using a glass slab.
3. To determine the refractive index of the material of the prism by measuring the angle A and Dm (symmetrical method).
4. To draw the I-D curve for a prism and there by to determine the refractive index of the material of the prism.
5. To determine the focal length of convex lens by direct and p-q method.

**Unit V : Electricity, Electronics and Magnetism**

1. To verify the laws of resistances in series and parallel by using meter- bridge.
2. To find out the specific resistance of a conductor by using a post office box.
3. To trace the magnetic lines of force due to a bar magnet with north pole pointing south and hence to locate the neutral points.
4. To trace the magnetic lines of force due to a bar magnet with north pole pointing north and hence to locate the neutral points.
5. To draw the V-I characteristics of a semiconductor diode/ diode valve.
6. To verify Ohm's law by voltmeter-ammeter method.
7. To trace magnetic lines of force avoiding earth's magnetic field and hence to verify the inverse square law of magnetism.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**

**PHYSICS (Practical)**

**+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)**

**Full Mark : 30**

**Time : 3 Hrs**

- |    |            |   |          |
|----|------------|---|----------|
| 1. | Experiment | : | 18 Marks |
| 2. | Viva- voce | : | 7 Marks  |
| 3. | Record     | : | 5 Marks  |

**CHEMISTRY**  
**(THEORY)**  
**+ 2, 1<sup>st</sup> Year Science**  
**(Detailed syllabus)**

No. of periods: Yearly-100

**Unit-I**

**i) Basic Concepts : ( 6 periods )**

Atomic mass, molecular mass and equivalent mass. Relation between atomic mass equivalent mass and valency. Equivalent mass of acid, base, salt, oxidant and reductant. Variable equivalent mass (examples). Percentage composition, empirical and molecular formula, Avogadro's hypothesis and its applications. Mole and molar mass, chemical reactions - stoichiometry and calculations based on stoichiometry.

**ii) States of Matter :**

**a) Gaseous State : ( 8 periods )**

Characteristics of gases. The four state variables of a gas - pressure, volume, temperature and amount (number of moles). Gas laws - Boyle's law, Charles' law, combined gas law, Avogadro's law, the ideal gas equation, Dalton's law of partial pressure (calculation of partial and total pressure in simple cases), Graham's law of diffusion / effusion. Numerical problems on gas laws.

**Kinetic theory :** Postulates, Derivation of the kinetic gas equation. Explanation of gas laws in light of kinetic model of gases. Ideal and real gases, deviation of real gases from ideal behaviour, the compressibility factor, van der Waals' equation. Molecular speeds - root mean square, average and most probable speeds, interrelations among them, distribution of molecular speeds (qualitative treatment only). Numerical problems. Liquefaction of gases (principle only), critical temperature.

**b) Solid State : ( 4 periods )**

Characteristics of solids. Classification into ionic, covalent, molecular and metallic solids. Crystalline & amorphous solids. Crystal lattices and unit cells - fcc, bcc and hcp crystals of simple ionic solids. Calculation of density of unit cells, packing in solids, voids, number of atoms per unit cells in a cubic unit cell, point defects. Numerical problems.

**c) Liquid State & Solution : ( 6 periods )**

Characteristics of liquids. Properties of liquids - viscosity and surface tension ; their variation with temperature. **Solutions :** Solute and solvent of a binary solution. Types of solutions, concentration of solution - percentage (*idea of ppm*), strength, normality, molarity, molality, mole fraction, formality, and their interrelations. Solubility of gases in liquids, Vapour pressure of solutions, ideal and non-ideal solutions. **Colligative properties :** Lowering of vapour pressure & Raoult's law (of ideal solutions and lowering of vapour pressure). Boiling point and its elevation. Freezing point and its depression. Osmosis and osmotic pressure ; laws of osmotic pressure. Determination of molar mass from colligative properties. Interrelations among colligative properties. Abnormal molecular masses - degree of association and dissociation. Numerical problems.

**d) Colloidal State & Surface Chemistry : ( 4 periods )**

True solutions, colloids & suspension ; lyophilic, lyophobic, multimolecular and macromolecular colloids, preparation, purification, properties and uses of colloids, emulsion - types of emulsion.

**Adsorption :**

Types of adsorption, Freundlich and Langmuir adsorption isotherms, factors affecting adsorption of gases on solids, applications of adsorption.

**iii) Structure of Atom : ( 8 periods )**

Thomson's model and its limitations, Rutherford's nuclear model of atom ; its defects. Hydrogen spectrum, different spectral series. Bohr model of atom, radius of electron orbits, energy of electron in hydrogen and hydrogen-like atoms ; speed of electron in different orbits, explanation of hydrogen spectra, defects of Bohr model. Dual nature of matter and de Broglie theory of matter waves.



Heisenberg's uncertainty principle, quantum numbers and shapes of *s*-, *p*- and *d*-orbitals. Aufbau order of subshells, Pauli's exclusion principle and Hund's rule of maximum multiplicity. Electronic configuration of atoms and stability of half filled and filled subshells. Isotopes, isobars and isotones.

**iv) Periodic Classification:**

**( 4 periods )**

Classification of elements, Periodic laws. Periods and Groups, classification of elements into *s*-, *p*-, *d*- and *f*-blocks. Periodicity in properties like atomic and ionic radii, ionisation enthalpy, electron gain enthalpy, electronegativity, and oxidation states.

**Unit-II**

**i) Chemical Bond :**

**( 8 periods )**

Electrovalent (ionic) bond, lattice energy and Born-Haber cycle, covalent bond, coordinate (dative) bond, dipole moment and polarity of covalent bond, calculation of percentage of ionic character from dipole moment. Hybridisation ( $sp$ ,  $sp^2$ ,  $sp^3$ ,  $dsp^2$ ,  $dsp^3$  &  $d^2sp^3$ ) of covalent molecules and ions, VSEPR theory and shapes of linear, angular, planar, pyramidal, tetrahedral and octahedral molecules, *s*- and *p*-bonds. Hydrogen bonds - inter and intramolecular hydrogen bonds, their consequences. Molecular orbital theory - linear combination of atomic orbitals, bonding and antibonding orbitals, energy level diagrams of simple homonuclear diatomic molecules of the elements of first and second periods only.

**ii) Chemical Reactions :**

**( 4 periods )**

Types of chemical reactions, redox reactions, oxidation number, calculation of oxidation number, balancing redox equations by oxidation number and ion-electron methods. Neutralisation reaction - types of neutralisation reactions, volumetric analysis. Numerical problems.

**iii) Principles of Extraction of Metals :**

**( 3 periods )**

Occurrence of metals, ores and minerals, concentration, calcination, roasting, smelting, reduction methods (carbon reduction, aluminothermic process, electrolytic & self-reductions) of metal extraction, flux and slag, refining of metals.

**iv) s-Block Elements :**

**( 3 periods )**

Alkali & alkaline earth Metals : General characteristics, principles of extractions, properties and uses of Na, Mg and Ca (industrial details excluded).

**vi) p-Block Elements :**

**a) Group 13 elements :**

**( 3 periods )**

General characteristics of boron family, principles of extraction and uses of aluminium, preparation, properties and uses of borax, boric acid and potash alum.

**b) Group 14 elements :**

**( 3 periods )**

General characteristics of carbon family, allotropes of carbon, silicones and silicon carbides (preliminary idea).

**c) Group 15 elements :**

**( 3 periods )**

General characteristics of nitrogen family, preparation, properties and uses of ammonia, phosphine and nitric acid (Ostwald's process), brown-ring test for nitrates.

**Unit-III : Organic Chemistry :**

**i) Some Basic Concepts :**

**( 10 periods )**

Organic compounds, tetravalency of carbon, state of hybridisation of carbon in organic molecules, functional groups, IUPAC system of nomenclature (substitutive system) of mono- and polyfunctional organic molecules, the seniority table. Inductive effect, electromeric effect, resonance, hyperconjugation and their applications. Fission of carbon-carbon bond (homolytic and heterolytic fission), electrophiles and nucleophiles, idea of carbocation, carbanion and free radicals, their stabilities. Types of organic reactions (addition, substitution and elimination only). Isomerism - structural (chain, position, functional isomerisms, metamerism and tautomerism). Stereoisomerism : **a)**

Geometrical isomerism - definition, examples, EZ-nomenclature. **b)** Optical isomerism - definition, chiral and achiral centres, optical rotations, examples, RS-nomenclature.

**ii) Hydrocarbons :**

**a) Alkanes :**

**( 4 periods )**

General formula, methods of preparation (reduction, decarboxylation, Wurtz reaction, Grignard's and Kolbe's methods, Corey-House synthesis), properties - physical, chemical : Substitution (halogenation & nitration), aromatisation, pyrolysis and isomerisation. Conformations of ethane and butane.

**b) Alkenes :**

**( 4 periods )**

General formula, types of alkenes, stability of alkenes, methods of preparation (dehydration, dehydrohalogenation, dehalogenation, Kolbe's reaction), properties - physical, chemical (addition of  $H_2$ ,  $X_2$ ,  $HX$ ,  $HOX$ ,  $H_2O$ ,  $H_2SO_4$ ), Markownikoff's rule and peroxide effect, ozonolysis and polymerisation.

**c) Alkynes :**

**( 4 periods )**

General formula, methods of preparation (dehydrohalogenation, dehalogenation, from metal alkynides, electrolysis), preparation of acetylene from iodoform and calcium carbide, properties - physical, chemical - addition of  $H_2$ ,  $HX$ ,  $HOX$ ,  $H_2O$ , ozonolysis, acidic nature of terminal alkynes, reaction with ammoniacal cuprous chloride and ammoniacal silver nitrate solutions, uses of acetylene.

**iii) Haloalkanes :**

**( 4 periods )**

Types of halogen derivatives. Monohalogen derivative - preparation (addition of  $HX$  to alkenes, halogenation of alkanes, from alcohols), properties - physical, chemical (haloalkanes as potential synthetic agents, synthesis of alkanes, alkenes, alkynes, alcohols, aldehydes, acids, esters, nitroalkynes & amines, 2 grignard's reagent).

**iv) Alcohols (Monohydric alcohols) :**

**( 4 periods )**

General formula, classification into primary, secondary and tertiary alcohols, methods of preparation (from alkyl halides, esters, aldehydes, ketones, Grignard's reagents, alkenes by hydration, hydroboration-oxidation and oxymercuration-demercuration), properties - physical, chemical (acidity, reactions with organic and inorganic acids, formation of alkyl halides, oxidation, catalytic dehydrogenation), distinction among primary, secondary and tertiary alcohols by oxidation and catalytic dehydrogenation, Lucas' test and Victor-Meyer's test.

**v) Organometallic compounds:**

**( 3 periods )**

Nature of metal-carbon bond, organomagnesium compounds (the Grignard's reagent) : Preparation from alkyl halides, synthetic applications (synthesis of alkanes, alcohols, aldehydes, ketones, acids and esters).

**Books Recommended:**

+2 Chemistry, Vol-I Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**CHEMISTRY (THEORY)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Mark : 70**

**Time : 3 Hrs.**

**Group-A (Objective Type)**

**Q. 1 Compulsory :** **1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :** **1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :** **2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :** **3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type Questions with alternatives):**

**Q.5 to Q.7 :** **7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**CHEMISTRY (PRACTICAL)**  
**+ 2, 1<sup>st</sup> Year Science**  
**(Detailed syllabus)**

**Experiments :**

**1. Basic Laboratory Techniques: (Non-evaluative)**

- a) Bunsen burner (different parts and their functions)
- b) Chemical balance - weighing with chemical balance by equal oscillation method.
- c) Cutting and bending glass tube, drawing jet and boring a cork.

**2. Crystallisation :**

Preparation of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  crystal from  $\text{CuCO}_3$ .

**3. Qualitative Analysis :**

**a) Identification of acid radicals :**

Radicals :  $\text{CO}_3^{2-}$ ,  $\text{SO}_3^{2-}$ ,  $\text{S}^{2-}$ ,  $\text{NO}_2^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ , &  $\text{PO}_4^{3-}$ .

**b) Identification of Basic Radicals :**

Radicals :  $\text{Ag}^+$ ,  $\text{Pb}^{2+}$ ,  $\text{Hg}_2^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Hg}^{2+}$ ,  $\text{Bi}^{3+}$ ,  $\text{As}^{3+}$ ,  $\text{Sb}^{3+}$ ,  $\text{Sn}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{NH}_4^+$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$  and  $\text{Na}^+$  (Dry Tests only).

**4. Volumetric Analysis :**

Single titration of acids and bases (three experiments to be done ; one on direct determination of normality of one of the solutions from that of the other and the other two, involving numerical calculations)

**5. Gravimetric Analysis**

- a) Equivalent mass of Mg by hydrogen displacement method.
- b) Solubility of  $\text{K}_2\text{SO}_4$  at room temperature.

**Books Recommended:**

+2 Practical Chemistry, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**CHEMISTRY (PRACTICAL)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Mark : 30**

**Time : 3 Hrs.**

<b>1. Salt analysis (Acid radical)</b>	—	—	10 marks
<b>Dry Test</b>	—	<b>04 mark</b>	
<b>Wet Test</b>	—	<b>06 mark</b>	
<b>2. Crystallisation / Single titration /</b>			
Equivalent mass / Solubility	—	—	<b>10 marks</b>
<b>3. Viva-voce</b>	—	—	<b>06 marks</b>
<b>3. Record</b>	—	—	<b>04 marks</b>

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**CHEMISTRY**  
**(THEORY)**  
**+2 2nd Year Science**  
**(Detailed syllabus)**

**No. of periods: Yearly-100**

**Unit-I : Physical Chemistry :**

**i) Thermodynamics : (6 periods)**

System and its types, surroundings, properties of system, extensive and intensive properties of a system, thermodynamic state of a system, processes- reversible and irreversible processes, internal energy and enthalpy, the first law, heat capacity and specific heat, measurement of  $\Delta U$  and  $\Delta H$ . **Thermochemistry:** exothermic and endothermic reactions, enthalpy change of reaction at constant pressure and constant volume, relation between them, enthalpy of formation, combustion and neutralisation, sublimation, ionization and solution. Hess's law of heat summation and its applications. Entropy and free energy, spontaneity of a process.

**ii) Equilibria :**

**a) Chemical Equilibria : (6 periods)**

Equilibria in physical and chemical processes, law of mass action, equilibrium constants ( $K_c$ ,  $K_p$ , and  $K_x$ ), relation among them, the reaction quotient and its relation with the equilibrium, simple homogeneous equilibria, heterogeneous equilibria (dissociation of  $\text{CaCO}_3$  and  $\text{NH}_4\text{HS}$ ), Le-Chatelier's principle and its application to synthesis of  $\text{NH}_3$  and  $\text{HI}$ . Numerical problems.

**b) Ionic equilibria : (6 periods)**

Theories of acids & bases, ionisation of weak acids and bases (derivation of expression, for ionisation constants & degree of ionisation), ionic product of water, pH and other logarithmic terms, common-ion effect, solubility product and their applications with special reference to application in salt analysis, Buffer solution & Henderson equations for acid and basic buffers, hydrolysis of salts, Numerical problems.

**iii) Chemical Kinetics : (6 periods)**

Slow and fast reactions, rate (speed) of reactions, average and instantaneous rates, factors affecting rate of reactions, order and molecularity of reactions with examples of simple reactions, kinetics of zero and first order reactions, fractional-life period (half-life period as a special case), dependence of rate constant with temperature (Arrhenius equation), activation energy. Collision theory of unimolecular reactions ( elementary idea ; mathematical treatment excluded ). Numerical problems.

**iv) Electrochemistry : (6 periods)**

Electrolytes and non-electrolytes, electrolysis in molten state and aqueous solutions, laws of electrolysis.

**Electrolytic conductance :** conductance and resistance, specific, equivalent and molar conductance, variation of equivalent conductance with dilution (qualitative treatment), equivalent (and molar) conductance at infinite dilution, Kohlrausch's law and its applications. **Galvanic cells :** cells and cell reactions, electrode potential and cell potential, the Nernst equation and its application, standard electrode potential, electromotive series, emf of simple cells. Lead accumulator and fuel cells. Numerical problems.

**Unit-II : Inorganic Chemistry :**

**i) Nuclear Chemistry : (4 periods)**

Consequences of  $\alpha$ ,  $\beta$  and  $\gamma$  emissions - the group displacement law, kinetics of radioactive decay, half-life and average-life period, nuclear stability and neutron-proton ratio, mass-energy conversions, the binding energy, carbon dating, artificial radioactivity induced by alpha particles and neutrons, elementary idea on nuclear fission and fusion, application of radioisotopes. Numerical problems.

**ii) p-Block Elements: (3 Periods)**

**a) Group 16 elements:**

General characteristics of oxygen family, preparation, properties and uses of ozone, hydrogen sulfide, sulfur dioxide and sulfuric acid.

**b) Group 17 elements : (6 Periods)**

General characteristics of halogen family, preparation, properties and uses of fluorine,  $\text{HF}$ ,  $\text{HCl}$ ,  $\text{HBr}$  &  $\text{HI}$ , brief idea

about interhalogen compounds.

**c) Group 18 elements :**

**(3 Periods)**

Position in the periodic table, general characteristics, properties and uses of noble gases, properties and structure of  $\text{XeF}_2$ ,  $\text{XeF}_4$  and  $\text{XeF}_6$ .

**iii) d-Block Elements :**

**( 4 periods )**

**Transition metals :** General characteristics, principle of extraction (industrial details excluded), properties and uses of Cu and Fe.

**iv) Co-ordination Compounds :**

**( 8 periods )**

Introduction, ligands and their types, Werner's theory of co-ordination compounds, nomenclature and isomerism of coordination compounds, colour, magnetic properties and shapes, elementary idea of valence-bond and crystal field theory importance of coordination compounds in qualitative analysis, extraction of metals and in biological systems.

**Unit-III : Organic Chemistry :**

**i) Aldehydes and Ketones :**

**( 6 periods )**

Preparation (Oxidation and dehydrogenation of alcohols, dry distillation of calcium salts, from carboxylic acids, ozonolysis, from acid chlorides & Grignard's reagents, hydration of alkynes), properties (additions of HCN,  $\text{NaHSO}_3$ , ROH to carbonyl groups, blocking of carbonyl group by cyclic acetal formation, addition-elimination reactions with hydrazine, phenyl hydrazine, DNPH, semicarbazide and ammonia), reactions with Tollen's reagent, Fehling's solution, oxidation and reduction, action of  $\text{PCl}_5$ , halogenation & haloform reactions, aldol reaction and Cannizzaro's reaction.

**ii) Monocarboxylic Acids :**

**( 3 periods )**

General formula, methods of preparation (oxidation of primary alcohols and aldehydes, hydrolysis of nitriles and esters, carboxylation of Grignard's reagent), properties - physical, chemical (acidic nature, formation of acid derivatives, alkanes, reaction of formic acid with Tollen's reagent).

**iii) Derivatives of monocarboxylic acids :**

**( 3 periods )**

**a) Amides :** Preparation (pyrolysis of ammonium salts, partial hydrolysis of nitriles), reactions (dehydration, action of  $\text{HNO}_2$ , Hoffmann's bromamide reaction).

**b) Acid chlorides :** Preparation from acids, reactions with alcohols and sodium salts of acids.

**c) Esters :** Preparation from acids and acid derivatives, reactions (hydrolysis, with alkali and reduction).

**iv) Aliphatic nitrogen compounds :**

**( 4 periods )**

**a) Nitroalkanes :** Preparation by nitration of alkanes & substitution of alkyl halides, reaction (reductions, action of  $\text{HNO}_2$ ).

**b) Aliphatic amines :**

Types of amines, basic nature of amines, preparation of primary amines only reduction of nitroalkanes, cyanides, Hoffmann bromamide reaction, Properties; Physical, Chemical : basicity, reaction with alkyl halides, acid chlorides and carbylamine reaction.

**v) Aromatic compounds :**

**( 16 periods )**

- a) Aromatic hydrocarbons : Preparation :** General methods of preparation. Aromaticity (Huckel's rule), graphic formula of benzene, toluene and xylenes. Properties: Electrophilic substitution reactions with mechanism ( halogenation, nitration, sulfonation and Friedel-Craft's reactions), addition reactions, oxidation and ozonolysis. Directive influence of substituents in aromatic substitution reactions.
- b) Haloarenes :** Nature of C—X bond ( $sp^3C-X$  and  $sp^2C-X$  bonds), Preparation by substitution reaction and Sandmeyer's reaction, Reactions : Nucleophilic and electrophilic substitution reactions (directive influence of the halogen atom), Fitting and Wurtz-Fitting reactions
- b) Phenols : Preparation :** From haloarenes, sodium arene-sulphonates, diazonium salts, phenol from cumene (principle only). **Properties :** Physical, Reactions-acidic nature, esterification, electrophilic substitution reactions (nitration & halogenation), oxidation, reaction with zinc dust & Reimer-Tiemann reaction.
- c) Aromatic aldehydes :** General methods (From acid chlorides, nitriles, arenes, by side chain halogenation followed by hydrolysis, Gatterman-Koch reaction), Preparation of benzaldehyde by Etard's reaction. Properties : Reaction with HCN, phenyl hydrazine, electrophilic substitution reaction (nitration, halogenation), Cannizzaro reaction.
- d) Aromatic Carboxylic acids :** General methods of preparation by oxidation of arenes (alkyl benzenes), from nitriles and amides, acyl halides, esters & anhydrides, carboxylation of Grignard reagents. Properties: Acidic character, reaction with  $PCl_5$  alcohol, decarboxylation, electrophilic substitution reaction (nitration, halogenation).
- e) Arylamines :** General methods of preparation of aniline from nitroarenes, Properties: basic character, reaction with alkyl halide, acyl halide, nitrous acid & electrophilic substitution reaction (halogenation & sulfonation).
- f) Aryl diazonium salts:** Preparation of arene diazonium chloride from arylamines, its use in synthesis of arenes, phenols, nitroarenes, fluoroarenes, chloroarenes, bromoarenes, aryl cyanides, coupling reaction.

**vi) Interconversion of organic compounds :**

**(4 periods)**

Interconversion of organic compounds involving a) Ascending and descending carbon series without changing functional group and b) Changing functional group without changing the number of carbon atoms in both aliphatic and aromatic systems.

**vii) Chemistry in the service of mankind :**

**( 6 periods )**

- :a) Chemicals in Medicines :** Analgesics, antipyretics, antibiotics and antiseptics (only characteristics

and few important examples, structure and preparation are not required).

- b) Polymers :** Classification of polymers; natural and synthetic polymers, important uses and formula of polythene, PVC, neoprene, teflon, Buna-S, nylon 6, nylon 6,6, terylene and bakelite.
- c) Pesticides :** Definition, classification, insecticides, fungicides and rodenticides (only the names of few commercial compounds be mentioned).
- d) Soaps and Detergents :** General idea about Soap and detergent, some important examples.
- viii) Biomolecules :** The Cell and energy cycle, photosynthesis and energy, preliminary idea about carbohydrates, proteins, aminoacids, polypeptides, lipids, hormones and vitamins.

**Book Recommended :**

+2 Chemistry, Vol-II Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS  
CHEMISTRY (THEORY)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

**Full Mark : 70**

**Time : 3 Hrs.**

**Group-A (Objective Type)**

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type Questions with alternatives):**

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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## CHEMISTRY (PRACTICAL)

+2 2nd Year Science

(Detailed syllabus)

### 1. Crystallisation :

- a) Preparation of Mohr's Salt  $[\text{FeSO}_4, (\text{NH}_4)_2\text{SO}_4, 6\text{H}_2\text{O}]$  crystal.
- b) Preparation of potash alum  $[\text{K}_2\text{SO}_4, \text{Al}_2(\text{SO}_4)_3, 24\text{H}_2\text{O}]$  crystal.

### 2. Quantitative Analysis :

- a) **Double titration** : Two experiments to be done - i) one acid two alkalis double titration and ii) two acids one alkali double titration.
- b) **Bench Acid Titration** : Strong acid of approximately 2.0 N be supplied.
- c) **Redox Titration** : Titration between potassium permanganate and oxalic acid.

### 3. Qualitative Inorganic Analysis :

**Wet tests for basic radicals** : Wet tests for the following basic radicals be done.

Group-I basic radicals :  $\text{Ag}^+$ ,  $\text{Pb}^{2+}$ ,  $\text{Hg}_2^{2+}$

Group-II basic radicals :  $\text{Hg}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Bi}^{3+}$ ,  $\text{As}^{3+}$ ,  $\text{Sb}^{3+}$ ,  $\text{Sn}^{2+}$  &  $\text{Sn}^{4+}$ . Group-III A basic radicals :  $\text{Fe}^{3+}$ ,  $\text{Al}^{3+}$  &  $\text{Cr}^{3+}$ .

Group-IIIB basic radicals :  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Zn}^{2+}$  &  $\text{Mn}^{2+}$ . Group-

IV basic radicals :  $\text{Ba}^{2+}$ ,  $\text{Ca}^{2+}$  &  $\text{Sr}^{2+}$ . Group-V basic radicals

:  $\text{NH}_4^+$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ ,  $\text{Na}^+$ . Identification of unknown basic radicals.

[For identification of unknown basic radicals both dry and wet tests are to be performed]

### 4. Qualitative Organic Analysis :

Tests for unsaturation, distinction between aromatic and aliphatic compounds by copper foil test, tests for carboxylic, phenolic, aldehydic, ketonic and alcoholic groups.

### Book Recommended

+ 2 Practical Chemistry : Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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## QUESTION PATTERN AND MARK DISTRIBUTION

### CHEMISTRY (PRACTICAL)

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

Full Mark : 30

Time : 3 Hrs.

#### 1. Salt Analysis (Identification of basic radical only)

12 mark

Dry Test

05 marks

Wet test

07 marks

#### 2. Crystallisation / Double Titration /

Bench Acid Titration OR

10 mark

Redox Titration

06 mark

Organic compound

04 mark

#### 3. Viva-voce

05 mark

#### 4. Record

03 mark

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# MATHEMATICS

+ 2, 1<sup>st</sup> Year Science  
(Detailed syllabus)

No. of Periods: Yearly-100

Unit-I

25 periods

**(A) Logic: (6 periods)**

Statements, negation, conjunction, disjunction, conditional, biconditional and their truth tables.  
Tautology and equivalence of statements, implications and double implications.  
Converse, Inverse, Contrapositive.  
Different methods of proof with emphasis on method of mathematical induction.

**(B) Sets : (3 periods)**

Proofs of commutative, associative and distributive properties of set union and intersection, Difference and symmetric difference of sets.

De Morgan's laws.

Cardinality of sets, similar sets, cartesian product of sets, cartesian plane and its representation by  $\mathbb{R} \times \mathbb{R}$ .  
Representation of 3-dimensional space by  $\mathbb{R} \times \mathbb{R} \times \mathbb{R}$ .

**(C) Real number system and Inequalities : (6 periods)**

Natural numbers and Integers, Arithmetic of Integers, Prime numbers, Rational and Irrational numbers, Real numbers, Algebraic properties of real numbers, ordering in  $\mathbb{R}$ , Absolute value, Triangle inequality,  $AM \geq GM$ , Inequality (simple cases).

Solution of linear inequation in one variable.

**(D) Quadratic Polynomials : (4 periods)**

- (i) Roots of quadratic polynomial, factorisation of quadratic polynomial.
- (ii) Maximum and minimum values of quadratic polynomial for all real values of the variable.
- (iii) Sign of quadratic polynomial for real values of the variable.
- (iv) Solution of quadratic inequations.
- (v) Graph of Quadratic polynomial of the form  $ax^2 + bx + c = 0$ ,  $a \neq 0$ ,  $a, b, c \in \mathbb{R}$ .

**(E) Complex number system : (6 periods)**

- (i) Complex number and their algebraic properties, Argand plane and geometrical representation of complex numbers, modulus, argument and conjugate of complex numbers. Triangle inequality.
- (ii) Square roots of a complex number, cube roots of unity and their properties.
- (iii) Statement and proof of De-Moivre's theorem for integral index : Statement for rational index and its application.

Unit-II

(25 periods)

**(A) Relation (6 periods)**

- (i) Definition, domain and range of a relation, inverse of a relation, types of relation.
- (ii) Relation in a set, equivalence relation, congruence modulo relation on the set of integers. (iii) Equivalence classes and partition of a set through examples only.

**(B) Function : (6 periods)**

- (i) Definition, domain, range of a function, injective, surjective and bijective functions.
- (ii) Equality of functions, composition of functions, inverse of a function, odd and even functions,
- (iii) Real valued function of a real variable.
- (iv) Domain, range and graph of the following functions with simple properties, trigonometric and inverse trigonometric functions,  
 $a^x$ ,  $\log_a x$  for  $a > 1$  and  $0 < a < 1$ ,  $e^x$ ,  $\ln x$ ,  $|x|$ ,  $[x]$ ,  $\text{sgn}(x)$ .

**C. Limit and continuity : (7 periods)**

Limit of function ( $\epsilon$ - $\delta$  definition only), left-hand limit, right hand limit, infinite limit, limit at infinity, Algebra of limits (without proof), continuity, limits and continuity of trigonometric functions,  $a^x$ ,  $\log_a x$  and composite functions. (Details of proof for continuity, of  $a^x$ ,  $\log_a x$  and composite functions excluded)

**D. Differentiation : (6 periods)**

Derivatives, its geometrical and physical meaning, algebra of derivatives, derivatives of algebraic polynomial and trigonometric functions from first principle, relation between continuity and differentiability.

**Unit-III****(25 periods)****A. Trigonometry : (11 periods)**

- (i) Periodicity of trigonometric functions.
- (ii) Trigonometric ratios of compound, multiple and sub multiple angles and standard trigonometric formulae.
- (iii) Trigonometric equations and their general solutions,
- (iv) Properties of triangles,
- (v) Inverse trigonometric functions.

**B. Sequence and series :(6 periods)**

- (i) Definition of sequence and series.
- (ii) Infinite geometric series, Arithmetico-geometric series.
- (iii) Exponential and logarithmic series.

**C. Statistics : (4 periods)**

Measures of dispersion, mean deviation, standard deviation and variance, co-efficient of variation, co-efficient of correlation.

**D. Number system : (4 periods)**

- (i) Decimal, binary, octal and hexadecimal number systems,
- (ii) Conversion of a number from one system to the other,
- (iii) Binary arithmetic.

**Unit-IV : Co-ordinate Geometry of two Dimensions.****(25 Periods)****A. Straight line : (11 periods)**

Rectangular co-ordinate system, distance and division formula, Area of a triangle, slope of a line, Angle between lines.

Locus of an equation and equation of a locus.

Equation of a straight line in different forms. Reduction of the general form to different forms.

Distance of a point from a line. Condition for concurrency of three straight lines. Family of straight lines, equation of bisectors of angles between two straight lines, Pair of straight lines of the forms :

$$ax^2 + 2hxy + by^2 = 0 \text{ and } ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0.$$

Angle between the pair of straight lines. Change of axes (translation only).

**B. Circle : ( 6 periods)**

Definition and equation of a circle. Tangent and Normal to a circle. Condition of tangency. System of circles, (Angle between two circles and condition of orthogonality) Equation of a circle in parametric form.

**C. Conic Section : (8 periods)**

Standard cartesian form of equation of parabola, ellipse and hyperbola, and their equations in parametric form. Equations of tangents and normals. Condition of tangency, rectangular and conjugate hyperbolas.

**Books Recommended :**

Elements of Mathematics : Vol - I & II

Published by Odisha State Bureau of Textbook Preparation and Production.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**MATHEMATICS**

**+ 2, 1<sup>st</sup> Year Science (For College Level Exam)**

**Full Mark : 100**

**Time : 3 Hrs**

**Group – A (Objective Type)**

Q1. 10 Objective type questions carrying 1 mark each : (1 × 10 = 10 Marks)  
Covering all units

**Group – B (Short Answer Type)**

Q2 to Q.5. Out of 30 questions one has to answer 20 questions : (3 × 20 = 60 Marks)  
(Unit – I – 5 Question out of 7)  
(Unit – II – 5 question out of 7)  
(Unit – III – 5 questions out of 8)  
(Unit – IV – 5 question out of 8)

**Group – C (Long Answer Type)**

Q.6 to Q.9 Four long answer type questions with alternatives : (7 ½ × 4 = 30 marks)  
(Unit - I - 1 question out of 2)  
(Unit - II - 1 question out of 2)  
(Unit - III - 1 question out of 3)  
(Unit - IV - 1 question out of 3)

# MATHEMATICS

+ 2, 2<sup>nd</sup> Year Science  
(Detailed syllabus)

No. of Periods: Yearly-100

Unit-I

25 periods

**(A) Differential Calculus : (12 periods)**

Derivatives of composite functions (chain rule), Inverse trigonometric functions, Implicit functions, exponential and logarithmic functions, Logarithmic differentiations, Derivatives of functions represented by parametric forms, successive differentiation. Leibnitz theorem (Statement only) & its application is problems. Partial derivatives, Euler's theorem (without proof) and its simple applications.

**(B) Applications of Derivatives : (13 periods)**

Rate of change, Increasing and decreasing functions, tangents and normals, approximations, maxima and minima (simple problem), Rolle's theorem, Lagrange's and Cauchy's Mean value Theorem (without proof) Geometrical interpretations of Rolle's and Lagrange's theorem and their simple applications, Indeterminate forms, L Hospital's rule (without proof) and its applications.

Unit-II

(25 periods)

**A. Integral Calculus (10 periods)**

Anti derivatives, Indefinite integrals, Standard integration formulae, algebra of integrals, Integration by method of substitution, by parts, by partial fractions and integration of rational and irrational algebraic functions and trigonometric functions. Definite-integral, fundamental theorem of integral calculus (Statement only), Elementary properties of definite integrals, Walli's formula. Evaluation of areas of plane regions bounded by simple curves using definite integral.

**B. Differential Equations : (6 periods)**

Definition, order, degree, general and particular solutions of a differential equation, formation of differential equation. Solutions of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree, linear differential equations of the form.

$$\frac{dy}{dx} + p(x)y = |q(x)| \text{ Solutions of differential equations of the form } \frac{d^2y}{dx^2} = f(x)$$

Unit-III :

(25 periods)

**A. Vectors : (8 periods)**

Vectors and scalars, Types of vectors, algebra of vectors, position vector of a point. Resolution of a vector into components.

Scalar (dot) product of two vectors and its geometrical meaning, Commutative and distributive properties of dot product, vector (cross) product and its geometrical meaning, properties of vector product (without-proof)

Scalar triple product and vector triple product with simple applications.

**B. Three Dimensional Geometry (10 periods)**

Co-ordinate axes and co-ordinate planes, co-ordinates of a point, distance between two points, division formula. Direction cosines and direction ratios of a line.

Projection of line segment on another line, Angle between two lines.

Definition of a plane and its equations in different forms. Transformation of the general form to normal form. Angle between two planes, Distance of a point from a plane, System of planes.

Equation of a plane bisecting the angle between two planes. Symmetrical and un-symmetrical form of equation of a line and transformation of unsymmetrical form to symmetrical form. Condition of co planarity of two lines, Angle between a line and a plane, Distance of a point- from a line.

Definition and equation of a sphere in standard form. Sphere through four non-coplanar points.

Equation of a sphere when end points of a diameter are given.

**C. Linear Programming (7 periods)**

Introduction to Linear Programming Problem (LPP), Graphical solution of system of linear equations in two variables. (upto three constraints)

**Unit-IV**

**(25 periods)**

**A. Determinants and Matrices : (9 periods)**

Determinants upto order three, Minors and Co-factors, properties of determinants, Cramer's rule.  
Matrices, Algebra of matrices, transpose and inverse of a matrix, solution of system of linear equations in two or three variables by matrix inversion method.

**B. Permutation, Combination and Binomial Theorem : (8 periods)**

Counting principle, Permutations and combinations (with and without repetition )  
Statement of Binomial theorem for any rational index and proof of this theorem for positive integral index and identities involving binomial co-efficients.

**C. Probability : (8 periods)**

Basic concepts of probability  
Conditional probability and independence  
Compound events  
Random variable and probability Distribution (Binomial distribution only)

**Books Prescribed :**

Elements of Mathematics : Vol - I & II  
Published by Odisha State Bureau of Textbook Preparation and Production.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**MATHEMATICS**

**+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)**

**Full Mark : 100**

**Time : 3 Hrs**

**Group – A (Objective Type)**

- Q1. 10 Objective type questions carrying 1 mark each : (1 × 10 = 10 Marks)  
(Diff. Calculus , Integral calculus, Application of derivatives, Differential equation, vectors, Det & Matrix, Permutation and combinations & Probability : 1 questions from each chapter  
Three dimensional geometry : 2 questions)

**Group – B (Short Answer Type)**

- Q2 to Q.5. Out of 30 questions one has to answer 20 questions : (3 × 20 = 60 Marks)  
(Unit – I – 5 Question out of 7)  
(Unit – II – 5 question out of 7)  
(Unit – III – 5 questions out of 8)  
(Unit – IV – 5 question out of 8)

**Group – C (Long Answer Type)**

- Q.6 to Q.9 Four long answer type questions with alternatives : (7 ½ × 4 = 30 marks)  
(Unit - I - 1 question out of 2)  
(Unit - II - 1 question out of 2)  
(Unit - III - 1 question out of 3)  
(Unit - IV - 1 question out of 3)

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# BIOLOGY – I (Botany) Theory

## + 2, 1<sup>st</sup> Year Science

### (Detailed syllabus)

No. of periods: Yearly-40

#### UNIT – 1: Diversity of Plant Life:

- i. **Classification:** 2 Periods  
Diversity of plant life: Classification of living organisms and five kingdom system with their merits and demerits; Status of Bacteria & Viruses, Binomial nomenclatures, Classification of plant kingdom with salient features.
- ii. **Salient features of various plant groups:** 7 periods  
Life history of representative members of different plant groups (No anatomical details) and their economic importance.  
Algae- *Spirogyra*, Fungi- *Saccharomyces*, Bryophyta- *Funaria*, Pteridophyta- *Dryopteris*, Gymnosperms- *Cycas*  
Structure, reproduction and economic importance of Bacteria and Viruses (including bacteriophage & TMV)
- iii. **Plant Nutrition:** 1 Period  
Elementary idea of modes of nutrition
- iv. **Plant Diseases:** 2 Periods  
Elementary idea on symptoms and control measure of following plant diseases: Powdery mildew of peas, Bacterial blight of rice, Papaya mosaic disease.

#### UNIT-II Cell Biology

- i. **Cell:** 2 Periods  
Cell as a basic unit of life: discovery of cell, cell theory, exceptions to cell theory, Tools and techniques (Principle of compound microscope and electron microscope), Ultrastructure of eukaryotic cell, Basic differences between prokaryotic and eukaryotic cell.
- ii. **Structural components :** 6 Periods  
Cell wall, Plasma membrane: structural models and function; protoplasm, vacuole, nucleus, chromosome: structure and function, nucleosome concept, Cell organelles: plastids, mitochondria, endoplasmic reticulum, Golgi complex, ribosome, lysosome, peroxisome, sphaerosome, microtubules, cilia and flagella; Excretory & secretory products.
- iii. **Biomolecules:** 3 Periods  
General structure and importance of carbohydrates, amino acids, proteins, lipids and nucleic acids.
- iv. **Enzymes:** 2 periods  
Properties, chemical nature, mode of action.
- v. **Cell Cycle:** 3 Periods  
Cell division and its significance, cell cycle and its control, amitosis, *mitosis*, meiosis.

#### UNIT-III : Morphology, Anatomy, Reproduction and Classification

- i. **Morphology:** 4 Periods  
Typical angiospermic plant, Root, Stem and Leaf, their structure and modifications; Types of inflorescences, Flower and floral parts, Fruits and Seeds, (To be taught in practical classes).
- ii. **Anatomy of Angiosperms:** 4 Periods  
Tissues (meristematic and permanent): Tissue system. Anatomy of root, stem and leaf of monocot and dicot plants. Secondary growth (normal) of dicot stem.
- iii. **Reproduction in Angiosperms:** 4 Periods  
Modes of reproduction in flowering plants: asexual & sexual; microsporogenesis, megasporogenesis, male and bisporic female gametophyte, *Pollination: types, agents; contrivances for cross pollination*, double fertilization, endosperm, embryo, apomixis and polyembryony.

- iv. **Classification of Angiosperms:** 4 Periods  
Units of classification, Different types of classification of angiosperms, Bentham and Hooker's system of classification and its merits & demerits; concept of Botanical Gardens and Herbaria.
- v. **Studies of important Families:** 2 Periods  
Malvaceae, Solanaceae, Fabaceae, Brassicaceae, Asteraceae, Liliaceae
- vi. **Uses of plants (Economic Botany):** 2 Periods  
Botanical name, family, habit, habitat and parts of the plant used for economic purposes; Cereals (Rice); Pulses (Green gram); Oil-yielding seed (Ground nut); Fruits (mango, banana); Fibers (jute, cotton) Medicine (Tulsi, neem).

**Text Book Recommended :**

Bureau's Higher Secondary (+2) Botany, Part-I, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**

**BIOLOGY – I (Botany) Theory**

**+ 2, 1<sup>st</sup> Year Science (For College Level Exam)**

**Full Mark : 35**

**Time : 2 Hrs**

**Group - A: Objective Type Compulsory**

1. Multiple choice / One word answer (1x5=5 marks)
2. Correct the sentences / Fill up the blanks (1x4=4 marks)

**Group - B: Short Answer Type**

3. Answer within two / three sentences (2x4=8 marks)  
(Out of 8 bits - one has to answer 4 bits)  
Short answer type (Differentiate) 3 bits to be answered from 6 bits, each carrying 2 marks (2x3=6 marks)

**Group - C: Long Answer Type**

Out of 4 questions from all units, one has to answer 2 questions (6x2=12 marks)

(Long answer type questions are to be set only from the portions underlined in the syllabus)

**BIOLOGY – I (Botany) Practical**

**+ 2, 1<sup>st</sup> Year Science  
(Detailed syllabus)**

1. Study of parts of dissecting & compound microscopes.
2. Study of a typical angiospermic plant.

**Major Experiments**

1. Study of mitosis in onion root tip.
2. Study of meiosis in onion flower bud.
3. Study and description of flowers belonging to the families: *Malvaceae, Solanaceae, Fabaceae, Brassicaceae, Asteraceae* and *Liliaceae*.
4. Preparation and study of transverse section of dicot and monocot root, stem & leaf.

**Minor Experiments**

Study of cell: onion scale leaf, *Rhoeo discolor* epidermal peel.  
Study of cell inclusions: starch grains & raphides.  
Qualitative test for catalase activity by leaf disc method.  
Study of modifications of roots, stems and leaves.  
Study of identification of different types of inflorescences.  
Study of flower and its parts.  
Study of parenchyma, collenchyma, sclerenchyma, xylem and phloem through permanent slides.



### Spottings

1. Identifications with reasons of the following specimens/permanent slides of *Spirogyra* (vegetative filament, scalariform & lateral conjugation). *Saccharomyces* (cell & budding) *Funaria*, *Dryopteris*, *Cycas*
2. Botanical name, family, habit and parts of the plant used for economic purposes : rice, green gram, ground nut, banana, jute, cotton, Tulsi and neem.
3. Identification with reasons of the following permanent slides:
  - A. T.S. of a typical angiospermic anther
  - B. L.S. of ovules: Anatropous/Orthotropous/Campylotropous
  - C. Monocot & dicot embryo

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### QUESTION PATTERN AND DISTRIBUTION OF MARKS

BIOLOGY – I (Botany) Practical

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Marks - 15  
hours**

**Time - 2**

- |    |   |   |         |
|----|---|---|---------|
| 1. | Major Experiment (One)                            | - | 7 marks |
|    | (Theory & Procedure = 3, experiments results = 4) |   |         |
| 2. | Minor Experiment (One)                            | - | 3 marks |
| 3. | Spottings: Three: 3x 1 (Three minutes each)       | - | 3 marks |
| 4. | Record  | - | 2 marks |

All the above experiments should be conducted by individual student.  
Questions for major and minor experiments are to be set by drawing lots.

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# BIOLOGY – I (Botany) Theory

+ 2, 2<sup>nd</sup> Year Science

(Detailed syllabus)

**No. of Periods: Yearly-40**

## UNIT - I Physiology:

**14 Periods**

**Plant and Water:** (1 Period)

Cell as a physiological unit, imbibition, diffusion, osmosis, water potential, osmotic potential and pressure potential.

**Water Relation** (3 Periods)

Availability of soil water. Mechanism of active and passive absorption; apoplast-symplast concept, Theories of ascent of sap - root pressure, transpirational pull; Transpiration - types, significance; factors affecting rate of transpiration; mechanism of stomatal opening and closing (Starch-sugar hypothesis, potassium pump theory).

**Mineral nutrition:** (2 Periods)

Essential elements; Macroelements and micro (trace) elements: their functions & deficiency symptoms.

**Elementary idea on Biological nitrogen fixation** (1 Period)

**Photosynthesis:** (4 Periods)

Site and significance of Photosynthesis; Chlorophyll structure; Light and dark phases; Photosystems, Photophosphorylation (cyclic and non-cyclic); C3 and C4 pathway; CAM plants, photorespiration; Factors affecting photosynthesis.

**Respiration:** (3 Periods)

Cellular respiration; (Aerobic, Anaerobic and Fermentation); Respiratory substrates, Respiratory quotient, Glycolysis; TCA cycle; Electron transport system and oxidative phosphorylation.

## UNIT- II Ecology and Genetics:

**14 Periods**

**Ecology:** (3 Periods)

Autoecology, Synecology, Ecological factors: climatic, edaphic, topographic and biotic; Broad ecological classification of plants: mesophytes, hydrophytes and xerophytes. Ecosystem: components of ecosystem, types of ecosystem: terrestrial and aquatic; energy flow in ecosystem, food chain and food web, ecological pyramids; Ecosystem services; Plant succession (hydrosere and xerosere).

**Genetics:**

**Continuity of Life:** (3 Periods)

Heredity & variation; Mendel's laws of inheritance, chromosomal basis of inheritance; other patterns of inheritance: incomplete dominance, multiple allelism, quantitative inheritance.

**Molecular basis of Inheritance:** (5 Periods)

The search for genetic material: Griffith and Avery's experiments on transformation: DNA: its structure, function and replication; RNA world; Gene expression: central dogma, genetic code, transcription and translation in prokaryotes and eukaryotes; Regulation of gene expression: induction and repression.

**Plant breeding:** (1 Period)

Hybridization; Breeding for crop improvements.

## UNIT - III Biotechnology, Growth & Development: 12 Periods Biotechnology: (5 Periods)

Recombinant DNA technology: tools, techniques, steps and applications; Tissue culture: totipotency; techniques, steps and applications of plant tissue culture; Production of Transgenics with examples from plants, animals & microbes.

Microbes in human welfare: household and industrial products, sewage treatment, biogas production, biocontrol agents and biofertilizers.

**Growth & Development:**

**Phytohormones:** (3 Periods)

Characteristics of plant growth; Elementary idea on Phytohormones; Physiological effects of Auxins, Gibberellins and Cytokinins.

**Seed Germination:** (1 Period)

Mechanism of seed germination, factors affecting seed germination, seed dormancy.

**Senescence and abscission** (Elementary idea): (1 period)**Process of Flowering:** (1 Period)

Elementary idea on photoperiodism and vernalisation.

**Plant movement:** (1 Period)

Elementary idea on phototropism, geotropism, tropic and nastic movements.

**Text Book Recommended :**

Bureau's Higher Secondary (+2) Botany, Part - II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS****BIOLOGY – I (Botany) Theory**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam 2015)

Full Mark : 35

Time : 2 Hrs

**Group - A: Objective Type Compulsory**

1. Multiple choice / One word answer (1x5=5 marks)
2. Correct the sentences / Fill up the blanks (1x4=4 marks)

**Group - B: Short Answer Type**

3. Answer within two / three sentences (2x4=8 marks)  
(Out of 8 bits - one has to answer 4 bits)

Short answer type (Differentiate) 3 bits to be

answered from 6 bits, each carrying 2 marks (2x3=6 marks)

**Group - C: Long Answer Type**

Out of 4 questions from all units, one has to answer 2 questions (6x2=12 marks)

*(Long answer type questions are to be set only from the portions underlined in the syllabus)*

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**BIOLOGY – I (Botany) Practical**

+ 2, 2<sup>nd</sup> Year Science

(Detailed syllabus)

**Major Experiments**

1. Study of the effect of temperature and chemicals (ethanol, acetone, formaldehyde) on leaching of pigments in beet root.
2. Study of plants pigments by paper chromatography.
3. Study of the effect of different wavelength of light on photosynthesis by Wilmott's bubbler.
4. Study of effect of dissolved carbon dioxide on photosynthesis by Wilmott's bubbler.
5. Study of transpiration by Ganong's or Farmer's potometer.
6. Study of relation between transpiration and absorption by T/A apparatus.
7. Comparative study of rate of transpiration from upper and lower surface of a dicot leaf.
8. Study of plasmolysis in cells of epidermal peels of *Rhoeo discolor* and to find out the concentration of isotonic condition.

### Minor Experiments

- 1 Qualitative test for the presence of carbohydrates (glucose, starch, cellulose)/ proteins / and fats in seeds of rice/wheat/gram or potato tuber.
- 2 Study of osmosis by potato osmometer.
- 3 Study of distribution of stomata on upper and lower surface of a dicot and monocot leaf.
- 4 Analysis of samples of verification of Mendelian ratio using pea seeds or colour beads.

### Spottings

1. Identification with morphological adaptations of the following specimens:
  - a. Hydrophytes: *Hydrilla*, *Pistia*, & *Eichhornia*
  - b. Xerophytes: *Opuntia*, & *Casuarina*
2. Experimental set up showing conditions necessary for germination (air and water).
3. Experimental set up showing types of germination: epigeal/hypogeal.
4. Experimental set up showing phototropism or geotropism.

## QUESTION PATTERN AND DISTRIBUTION OF MARKS

### BIOLOGY – I (Botany) Practical

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam 2015)

### Full Marks - 15

Time - 2 hours

- |    |   |   |         |
|----|---|---|---------|
| 1. | Major Experiment (One)                              | – | 7 Marks |
| 2. | Minor Experiment (One)                              | – | 3 Marks |
| 3. | Spotting: three: 1x3 =<br>(Each 3 minutes duration) | - | 3 Marks |
| 4. | Record  | - | 2 Marks |

All the above experiments should be conducted by individual student.

Questions for major and minor experiments are to be set by drawing lots.

For each major and minor experiments, candidates have to write the requirements as per their questions which may be verified and signed by the external examiner only.

One observation for major experiment may be verified and signed by the external examiner only.

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# BIOLOGY – II (Zoology) Theory

+ 2, 1<sup>st</sup> Year Science

(Detailed syllabus)

No. of Periods: Yearly-40

**Unit - I Introduction to Zoology:** (01 Periods)

Brief History, Branches of Zoology, Scope of Zoology.

Biological Classification: (04 Periods)

Classification (Artificial, Natural, Phylogenetic), Two Kingdom and Five Kingdom-their merits and demerits, Binomial nomenclature. Scientific name of Rohu, Frog, Toad, Wall Lizard, Garden Lizard, Pigeon, Peacock, Rat, Man. Broad outline classification of animals (non-chordate up to phylum and chordate up to class level).

**Unit - II Organic Evolution:** (06 Periods)

Origin of Life, Oparin-Haldane theory, Miller's experiment, Theories of evolution (Lamarckism and Darwinism), Evidences of evolution (Anatomical, embryological, paleontological and biochemical).

**Unit - III Animal Tissue:** (06 Periods)

Structure and functions of Epithelial, Connective (detailed about blood and bones) Muscular and Nervous Tissues.

**Unit - IV Locomotion and Movement in Man:** (03 Periods)

Locomotion-joints and muscles in movement of Man, Mechanism of muscle contraction, Disorders- Arthritis and Osteoporosis.

**Unit - V Digestion and Absorption:** (05 Periods)

Intracellular and extracellular digestion, digestive system of cockroach, digestive system in human and physiology of digestion and absorption, role of hormones in digestion, malnutrition and under- nutrition.

**Unit - VI Animal Respiration:** (04 Periods)

Respiration and types (Cutaneous, tracheal), Respiration in Human: respiratory organs, mechanism of breathing, transport of respiratory gases, common respiratory disorders- prevention and cure)

**Unit - VII Circulation of Body Fluid:** (06 Periods)

Types of Circulation : Open circulation in Cockroach, closed circulation in human, structure and working of human heart, heart beat, cardiac cycle, pulse, blood groups ("ABO" and Rh), blood coagulation, Blood related disorders-hypertension, atherosclerosis, arteriosclerosis and pace maker.

**Unit - VIII Excretory Products and Elimination:** (5 Periods)

Types: Ammonotelism, ureotelism, and uricotelism, Malpighian tubules in Cockroach, Septal nephridia in Earthworm.

Excretion in Human-excretory system, formation of urine, Role of kidney in osmoregulation. Disorders related to excretion: kidney failure, dialysis, Role of ADH. Role of liver in excretion, Ornithine Cycle.

## Book Recommended :

Bureau's Higher Secondary (+2) Zoology, Part-I Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

## QUESTION PATTERN AND DISTRIBUTION OF MARKS

### BIOLOGY – II (Zoology) Theory

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Mark : 30

Time : 2 Hrs

#### Group A: (Objective Type- Compulsory)

- Q.1- Multiple choice/ one word answer : 1 mark each x 5 = 5 marks  
Q.2- Correct Sentences/Fill up the blanks : 1 mark each x 4 = 4 marks

#### Group B: (Short Answer Type)

- Q.3- Answer within two or three sentences : 2 marks each x 4 = 8 marks  
(out of eight bits one has to answer 4 bits)  
Q.4- Short answers type” (Differentiate) 3 bits to be  
answered out of 6 bits each carrying 2 marks 2marks each x 3 = 6 marks

#### Group C: (Long Answer Type) :

- (out of four questions from all units One has  
Q.5- to answer two questions) 6 mark each x 2 = 12 marks

N.B: Long answer type questions are to be set only from the portions underlined in the syllabus.

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## **BIOLOGY – II (Zoology) Practical**

**+ 2, 1<sup>st</sup> Year Science**

**(Detailed syllabus)**

### **EXPERIMENTS/ OBSERVATIONS:**

1. Tests for carbohydrate and fat (Qualitative)
2. Habit, Habitat, External features of specimens and identification with reasons-Amoeba, Hydra, Sycon, Planaria, Liver fluke, Ascaris, Earthworm, Leech, Prawn, Cockroach, Silkworm, Honeybee, Snail, Starfish, Shark, Rohu, Frog, Wall lizard, Cobra, Krait, Pigeon and Rat.
3. Study of squamous epithelium, muscle fibres, nerve cells and mammalian blood film (temporary/permanent slides)
4. Microscopic Preparation of striated muscle fibre of Toad.

### **Book Recommended :**

Bureau's Higher Secondary (+2) Zoology, Practical, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

## **QUESTION PATTERN AND DISTRIBUTION OF MARKS**

**BIOLOGY – II (Zoology) Practical)**

**+ 2, 1<sup>st</sup> Year Science (For College Level Exam)**

**Full Mark : 15**

**Time : 2 Hrs**

- |    |   |            |
|----|---|------------|
| 1. | Experiment  |            |
|    | Theory & Procedure  | - 03 maks  |
|    | One experiment to be set:<br>(To be set from Sl.No.1 &4)  |            |
|    | Experiment, Observation & Results   | - 04 marks |
| 2. | Spotting  | - 06 marks |
|    | Four spotting each carrying 1.5 mark. (three museum specimens and one slide<br>(To b e set from Sl No. 2 & 3) |            |
| 3. | Record  | - 02 marks |

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## **BIOLOGY – II (Zoology) Theory** **+ 2, 2<sup>nd</sup> Year Science** **(Detailed syllabus)**

**No. of Periods: Yearly-40**

- Unit -I      Neural Control and Coordination:** (06 Periods)  
Neural control and coordination: Broad outline of Nervous System of Earthworm and Cockroach. Human brain and spinal cord (structure and function), Mechanism of transmission of nerve impulse, reflex action and autonomic nervous system (elementary idea).
- Unit - II      Chemical Coordination and Regulation:** (04 Periods)  
Chemical coordination and regulation of Human endocrine system-Endocrine glands (name, location, hormones, their functions and hormonal disorders), feedback controls.
- Unit -III      Animal Reproduction:** (04 Periods)  
Reproduction types: Asexual reproduction-binary fission, multiple fission, Gemmule in Sponges, Budding in hydra, Sexual reproduction in human-male and female reproductive system, Menstrual cycle.
- Human Development:** (04 Periods)  
Gametogenesis (spermatogenesis, oogenesis), Fertilization, Implantation, Pregnancy & Embryonic development (brief), Parturition and Lactation.
- Unit -IV      Reproductive Health:** (04 Periods)  
Problems and Strategies, Population Explosion and Birth Control, Medical Termination of Pregnancy(MTP), Sexually Transmitted Diseases(STD) and Infertility.
- Unit -V.      Genetics:** (07 Periods)  
Mendelism,, Linkage and crossing over, Sex determination, Sex linked inheritance, Chromosomal aberrations (Structural), Elementary idea about Recombinant DNA Technology, Human Genome Project, DNA Fingerprinting, Pedigree analysis of Haemophilia Genetic disorders (Haemophilia, Sickle- cell anaemia, Phenylketonuria, Down's syndrome, Klinefelter's Syndrome and Turner's Syndrome).
- Unit -VI.      Human Health and Diseases:** (06 Periods)  
Common Diseases in Humans: Typhoid, Pneumonia, Common Cold, Malaria, Amoebiasis, Ascariasis, Filariasis, Ringworm. Immunity: Innate immunity, Acquired immunity, Cell mediated immunity, Humoral immunity, Active and Passive immunity, Vaccination and Immunization, Allergies, Autoimmune Diseases, Immune System of our body. AIDS, Cancer. Problems of Adolescence : Drug and Alcohol abuse, Effect of Drug/ Alcohol abuse (prevention and control).
- Unit -VII      Strategies for enhancement of Food Production:** (02 Periods)  
Animal Husbandry : Management of Farm animals (Diary Farm Management, Poultry Farm Management, Animal Breeding), Bee Keeping, Fisheries.
- Unit -VIII      Biodiversity :** (01 Period)  
Its importance, Biosphere reserve, National Parks, Zoos, Sanctuaries
- Unit -IX      Environmental Issues:** (04 Periods)  
Air pollution and its control, Water pollution and its control, Solid wastes, Agro-chemicals and their effects, Radioactive wastes, Green house Effect and Global Warming, Ozone Depletion in the Stratosphere, Degradation by Improper resource utilization & maintenance and Deforestation.

### **Book Recommended :**

Bureau's Higher Secondary (+2) Zoology, Part - II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar



## QUESTION PATTERN AND DISTRIBUTION OF MARKS

### BIOLOGY – II (Zoology) Theory

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

Full Mark : 30

Time : 2 Hrs

#### Group A: (Objective Type Compulsory)

- Q.1- Multiple choice/ one word answer : 1 mark each x 5 = 5 marks  
Q.2- Correct Sentences/Fill up the blanks : 1 mark each x 4 = 4 marks

#### Group B: (Short Type Answer)

- Q.3- Answer within two or three sentences : 2 marks each x 4 = 8 marks  
(out of eight bits one has to answer 4 bits)  
Q.4- Short answers type” (Differentiate) 3 bits to be  
answered out of 6 bits each carrying 2 marks 2marks each x 3 = 6 marks

#### Group C: (Long Type Answer) :

- (out of four questions from all units One has  
Q.5- to answer two questions) 6 mark each x 2 = 12 marks

N.B: Long answer type questions are to be set only from the portions underlined in the syllabus.

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**BIOLOGY – II (Zoology) Practical**  
**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**A : Major Experiments**

1. Study of action of salivary amylase on starch-effect of pH and temperature.
2. To test the presence of urea in urine/ given sample solution.
3. To test the presence of sugar and bile salts in urine/ given sample solution.
4. Study of Mendelian trait in man-Tongue Rolling, Hitchickers thumb, Ear lobe, Widows peak.

**B : Minor Experiments**

1. Preparation of Blood Smear of Toad/ Man
2. Study of haemolysis and crenation from human blood cells.
3. Study of heart beat of Frog/ Toad and effect of temperature on heart beat.
4. Working principle of Haemoglobinometer.

**C : Spotting –Slides, Bones and Models (mammalian)**

1. T.S/V.S through spinal cord, ovary, testis, artery, vein, kidney, stomach.
2. Axial and appendicular skeleton (excluding skull)
3. Models- Human Eye, Ear, Heart and Brain

**Book Recommended :**

Bureau's Higher Secondary (+2) Zoology, Practical, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**

**BIOLOGY – II (Zoology) Practical**

**+ 2, 2<sup>nd</sup> Year Science (For H.S Exam - 2015)**

**Full Mark : 15**

**Time : 2 Hrs**

- |    |  |   |           |
|----|--|---|-----------|
| 1. | Major Experiment (one) Experiment Observation & Results - 03 Theory and Procedure - 03 | - | 06 marks  |
| 2. | Minor Experiment (one)   | - | 2.5 marks |
| 3. | Spotting (Three to be set) One Slide, One bone, One model. Each spotting- 1.5          | - | 4.5 marks |
| 4. | Record   | - | 02 marks  |

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**GEOLOGY**  
**(THEORY)**  
**+2 1st Year Science**  
**(Detailed syllabus)**

**No. of periods: Yearly-80**

**UNIT – I**

25 Periods

**A. General Geology:-**

1. Subdivision and Scope of Geology.
2. Origin of the earth
3. Age of the earth
4. Internal constitution of the earth: crust, mantle, outer core, Inner core.
5. Depth Zone of oceans.

**B. Geomorphology:-**

1. Definition of geomorphology
2. Weathering and Erosion.
3. Geological work of the following Exogenetic processes with respect to weathering. Transportation and deposition with their important land forms:-
  - a) River
  - b) Glacier
  - c) Wind
4. Orogeny & Epeirogeny (Definition only)
5. Definition, classification, causes and effects of the following endogenetic processes.
  - a) Earthquake
  - b) Volcanoes

**UNIT – II : Crystallography:**

25 Periods

1. Crystalline and Amorphous substances.
2. Morphology of Crystals Form, Face, Edge, Solid angle.
3. Symmetry Elements of Crystals:- Plane of symmetry, Axis of symmetry, centre of symmetry.
4. Crystallographic axes, their relationship and classification of crystals into six systems.
5. Parameters, Indices and symbol of the crystals.
6. Description of Normal Class of different crystal systems (Except Triclinic) with respect to
  - a) axial relationship,
  - b) Symmetry Elements,
  - c) Forms present (Both Tabular and description of each) and
  - d) Mineral crystallised in this system (at least Five).

**UNIT – III : Mineralogy**

15 Periods

1. Definition of Minerals
2. Physical properties of Minerals:-  
Form, Colour, Luster, Streak, :Hardness, Cleavage, Fracture, Specific gravity, any other special property.
3. Description of following minerals with respect to their chemical composition, physical properties and uses:-
  - i) Oxides :- Quartz, Corundum, Haematite Magnetite, Chromite, Bauxite,
  - ii) Carbon :- Graphite

- iii) Carbonates :- Calcite, Magnesite.
- iv) Silicates :- Orthoclase, Microcline, Plagioclase, Biotite, Muscovite, Olivine, Topaz, Talc, Garnet, Beryl, Hornblende, Augite, Sillimanite, Kyanite.
- v) Sulphides:- Pyrite, Chalcoprite
- vi) Sulphates:- Gypsum, Apatite
- vii) Fluoride :- Fluorite.

#### UNIT – IV : Palaeontology -

15 Periods

- (a) Definition, mode of preservation and uses of fossils.
- (b) Index fossils- with examples
- (c) Morphology of Brachiopoda, Lamellibranchia. Gastropoda, Cephalopoda.
- (d) Plant Fossils :- Glossopteris, Gangamopteris, Vertebraria, Ptillophylum with reference to systematic position, Morphology, Indian occurrence and Age.

#### Books Recommended:

1. Bureau's Higher Secondary (+2) Geology, Part-I  
*Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.*

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### QUESTION PATTERN AND DISTRIBUTION OF MARKS GEOLOGY (THEORY)

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Mark : 70

Time : 3 Hrs.

#### Group-A (Objective Type)

##### Q. 1 Compulsory :

1×10 = 10 marks

Ten multiple choice answer type questions, each carrying one mark, covering all units.

##### Q. 2 Compulsory :

1×10 = 10 marks

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

#### Group-B (Short Answer Type)

##### Q. 3 Short Answer Type Questions with alternatives :

2×10 = 20 marks

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

##### Q. 4 Short Answer Type Questions with alternatives :

3×3 = 9 marks

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

#### Group-C (Long Answer Type ):

##### Q.5 to Q.7 :

7×3 = 21 marks

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**GEOLOGY (PRACTICAL)**  
**+2 1st Year Science**  
**(Detailed syllabus)**

**1. Crystallography: -**

Study of crystal models of normal classes -Isometric, Tetragonal, Hexagonal and Orthorhombic system with respect to axial relationship, symmetry elements and forms present.

**2. Mineralogy: -**

Study of physical characters of rock -forming and ore forming minerals listed in the theory.

**3. Palaeontology: -**

Drawing, Labelling, Age and description of the following fossils: -

Productus, Spirifer, Rhynchonella, Pecten, Arca, Conus, Physa, Natica, Nautilus, Ceratites, Glossopteris, Gangamopter is, Vertebraria, ptylophyllum.

**4. Laboratory Records and Viva-Voce -**

To be examined by Examiners.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**GEOLOGY (PRACTICAL)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Mark : 30**

**Time : 3 Hrs.**

1.	Experiment	-	26 Marks
2.	Viva – Voce	-	2 Marks
3.	Record	-	2 Marks

**GEOLOGY**  
**(THEORY)**  
**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**No. of Periods: Yearly-80**

**Unit – I : Petrology**  
**Igneous Petrology**

20 Periods

Definition and classification of rocks.

Classification of igneous rock based on depth of cooling.

Forms of igneous rock -a) Concordant -Sill, Laccolith, Lopolith, Phacolith.

Discordant -Dyke, Batholith.

Texture & Structure of Igneous rocks.

Description of the following rocks with respect to the textural, structural & mineralogical composition.

Intrusive rocks - Granite, Pegmatite, syenite, Diorite, Gabbro, Dolerite, Periodotite

Extrusive rocks -Basalt.

**Sedimentary Petrology**

Brief idea about mode of formation of sedimentary rocks.

Texture and structure of sedimentary rocks. Description  
of the following sedimentary rocks Conglomerate,  
Breccia, Sandstone, Shale, Limestone.

**Metamorphic Petrology:**

Definition, Agents & kinds of metamorphism.

Metamorphic texture & structure.

Description of the following metamorphic rocks, Gneiss, Schist, Quartzite, Marble, Khondalite.

**Unit –II : Economic Geology & Applied Geology**

30 Periods

**Economic Geology:**

Definition of ore, Gangue, Tenor, & Grade of ore.

Elementary idea about the process of formation of mineral deposits with special reference to magmatic concentration and Hydrothermal processes.

Mineralogy, Mode of occurrence, uses and Indian distribution of the following ores.

a) Iron ores, b) Copper ore, c) Aluminium ore, d) Chromium ore, e) Coal, f) Petroleum,  
g) Manganese

**Applied Geology**

**A. Ground Water**

1. Definition of ground water.
2. Hydrologic cycle
3. Advantages of using ground water.
4. Porosity, Permeability
5. Aquifers & water table.

**B. Engineering Geology:**

1. Geological consideration of the damsite.
2. Geological consideration of the Bridge site.
3. Soil erosion & methods of soil conservation.

### Unit – III : Stratigraphy & Structural Geology

30 Periods

#### A. Stratigraphy :

- Definition, scope, units & principles of stratigraphy.
- Standard stratigraphic time scale.
- Principles of stratigraphic correlation.
- Dharwar super Group.
- Type Areas of Cuddapah & Vindhyan Super Group.
- Gondwana Super Group.
- A general idea about Geology of Orissa.

#### B. Structural Geology :

1. Attitude of beds : Dip and strike
2. Fold : Antiform, Synform, Anticline, Syncline, Symmetrical, Isoclinal & Recumbent fold.
3. Fault : Normal fault & Reverse fault  
Horst and Graben.
4. Unconformity & its types.

#### Books Recommended:

1. Bureau's Higher Secondary (+2) Geology, Part-II  
*Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.*

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### QUESTION PATTERN AND DISTRIBUTION OF MARKS GEOLOGY (THEORY)

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

Full Mark : 70

Time : 3 Hrs.

#### Group-A (Objective Type)

##### Q. 1 Compulsory :

1×10 = 10 marks

Ten multiple choice answer type questions, each carrying one mark, covering all units.

##### Q. 2 Compulsory :

1×10 = 10 marks

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

#### Group-B (Short Answer Type)

##### Q. 3 Short Answer Type Questions with alternatives :

2×10 = 20 marks

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

##### Q. 4 Short Answer Type Questions with alternatives :

3×3 = 9 marks

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

#### Group-C (Long Answer Type Questions with alternatives):

##### Q.5 to Q.7 :

7×3 = 21 marks

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**GEOLOGY (PRACTICAL)**  
**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**1. Petrology:**

Megascopic identification of rocks as given in theory.

**2. Structural Geology**

Study of geological maps and drawing of profiles.

**3. Economic Geology**

Megascopic identification of the following economic minerals:- Hematite Pyrite, Magnetite, Pyrolusite, Psilomelane, Chalcopyrite, Bauxite, Chromite, Magnesite.. Coal, Graphite.

**4. Field Training**

1. Use of clinometer compass
2. Study of structure and rock types, mineral assemblages during the course of field training.
3. Preparation of Field Report and it is to be submitted at the time of Practical Examination.

**5. Viva-voce**

Oral questions to be answered by the students.

**6. Laboratory Records**

The laboratory records are to be examined by the examiners at the time of Practical Examination.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**GEOLOGY (PRACTICAL)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam 2015)

**Full Mark : 30**

**Time : 3 Hrs.**

- |    |            |   |          |
|----|------------|---|----------|
| 1. | Experiment | - | 24 Marks |
|----|------------|---|----------|

(Petrology-10 marks, structural Geology-5 marks, Economic Geology-5 marks, Field report-4 marks)

- |    |             |   |         |
|----|-------------|---|---------|
| 2. | Viva – Voce | - | 3 Marks |
|----|-------------|---|---------|

- |    |        |   |         |
|----|--------|---|---------|
| 3. | Record | - | 3 Marks |
|----|--------|---|---------|



**GEOGRAPHY  
(THEORY)  
+ 2, 1<sup>st</sup> Year Science  
(Detailed syllabus)**

**No. of Periods: Yearly-80**

**Unit-I : Nature of Geography and Lithosphere:**

**30 Periods**

- 1 Meaning and scope of Geography, Branches of Geography
- 2 Origin and evolution of the Earth: Nebular, Tidal, Big-Bang hypothesis.
- 3 Interior of the Earth
- 4 Earthquakes and volcanoes
- 5 Major types of Rocks and their characteristics
- 6 Major types of Soils and their world distribution
- 7 Weathering and erosion
- 8 Works of River, Wind and Glacier.

**Unit-II : Hydrosphere and Biosphere:**

**20 Periods**

- 1 General relief of the Ocean floor
- 2 Distribution of Temperature and salinity of Ocean water
- 3 Movement of Ocean water- Tides and Currents (Atlantic & Indian)
- 4 Environment- Types and Conservation, Man-Environment Relationship, Bio-Sphere- Concept, importance of Plants and Animals in the Biosphere.

**Unit-III : Regional Geography of Odisha:**

**30 Periods**

- 1 Physiography, Climate and Natural Vegetation
- 2 Agriculture: Problems and Prospects
- 3 Industry: Iron and Steel, Aluminium
- 4 Population: Distribution and Density
- 5 Transportation - Land Water & Air

**Books Prescribed :**

Higher Secondary Geography, Part – I Published by Odisha State Bureau of Text Book Preparation & Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS  
GEOGRAPHY (THEORY)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Mark : 70**

**Time : 3 Hrs.**

**Group-A (Objective Type)**

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type Questions with alternatives):**

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**GEOGRAPHY (PRACTICAL)**

**+ 2, 1<sup>st</sup> Year Science  
(Detailed syllabus)**

**Unit-I : Fundamentals of Maps:**

- 1 Maps- Types, Scale- Types- Construction of Linear And Diagonal Scale
- 2 Drawing of parallels of latitudes and meridian of longitudes
- 3 Contour and cross-section: Hill, Waterfall, Plateau, Col, 'V'-shaped valley
- 4 Identification of topographical symbols and weather symbols
- 5 Function and use of Meteorological Instruments

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**

**GEOGRAPHY(PRACTICAL)**

**+ 2, 1<sup>st</sup> Year Science (For College Level Exam)**

**Full Mark : 30**

**Time : 3 Hrs.**

- |    |             |   |          |
|----|-------------|---|----------|
| 1. | Experiment  | - | 20 Marks |
| 2. | Viva – Voce | - | 5 Marks  |
| 3. | Record      | - | 5 Marks  |

**GEOGRAPHY**  
**(THEORY)**  
**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

No. of Periods: Yearly-80

**Unit-I : Atmosphere:**

**20 Periods**

- 1 Atmosphere –Composition and Structure
- 2 Elements and factors of Weather and Climate
- 3 Insolation, Temperature- Horizontal and Vertical Distribution
- 4 Atmospheric Pressure and Pressure belts, Winds- Planetary, Periodical and local
- 5 Humidity- Evaporation, Condensation and Precipitation, Types of Rainfall.

**Unit-II : Resource and Human Geography:**

**30 Periods**

- 1 Resource: Concept of Resource, Types of Resource and Conservation of Natural Resource, Resource Development
- 2 Human Activities:
  - a. Primary: Agriculture and allied activities,  
Types of Agriculture: Subsistence and Commercial
  - b. Secondary: Manufacturing Industries; Types-  
Household, Small Scale, Large Scale (Iron and Steel)
  - c. Tertiary: Transport and Communication(Roads & Railways)
- 3 Distribution of Population and Factors influencing pattern of distribution
- 4 Settlements: Types and Factors influencing growth and development of settlements.

**Unit-III : Regional Geography of India:**

**30 Periods**

- 1 Physiography
- 2 Drainage
- 3 Climate
- 4 Natural Vegetation
- 5 Soils
- 6 Population: Distribution and Density
- 7 Agriculture: Distribution of Rice and Wheat
- 8 Industry: Distribution of Iron and Steel Industries
- 9 Transport: Road and Railway Network.

**Books Prescribed :**

Higher Secondary Geography, Part – II, Published by Odisha State Bureau of Text Book Preparation & Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**GEOGRAPHY (THEORY)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

**Full Mark : 70**

**Time : 3 Hrs.**

**Group-A (Objective Type)**

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type):**

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**(Detailed Syllabus)**  
**GEOGRAPHY (PRACTICAL)**  
+ 2, 2<sup>nd</sup> Year Science

**Unit-I**

- 1 Map Projection- Construction of Simple Cylindrical, Cylindrical equal-area, Simple conical with one standard parallel, Gnomonic, Stereographic (Polar Case) Projections
- 2 Computation of Mean, Median and Mode (Grouped and Ungrouped data)
- 3 Construction of Vertical Bar, Horizontal Bar and Wheel Diagram

**Unit-II : Chain and Tape Survey**

**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**GEOGRAPHY (PRACTICAL)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

**Full Mark : 30**

**Time : 3 Hrs.**

- |    |             |   |          |
|----|-------------|---|----------|
| 1. | Experiment  | - | 20 Marks |
| 2. | Viva – Voce | - | 5 Marks  |
| 3. | Record      | - | 5 Marks  |

**STATISTICS**  
**(THEORY)**  
**+ 2, 1<sup>st</sup> Year Science**  
**(Detailed syllabus)**

**No. of Periods; Yearly-80**

**UNIT- I :**

**(20 periods)**

**a) Basic Mathematics:**

Permutations and combinations, Binomial theorem, logarithmic and exponential series.

**b) Probability -I :**

Definition of probability:- classical, empirical and axiomatic approach, Sample space and events, Correspondence between sets and events, Probability by direct enumeration, Laws of addition and multiplication, Conditional probability and independent events.

**c) Probability -II :**

Bayes' rule and its application, pairwise independence and mutual independence of events, Mathematical expectation of random variable, Laws of addition of expectation, Multiplication law of expectation for independent random variables, variance of sum of random variables.

**UNIT – II :**

**a. Statistical methods**

**(30 Periods)**

Definition, Scope and limitations of statistics, Collection of data: Primary and secondary data, classification of data according to attributes and variables. Tabulation of data, one-way and two-way tables.

Presentation of data: Diagrams, graphs and charts, Simple, multiple, sub-divided and percentage bar diagram, pie diagram, pictogram and cartograms, histogram, frequency polygon, frequency curve and ogives.

**b. Frequency distribution, Measures of central tendency and measures of location:** arithmetic mean, geometric mean, harmonic mean, median, mode, Quartiles, deciles and percentiles.

**c. Measures of dispersion:**

Range, Inter-quartile range, Quartile Deviation, mean absolute deviation, standard deviation, coefficient of variation and Lorenz curve.

**d. Moments, skewness and kurtosis:**

Raw and central moments of various orders, skewness and its different measures, kurtosis, Beta one ( $\beta_1$ ) Beta two ( $\beta_2$ ) Gamma one ( $\gamma_1$ ) and gamma two ( $\gamma_2$ ) measures.

**UNIT - III**

**a) Sampling methods:**

**(30 Periods)**

Sample, population, sampling units, sampling frame, Principal steps in sample survey, Census versus sample survey, Idea about questionnaires and schedules, sampling & non-sampling errors, Elementary idea on simple random sampling with and without replacement.

Methods of drawing random samples: Lottery method and random number table method, Estimation of population mean and population total, Variance of these estimates.

**b) Stratified sampling:** Elementary idea on stratified random sampling, Proportional and optimum allocation, Estimation of population mean and population total, Variance of these estimates.

**c) Statistical system in India**

Statistical organizations in the Union and State Governments, Agricultural statistics (Area, yield and Land Utilization statistics), Population Census, National Sample Survey; Organization.

**Text Book Recommended :**

Bureau's Higher Secondary (+2) Statistics, Part - I, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**STATISTICS (THEORY)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Mark : 70

Time : 3 Hrs.

**Group-A (Objective Type)**

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type ):**

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**STATISTICS (PRACTICAL)**

+ 2, 1<sup>st</sup> Year Science  
(Detailed syllabus)

Graphical representation of data-Histogram, frequency polygon and cumulative frequency curve, Bar diagram, pie diagram, Arithmetic mean, median, Mode, G.M and Harmonic mean, partition values, standard deviation, mean absolute deviation, coefficient of variation, moments, skewness & kurtosis.

**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**STATISTICS (PRACTICAL)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Mark : 30

Time : 3 Hrs

- 1) Solution of Problems : 24 Marks
- 2) Viva Voce : 3 Marks
- 3) Record : 3 Marks

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**STATISTICS**  
**(THEORY)**  
**+ 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**No. of Periods: Yearly-80**

**Unit – I : TIME SERIES**

**(20 periods)**

Definition, uses and components of time series, measurement of trend : Freehand, semi-average, moving average and least squares methods, Measurement of Seasonal fluctuations: simple averages, Ratio to trend, Ratio to moving average and link relatives methods.

**Unit – II : Index Number**

**(30 Periods)**

Need, meaning & uses of index number, important steps in the construction of Index Number. Problems in selection of items, base year, average and system of weighting. Weighted index number, Laspeyre's, Paasche's and Fisher's ideal index numbers. Time Reversal, Factor Reversal and circular tests, Base shifting, splicing and Deflating of index number, Cost of living index numbers-construction & uses.

**Unit – III :**

**(30 Periods)**

- a) Bivariate frequency distribution, simple correlation, Rank correlation (including ties), linear regression, Regression co-efficients and their properties.  
Probability Distributions : Binomial and Poisson distributions with properties and applications (computation of mean and variance only)
- b) Normal probability distribution, its properties and applications (mathematical proof excluded), Elementary ideas on testing of hypothesis, large samples tests based on normal distribution (mean, variance and proportion).

**Text Book Recommended :**

Bureau's Higher Secondary (+2) Statistics, Part - II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**STATISTICS (THEORY)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

**Full Mark : 70**

**Time : 3 Hrs.**

**Group-A (Objective Type)**

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type ):**

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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## **STATISTICS (PRACTICAL)**

**+ 2, 2<sup>nd</sup> Year Science**

**(Detailed syllabus)**

Measurement of trend by moving averages and by least square (straight line only) method.  
Measurement of seasonal fluctuations (simple average, Ratio to moving averages, Ratio to trend and link relative methods)

Computation of index numbers by weighted average of price relatives : Laspeyre's, Paasche's and Fisher's formula; coefficient of correlation, coefficient Regression co-efficients and regression lines.

N.B. Uniformly the practical records should be maintained in blue/black ink/ball pen by the students.

### **Book recommended :**

Bureau's Higher Secondary (+2)Statistics, Part-II Published by Odisha State Bureau of Textbook Preparation and production, Bhubaneswar.

## **QUESTION PATTERN AND DISTRIBUTION OF MARKS**

**STATISTICS (PRACTICAL)**

**+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)**

**Full Mark : 30**

**Time : 3 Hrs**

- 1) Solution of Problems – 24 Marks
- 2) Viva : 3 Marks
- 3) Record : 3 Marks

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# ELECTRONICS (THEORY) + 2, 1<sup>st</sup> Year Science (Detailed syllabus)

**No. of Periods: Yearly-80**  
**UNIT – I**

**25 Periods**

- a) **Resistance:-** Types of resistance, variable resistance, colour code, power rating, specific resistance, combination of resistance, principle of rheostat and potentiometer. Kirchhoff's law and wheatstone's bridge.  
**Capacitance:-** Capacitance, Types of capacitors, variable Capacitors, colour codes, charging and discharging of capacitor, energy stored in a capacitor, DC and AC reactance (idea only) and their variation with frequency, combination of capacitors.  
**Inductance :-** Faraday's and Len'z Law, self and mutual Inductance, types of inductors, inductance of a solenoid, energy stored in an inductor, DC and AC reactance (idea only) and variation with frequency, combination of inductors.
- b) **Circuits :-** DC Circuits -RC, RL and LC circuits for growth and Decay. AC Circuits -Pure R, L and C Circuits and RC, RL, LC and RLC series and parallel resonance circuits, Q factor.  
**Thermoionic Emission:-** Types of electron emission, potential barrier, work function, thermo ionic emission, Richardson- Dushman equation (No Derivation), Child's law (No derivation).  
**Vacuum Tubes :-** Diode valve working, characteristic and uses, Triode working, characteristic, constant of triode, relation between them, limitation of triode valve, use of triode as an amplifier, tetrode, characteristic, Dynatron effect and negative resistance, Pentode, characteristic, function of different grids.

## **Unit – II**

**30 Periods**

- (a) **Semi- conductor:** - Atomic structure, Band theory, Explanation of conductor, semiconductor and insulator, Intrinsic and Extrinsic semiconductor, P type and N type semiconductor, Energy band of extrinsic semiconductor.  
**PN Junction:** PN Junction, Potential barrier, Depletion layer, Forward bias and Reverse bias, characteristic, Zenner diode, Characteristic of Zenner diode, Impedance of Zenner diode.
- (b) **Transistor :-** PNP and NPN transistor, working, input, output and transfer characteristic of CB, CE and CC configuration, input and output impedance, current amplification factor and relation between them, leakage current, DC and AC load line, operating point, Q point.  
**Transistor biasing :** Thermal runaway, its elimination and stabilization of operating point, transistor biasing of base resistor, feed back resistor and potential divider method.

## **Unit – III**

**25 Periods**

- (a) **Rectifier and filters :-** Half wave, centre tapped full wave and bridge rectifier, efficiency, Ripple factor, capacitor filter, Inductor filter, L section filter and F section filter and RC filters (qualitative discussion of filters only). Zenner diode as voltage regulator for rectifier circuits.  
**Amplifiers :-** CB, CE and CC amplifiers with their voltage. Current and Power gain, phase relationship between input and output of these amplifiers. Qualitative discussion of Class A, B, AB and C amplifiers with reference to load line, Q point, angle of conduction and efficiency.
- (b) **Instruments :-** Multimeter -construction and working, VTVM- construction and working, Microphone - carbon and moving coil dynamic microphone, construction and working, Dynamic Loud speaker- construction and working, Public Address system and its use.  
**Integrated circuits:-** IC, basic idea, IC Classification, Monolithic IC, making, fabrication of components, thick and thin film IC (idea only), Hybrid or multichip IC (idea only).

## **Books Recommended :**

Bureau's Higher Secondary (+2) Electronics, Part-I

*Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.*

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## QUESTION PATTERN AND DISTRIBUTION OF MARKS

### ELECTRONICS (THEORY)

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Mark : 70

Time : 3 Hrs.

#### Group-A (Objective Type)

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

#### Group-B (Short Answer Type)

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

#### Group-C (Long Answer Type )

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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## ELECTRONICS (PRACTICAL)

+ 2, 1<sup>st</sup> Year Science

(Detailed syllabus)

### EXPERIMENTS

1. Verification of ohm's law, determination of resistance using Voltmeter and Ammeter.
2. Verification of laws of combination of resistance by meter bridge method.
3. Determination of specific resistance of resistance wire by PO Box method.
4. To draw characteristic curve of diode valve for different filament voltage. Hence determine plate resistance.
5. To draw characteristic curve of PN Junction diode for forward bias only for two junction diodes.
6. To draw characteristic curve of Zenner diode for reverse bias only.
7. To calculate the value of carbon resistors from their colour code for at least 10 resistors.
8. Determination of efficiency and ripple factor with and without filter for half wave rectifier.
9. Recognition of electronics components like resistors, capacitors, inductors, transformers, diodes, triode, PN Junction, transistors and IC.
10. Practice of soldering:-
  - a) Resistors in series.
  - b) Resistors in parallel.
  - c) Resistor- capacitor in series.
  - d) Resistor- capacitor in parallel.

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## QUESTION PATTERN AND DISTRIBUTION OF MARKS ELECTRONICS (PRACTICAL)

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Mark : 30

Time : 3 Hrs.

- |    |            |   |          |
|----|------------|---|----------|
| 1. | Experiment | - | 18 Marks |
| 2. | Viva-voce  | - | 7 Marks  |
| 3. | Record     | - | 5 Marks  |

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## ELECTRONICS (THEORY)

+ 2, 2<sup>nd</sup> Year Science  
(Detailed syllabus)

No. of Periods: Yearly-80

UNIT – I

25 Periods

**Amplifiers:-** Voltage amplifiers -RC coupled transistor amplifiers, voltage gain, Frequency Response Curve, Band Width, Gain Band Width product, Advantages and Use: Power Amplifiers -Class B Push- Pull amplifiers, working principle, efficiency, output impedance, transformer coupled amplifier, gain and use.

**Feed back amplifiers :-** Feed back technique, gain, negative feed back, voltage feed back amplifiers, current feed back amplifiers, effect of negative feed back on input and output impedance, voltage gain, band width and frequency distortion.

**(b) Oscillators :-** Condition for sustained oscillation, Barkhausen criterion, tank circuit with- positive feed back, Tuned collector oscillator, Hartley oscillator, Colpitt oscillator, RC phase shift oscillator, Crystal oscillator and its frequency stability. (Qualitative analysis of all these oscillators).

Unit – II

30 Periods

**4 Modulation and Transmitters:-** Types of modulation, amplitude modulation, side band, power dissipation in side band, modulation index and its significance, AM transmitter (explanation in block diagram), SSB transmitter (explanation in block diagram). Frequency modulation, side band frequency, FM index, FM modulator with varactor diode, FM transmitter (explanation in block diagram).

**Demodulation and Receivers :-** AM demodulator: Linear diode detector with capacitor filter, TRF receiver, AVC, Super heterodyne receiver (explanation in block diagram), FM Demodulation: FM detection, block diagram of FM receiver and explanation of each stage, AFC function, use and advantage of FM in communication.

**5 Digital Electronics :-** Decimal and binary numbers, conversion, binary arithmetic, Boolean algebra, De Morgan's theorems.

logic gates -OR, AND, NOT, NAND, NOR, XOR, Circuit symbol, use, truth table only. (No electronic circuit for NAND, NOR & XOR)

**Antenna :-** Principle and basic idea, types of antenna, dipole antenna, directional antenna, Morconi Yagi antenna, use in transmission, T.V. receiving antenna.

Unit – III

25 Periods

**Propagation of Radio Waves:-** Modes of propagation of radio waves ground waves, sky waves, space waves, skip distance, maximum usable frequency, general idea about satellite communication, propagation of Radio Waves in the Ionosphere.

**TV:-** Principle of TV transmission. scanning, TV Camera, Black & White, TV transmitter and Receiver (explanation in block diagram).

**Power Electronics :-** Idea about JFET, SCR, DIAC, TRIAC, UJT, their working, characteristics and uses.

**RADAR and CRO:-** Basic principle of Radar, Block diagram of Radar, its function and use, Cathode Ray Oscilloscope, Basic idea and use with working.

**Books Recommended :**

Bureau's Higher Secondary (+2) Electronics, Part-II

Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**ELECTRONICS (THEORY)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

Full Mark : 70

Time : 3 Hrs.

**Group-A (Objective Type)**

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type)**

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**ELECTRONICS (PRACTICAL)**

+ 2, 2<sup>nd</sup> Year Science  
(Detailed syllabus)

1. Use of multimeter to measure resistance and compare them with colour code. Hence, verify the law of combination of resistance. Measurement of DC and AC voltage.
2. Use of VTVM to measure resistance and compare them with colour code. Hence verify combination of resistance. Measurement of DC and AC voltage.
3. To draw characteristic curve for two junction diode in forward and reverse bias condition. Hence calculate forward bias resistance.
4. To draw characteristic curve for Zenner diode in reverse and forward bias condition.
5. To draw plate and mutual characteristic of triode valve and to determine the valve constants ( $r_p$ ,  $g_m$ ,  $\mu$ ) from graph.
6. Input, output and transfer characteristic of PNP/NPN transistor in CB configuration. Hence find out ( $\beta$ ,  $r_i$ ,  $r_o$ ) from graph ( $r_i$  -input resistance,  $r_o$  -output resistance,  $\beta$  = Current amplification factor).
7. Input, output and transfer characteristic of a PNP/NPN transistor in CE configuration, Hence findout,  $\beta$ ,  $r_i$ ,  $r_o$ .
8. Determination of efficiency and ripple factor with and without filter for full wave and bridge rectifier.
9. To study the characteristics of FET and find its parameters from the graph.
10. To study the characteristic of SCR for different gate current and find out its parameters from graph.
11. Assembly of a single stage RC coupled amplifier and to draw frequency response curve to find out the band width.
12. Assembly of Hartley oscillator and measurement of frequency for different positions of variable inductor/ capacitor with a wave meter.

13. Assembly of a Colpitts oscillator and measurement of frequency for different positions of variable capacitor with a wave meter.
14. Study of variation of Impedance of a series LCR circuit with frequency and hence find out the resonant frequency.
15. Study of variation of impedance of a parallel LCR circuit with frequency and hence to find out the resonant frequency.
16. Study of Zener diode as a voltage stabilizer.
17. Tuned Collector Amplifier, frequency response curve and band width.
18. Characteristic of UJT and find out its parameter from graph.
19. Linear diode detector and its characteristics.
20. To study selectivity of MW receiver.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**ELECTRONICS (PRACTICAL)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam 2015)

**Full Mark : 30**

**Time : 3 Hrs.**

1.	Experiment	-	18 Marks
2.	Viva-voce	-	7 Marks
3.	Record	-	5 Marks

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# COMPUTER SCIENCE (THEORY)

+ 2, 1<sup>st</sup> Year Science  
(Detailed syllabus)

**No. of Periods: Yearly-80**

**Unit: I**

**30 Periods**

Over view of computer system: Introduction, characteristics of computer, History of computer and generation of computer, Classification of computers, Anatomy of digital computer system, Input and output devices of computer, Primary and secondary memory.

Number system: Binary, Octal, Hexadecimal number system and their conversions, Binary arithmetic (Addition, subtraction, Multiplication and division), Computer codes (BCD, EBCDIC and ASCII), Boolean algebra and Logic gates (AND, OR, NOT, NAND, NOR & XOR) gates and their functions and truth tables.

**Unit: II**

**25 Periods**

Software: Classification of software, Operating system and its application, Programming languages- (Machine language, Assembly language and high level language), Assembler, compiler and Interpreter, Program planning and use of algorithms and Flow-charts in program developments.

**Unit: III**

**25 Periods**

Programming in C: data types, variables and Constants, Operators and Expressions, Input and output, Control functions, Control statements, IF, IF-ELSE, Nested IF-ELSE statements, Switch and Break statement, GOTO statements, Looping-WHILE loop, Do-WHILE, FOR and nested loop, BREAK and Continue statements.

## **Books Prescribed:**

1. Fundamentals of Computer By P.K.Sinha and Preeti Sinha, BPB Publication.
2. ANSI C by C Balaguruswami.
3. Let us C by Kanitakar.
4. Basic computer Education, by A.K. Mishra and S.K. Pattnaik, Kalyani Publication.

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## **QUESTION PATTERN AND DISTRIBUTION OF MARKS**

### **COMPUTER SCIENCE (THEORY)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Mark : 70**

**Time : 3 Hrs.**

#### **Group-A (Objective Type)**

##### **Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

##### **Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

#### **Group-B (Short Answer Type)**

##### **Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

##### **Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

#### **Group-C (Long Answer Type)**

##### **Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**(Detailed Syllabus)**  
**COMPUTER SCIENCE (PRACTICAL)**  
**+ 2, 1<sup>st</sup> Year Science**

- a) Use of DOS commands (Internal and External)
- b) Working with Windows.
- c) Development of C programs as per the Unit-III of theory.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**COMPUTER SCIENCE (PRACTICAL)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Mark : 30**

**Time : 3 Hrs.**

- |    |   |   |          |
|----|---|---|----------|
| 1. | Experiment  | - | 20 Marks |
|    | (Gr – A : Use of DOS Command and working with Windows – 10 Marks) |   |          |
|    | (Gr – B : Developing 'C' Programming - 10 Marks)                  |   |          |
| 2. | Viva-voce   | - | 5 Marks  |
| 3. | Record  | - | 5 Marks  |

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**COMPUTER SCIENCE**  
**(THEORY)**  
**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**No. of Periods: Yearly-80**

**Unit: I**

**30 Periods**

Business data processing: Concept, Database management system, Introduction to Relational database management system, Different key concepts, C.F Codd's rule, Normalization, Computer in Business, Medicine, Entertainment, Office Automation, Research and Development and Electronic Commerce.

**Unit: II**

**25 Periods**

Data Communication and Computer Networks: Network topology, Multiplexer, Concentrator, Network types: LAN, WAN and MAN, Network devices, OSI model, Internet and its applications, WWW, websites and web pages, search engines E -mail and its features, VIRUS, Cyber Crime, Computer Ethics.

**Unit: III**

**25 Periods**

Functions and Built-in functions in C: Introduction to functions, Types of functions, writing functions, accessing the function, function prototypes, Passing the arguments, Recursion Void function, Library functions.

Arrays: One dimensional and multidimensional array, Defining and initializing arrays, initialization of character arrays, String handling functions, Pointer: Introduction, Pointer array, Pointer operators.

Structure and Union: Introduction, Initialization, accessing the structure members, difference between the structure and union.

File handling operations in C: Data file, file .access, sequential and random access, Opening the file, reading and writing data in a file, closing a file.

**Books Prescribed:**

1. Data Base management system by Bipin Desai.
2. Fundamentals of computer by P.K.Sinha and Preeti Sinha.
3. ANSI-C, By E. Bdagurusaimi.
4. Lotus C - By kanitakar
5. Basic Computer education, by A.K. Mishra & S.K. Pattnaik, Kalyani Publication

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**COMPUTER SCIENCE (THEORY)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

Full Mark : 70

Time : 3 Hrs.

**Group-A (Objective Type)**

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type )**

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**(Detailed Syllabus)**  
**COMPUTER SCIENCE (PRACTICAL)**  
**+ 2, 2<sup>nd</sup> Year Science**

1. Working with internet
2. Use of MS OFFICE
3. C programs based on Unit III of theory

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**COMPUTER SCIENCE (PRACTICAL)**

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam 2015)

Full Mark : 30

Time : 3 Hrs.

1. Experiment - 20 Marks  
(Gr – A : Use of MS Office / Working with Internet – 10 Marks)  
(Gr – B : 'C' Programming based on Unit - III - 10 Marks)
2. Viva-voce - 5 Marks
3. Record - 5 Marks

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# INFORMATION TECHNOLOGY

(THEORY)

2, 1<sup>st</sup> Year Science

(Detailed syllabus)

No. of Periods:Yearly-80

## UNIT- I

28 Periods

### a. Overview of Information Technology : 8 Periods

Introduction of I.T, Data & its different forms, Distinction between data and information, Data Processing System, Use of I.T in business, education, Medicine, Entertainment, Office Automation, Research & Development, Concept of hardware and Software.

### b. COMPUTER: 10 Periods

Characteristics of digital computer, evolution of computer, classification of computer, use of binary number system in computer (idea of bit, word, nibble & byte), Components of a computer, CPU & its working, Main Memory, static & dynamic RAM, Cache, ROM, Secondary Memory (hard disk, floppy, optical disk), Input-Output devices (keyboard, monitor, mouse, OCR, MICR, Barcode Reader, Scanner, Joystick), Printer (DMP, Ink-jet, Laser Printer), Plotter, Use of Smart Card.

### c. COMMUNICATION: 12 Periods

Basic elements of communication system, Data Transmission Modes \_\_\_\_\_ Simplex, Half-Duplex & Full Duplex, Transmission Media\_\_\_\_\_ Twisted pair cable, Coaxial cable, Optical Fibre, Radio Link , Microwave Link & Satellite Link, Network Topology, Network Types \_\_\_\_\_ LAN, MAN & WAN 56kbps Modem, Cable Modem & DSL Modem, Client Server Concept.

## UNIT-II

24 Periods

### a. SOFTWARE: 12 Periods

System Software & Application Software, Operating System, Types Of Operating System & Its Uses. Programming Languages (Machine Level, Assemble Level, & High Level Languages), Assembler, Compiler and Interpreter.  
Programming Tools: Use of Flowchart & Algorithm in Programming Development, Steps in Program Development.

### b. Multimedia: 8 Periods

Introduction to Multimedia, Multimedia Components \_\_Text, Graphics, Animation, Audio, Video, Multimedia Applications.

## UNIT-III :

28 Periods

### Programming in C:

Data Types, Variables & Constants, Operators & Expressions, Input & Output Control Function, Control Statements ----- IF, IF----- ELSE, Nested IF----ELSE Statements, Switch Statements, Conditional Operator & GOTO Statements, Decision Making & Looping, While Statement, Do While Statement, For-----Next Statement, BREAK & CONTINUE Statements, Arrays One Dimensional & Multidimensional Arrays, Handling of Character Strings.

**Books Prescribed :** Bureau's Higher Secondary (+2) Information Technology, Part-I,

Published by Odisha State Bureau of Text Book Preparation & Production, Bhubaneswar

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## QUESTION PATTERN AND DISTRIBUTION OF MARKS

### INFORMATION TECHNOLOGY (THEORY)

+ 2, 1<sup>st</sup> Year Science (For College Level Exa)

Full Mark : 70

Time : 3 Hrs.

#### Group-A (Objective Type)

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

#### Group-B (Short Answer Type)

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

#### Group-C (Long Answer Type )

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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## INFORMATION TECHNOLOGY (PRACTICAL)

+ 2, 1<sup>st</sup> Year Science

(Detailed syllabus)

1. Use of DOS commands (Internal and external)
2. Working with Windows
3. Use of MS OFFICE
4. Development of C-programming as per Unit-III

**Books Prescribed :**

Bureau's Higher Secondary (+2) Information Technology, Practical, Published by Odisha State Bureau of Text Book Preparation & Production

## QUESTION PATTERN AND DISTRIBUTION OF MARKS

### INFORMATION TECHNOLOGY (PRACTICAL)

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Mark : 30

Time : 3 Hrs.

1. Experiment - 20 Marks

(Gr .A: Use of DOS/ MS OFFICE, working with windows-10 marks)

(Gr. B Development of C- programming )

2. Viva-voce - 5 Marks

3. Record - 5 Marks

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# INFORMATION TECHNOLOGY

## (THEORY)

+ 2, 2<sup>nd</sup> Year Science

(Detailed syllabus)

No. of Periods: Yearly-80

### UNIT-I :

20 Periods

#### a) Introduction to Internet :

Internet Backbones & Its Features, Internet Access Dial-Up Connection, Direct Connection & Broadband Connection, Role of ISP , Function of Hub, Switch, Bridge, Router, Repeater & Gateways in Internet, Internet Protocols----TCP/IP, FTP, HTTP, TELNET, Gopher & WAIS, Internet Addressing IP address, domain names, E-mail Address & URLS, Distinction between Internet , Intranet & Extranet.

#### b) Internet Application :

WWW, Web Sites & Web Pages, Web Browsing & Web Browsers, Search Engine, File Downloading & Uploading, Chatting, Internet Relay Chat(IRC), E-mail & its features, Mailing Lists & Newsgroups, Internet Telephony System.

### UNIT-II :

30 Periods

#### a. Introduction to Database Management System :

Basic Concepts Of Database Design, Components Of Database Design, Database & Its Features, Data Normalization, Normal Forms 1st , 2nd & 3rd Normal Forms, DBMS & Its Types, Advantages Of DBMS, Data Warehousing Definition, Different Layers, Components, Advantages, & Applications Area, Data Mining Definition, Its Evolution, Technologies Used in Data Mining, Advantages, Application Area , Geographical Information System ----- Definition, Components, Advantages, Uses & Application Area, E-Commerce --- Definition, Its Types With Advantages, Disadvantages, Application Area.

#### b. Network Security On Internet :

Threats & Prevention From Viruses, Worms Trojan Horse, Spams, Use of Cookies, Protection Using Firewall, Proxy Server, Concept of Public Keys & Private Key, Use of Digital signature, VPN.

#### c. Cyber Crime:

Definition & its Types --- Cyber Talking, Hacking, software Piracy, On-line Fraud, Pornography, Spoofing, Cyber Laws, India IT Act related to Cyber Laws, Intellectual Property Rights Issues.

### UNIT- III

30 Periods

#### a) Introduction to Visual Basic & Development Environment:

Object-oriented programming feature, Visual Basic and the integrated development environment, VB programming process, project Explorer, form layout, Creating application, Project & interface, VB intrinsic controls, Working with controls , From design , Development environment and customization, SDI & MDI customization & applications

#### b) Introduction to VB language :

Data Types, variable, Operators, Expressions, General statements & Control statements, Arrays, Built-in function & Procedures, Control Arrays & User-defined procedures, Creating & Calling Function.

### Books Prescribed :

Bureau's Higher Secondary (+2) Information Technology, Part-II, Published by Odisha State Bureau of Text Book Preparation & Production

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## QUESTION PATTERN AND DISTRIBUTION OF MARKS

### INFORMATION TECHNOLOGY (THEORY)

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

Full Mark : 70

Time : 3 Hrs.

#### Group-A (Objective Type)

**Q. 1 Compulsory :**

**1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :**

**1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

#### Group-B (Short Answer Type)

**Q. 3 Short Answer Type Questions with alternatives :**

**2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :**

**3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

#### Group-C (Long Answer Type Questions with alternatives):

**Q.5 to Q.7 :**

**7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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### (Detailed Syllabus)

### INFORMATION TECHNOLOGY (PRACTICAL)

+ 2, 2<sup>nd</sup> Year Science

1. Working with Internet
2. Using front page express for web page designing
3. Use of MS- Access (creation, insertion, deletion,& updation of data file forms ,query and report
4. Simple applications using VB as per Unit-III of theory

**Books Prescribed :**

Bureau's Higher Secondary (+2) Information Technology, Practical, Published by Odisha State Bureau of Text Book Preparation & Production

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## QUESTION PATTERN AND DISTRIBUTION OF MARKS

### INFORMATION TECHNOLOGY (PRACTICAL)

+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)

Full Mark : 30

Time : 3 Hrs.

1. Experiment - 20 Marks

(Gr.A : Working with internet/Web designing/ MS-Access -10 marks)

(Gr. B : Application of VB -10 marks)

2. Viva-voce - 5 Marks

3. Record - 5 Marks

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**BIOTECHNOLOGY**  
**(THEORY)**  
**+ 2, 1<sup>st</sup> Year Science**  
**(Detailed syllabus)**

**No. of periods: Yearly-80**

**UNIT- I**

**30 Periods**

**Biotechnology – An overview**

Definition and Historical perspective  
Scope and application  
Biotechnology – Indian and Global trends

**Cell – The unit of life**

Cell theory and Cell types (Prokaryotic and Eukaryotic)  
Ultra structures of typical plant and animal cells.  
Structures and functions of the following cell organelles  
Cell wall  
Plasma membrane  
Endoplasmic reticulum Golgi complex and Ribosome  
Mitochondria  
Lysosome  
Nucleus and Chromosomes  
Normal chromosome complement of human  
Some abnormal human chromosome complements (Down syndrome, Turner syndrome and Klinefelter syndromes)

**UNIT- II**

**25 Periods**

**Cell Continuity**

Cell cycle and its regulation (Elementary ideas only)  
Mitosis  
Meiosis  
Mendel's laws of inheritance  
Linkage and crossing over  
Sex determination in human (Role of X and Y chromosomes)  
Sex-linked inheritance (Criss-cross inheritance with reference to red-green colourblindness and haemophilia)

**B. Biochemistry**

- a) Biomolecules (Fundamental structures and functions of the following)**
- (i) Carbohydrates (Glucose, Cellulose and Starch)
  - (ii) Lipids (Triglyceride and Phospholipid)
  - (iii) Proteins [Structure of a polypeptide {(Primary, Secondary and Tertiary structures)} and Structure of two or more interacting polypeptides (Quaternary structure)]
  - (iv) Enzymes as biocatalysts (Classification, Properties, Mechanism of action and Factors affecting the rate of an enzyme-catalyzed reaction)
  - (v) Nucleic acids as genetic material
  - (vi) DNA – Physical and Chemical structures and Properties
  - (vii) RNA – Structure, Types (mRNA, tRNA and rRNA) and Functions
- b) Photosynthesis**
- (i) Conversion of light energy into chemical energy
  - (ii) Carbon dioxide assimilation (C3 and C4 Pathways)
- c) Cellular Respiration (Elementary ideas only)**
- i) Glycolysis
  - ii) Krebs's (TCS) Cycle and
  - iii) Electron Transport System and Oxidative Phosphorylation

**UNIT III****25 Periods****A. Immune System**

- (a) Innate vs Acquired (Adaptive) Immunity
- (b) Antigen and Antibody – Types and Structure of antibody (Ig G)
- (c) Antigen – Antibody Interaction

**B. Molecular Biology**

- (a) Gene Expression (Transcription and Translation)
- (b) Regulation of gene expression with particular reference to lac operon only
- (c) Elementary steps in gene cloning process
- (d) Polymerase Chain Reaction (PCR)
- (e) Human Genome Project (Meaning, Objective, Achievements and Issues)

**Books Prescribed :**

Bureau's Higher Secondary, (+2) Biotechnology, Part-I,  
Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**BIOTECHNOLOGY (THEORY)**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

**Full Mark : 70****Time : 3 Hrs.**

**Group-A (Objective Type)**

**Q. 1 Compulsory :****1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :****1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)**

**Q. 3 Short Answer Type Questions with alternatives :****2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :****3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type)**

**Q.5 to Q.7 :****7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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**BIOTECHNOLOGY (PRACTICAL)**  
**+ 2, 1<sup>st</sup> Year Science**  
**(Detailed Syllabus)**

- (a) Study of microscopic structure of living cells (Cheek epithelial / Onion peel / Rhoeo / Hydrilla) in respect to shape, colour and organelles.
- (b) Qualitative tests for carbohydrates, proteins and lipids
- (c) Cytological preparation of chromosomes during mitosis and meiosis by squashing technique (Onion root tip and Grasshopper testis).
- (d) Blood grouping and differential counting of leucocytes.
- (e) Enzyme activity determination of catalase and urease.
- (f) Preparation of models of macromolecules.

**Books Prescribed :**

- (i) Bureau's Higher Secondary +2 Biotechnology Practical  
Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**BIOTECHNOLOGY (PRACTICAL)**

**+ 2, 1<sup>st</sup> Year Science (For College Level Exam)**

**Full Mark : 30**

**Time : 3 Hrs.**

- |  |            |   |          |
|--|------------|---|----------|
| 1.   | Experiment | - | 21 Marks |
| (Major expt:10 marks, minor expt:5 marks, model:6 marks) |            |   |          |
| 2.   | Viva-voce  | - | 5 Marks  |
| 3.   | Record     | - | 4 Marks  |

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**BIOTECHNOLOGY**  
**(THEORY)**  
**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

**No. of periods: Yearly-80**

**UNIT I**

**25 Periods**

**Microbiology**

- (a) Microbial diversity and their applications (Eubacteria, Cyanobacteria, Protista and Fungi)
- (b) Microbial culture and its maintenance
- (c) Microbial Growth
- (d) Fermentation
  - (i) Meaning and fundamental process
  - (ii) Batch and Continuous fermentation
- (e) Downstream processing
- (f) Application of fermentation (Production of organic acids, enzymes and antibodies)

**UNIT II**

**25 Periods**

**Cell and Tissue Culture**

- (a) Totipotency of cells (Also the meaning of unipotency, pluripotency and multipotency)
- (b) Techniques and applications of animal cell culture.
- (c) Transgenic animals [Meaning, Fundamental gene transfer techniques (Microinjection, Electroporation, Microprojectile bombardment and Lipofection) and making of transgenic animals with some examples]
- (d) Animal cloning with reference to Dolly
- (e) Techniques and applications of plant tissue culture
- (f) Transgenic plants (Making of transgenic plants with some examples)

**UNIT III****30 Periods****Biotechnology in human welfare**

- (a) Production of drought-resistant and disease-resistant plants
- (b) Biofertilizer (Rhizobium, Mycorrhizae and Blue-Green Algae)
- (c) Biopesticides (Bacillus thuringiensis, and Trichoderma)
- (d) Biotechnological production of renewable energy [Biomass energy (Bioalcohol, Biogas and Biodiesel)]
- (e) Genetically engineered vaccine (Hepatitis vaccine) and Hormone (Insulin)
- (f) Biotechnology in waste management
- (g) Biosensor and Biochip
- (h) Gene Replacement Therapy
- (i) Bioinformatics (Elementary ideas)

**Books Prescribed :**

- (i) Bureau's Higher Secondary +2 Biotechnology, Part-II,  
Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS****BIOTECHNOLOGY (THEORY)****+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)****Full Mark : 70****Time : 3 Hrs.****Group-A (Objective Type)****Q. 1 Compulsory :****1×10 = 10 marks**

Ten multiple choice answer type questions, each carrying one mark, covering all units.

**Q. 2 Compulsory :****1×10 = 10 marks**

Ten one word answer / very short answer / correct sentences / fill in the blank type questions, each carrying one mark, covering all units.

**Group-B (Short Answer Type)****Q. 3 Short Answer Type Questions with alternatives :****2×10 = 20 marks**

Twelve short answer type questions, each carrying two marks, covering all units, out of which ten are to be answered. (Some of the questions should be of reasoning type, answers of which are to be written in two or three sentences)

**Q. 4 Short Answer Type Questions with alternatives :****3×3 = 9 marks**

Five short answer type questions (answers of which will be within six sentences), each carrying three mark, covering all units, out of which three are to be.

**Group-C (Long Answer Type)****Q.5 to Q.7 :****7×3 = 21 marks**

Six long answer type questions, each carrying seven mark, covering all units, out of which three are to be answered unit wise.

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## **BIOTECHNOLOGY (PRACTICAL)**

**+ 2, 2<sup>nd</sup> Year Science**  
**(Detailed syllabus)**

- (1) Culture Techniques: Sterilization of glass ware, Preparation of liquid and solid media (PDA media and Nutrient agar media)
- (2) Preparation of pure culture of microbes
- (3) Measurement of cell dimensions of microorganisms by micrometry and drawing diagrams using camera lucida in a magnifying scale
- (4) Measurement of growth of different microbes by haemocytometry / turbidometry and calculation of generation time
- (5) Determination of antibiotic sensitivity of microbes
- (6) Fundamental techniques of plant tissue culture
- (7) Preparation of models of macromolecules
- (8) Project Work: A student is required to submit a project work report in around 1000 words in any one of the following topics in the practical examination.
  - (a) Genetic Engineering
  - (b) Transgenic Plants
  - (c) Human Genome Project
  - (d) Transgenic Animals
  - (e) Gene Therapy
  - (f) Industrial Production of Beneficial Enzymes
  - (g) Mushroom Cultivation
  - (h) Immunodiagnosis Methods
  - (i) Biopesticides
  - (j) Biofertilizer
  - (k) Bioprocess Engineering

### **Books Prescribed :**

- (i) Bureau's Higher Secondary +2 Biotechnology Practical  
Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

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## **QUESTION PATTERN AND DISTRIBUTION OF MARKS**

### **BIOTECHNOLOGY (PRACTICAL)**

**+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam 2015)**

**Full Mark : 30**

**Time : 3 Hrs.**

- |  |            |   |          |
|--|------------|---|----------|
| 1.   | Experiment | - | 21 Marks |
| (major expt; 8 marks, minor expt:4 marks, model: 4 marks, project :5 marks ) |            |   |          |
| 2.   | Viva-voce  | - | 5 Marks  |
| 3.   | Record     | - | 4Marks   |

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**SANSKRIT (ELECTIVE)**  
**+2 ,1<sup>st</sup> Year Science**  
( Detailed Syllabus)

**No. of periods : Yearly - 80**

**Unit – I : Poetry**

**Kumarasambhavam [Canto V] of Kalidasa**

**25 Periods**

कुमारसम्भवम् – पञ्चमः सर्गः

**Unit – II : Prose**

**Samskrutamandakini (Gadyabagah)**

**20 Periods**

शंस्कृतमन्दाकिनी (गद्यभागः)

The following prose pieces from the above mentioned book are to be studied.

1. अपमन्युकथा (Upamanyukatha)
2. परहितसाधनम् (Parahitasadhanam)
3. मुद्रिकाप्राप्तिः (Mudrikapraaptih)
4. चन्द्रभूषतिकथा (Candrabhupatikatha)
5. संसेमिराकथा (Sasemirakatha)
6. ध्रुवोपाख्यानम् (Dhruvopakhyanam)
7. विभीषणस्य रावणं प्रति उपेदशः (Vibhisanasya Ravanam Prati Upadesah)

**Unit – III : History of Sanskrit Literature and Translation**

**15 Periods**

A) History of the following authors and their works are to be studied.

1. वाल्मीकि Valmiki
2. व्यास Vyasa
3. कालिदास Kalidasa
4. भास Bhasa
5. विष्णुशर्मा Visnusarma
6. पण्डित नारायण Pandita Narayana
7. चाणक्य Chanakya
8. जयदेव Jayadeva
9. विश्वनाथकविराज Viswanathakaviraja
10. मुरारि मिश्र Murari Mishra

**(B) Translation of Textual Sanskrit Sentences into Odia / English are to be done.**

**10 Periods**

**Unit – IV : Grammar**  
(Textual and out side the text / General)

**10 Periods**

**A) Grammar (Textual)**

- i) समास (Samasa)
- ii) कारक-विभक्ति (Karakavibhakti)
- iii) प्रकृति-प्रत्यय (Prakrutipratyaya)

**B) Grammar (General / out side the text)**

- i) कृतन्त - (Krudanta) शतृ, शानच्, तव्य, अनीयर्, क्त, क्तवतु, क्त्वा, ल्यप्, तुमुन्, क्तिन्, ल्युट्, घञ्, खल्
- ii) तद्धित- (Taddhita) अण्, त्व, तल्, मयट्, इन्, मतुप्, यत्
- iii) वाच्यपरिवर्तन (Vachyaparivartana)
- iv) वाक्यरचनम् (Sentence formation)
- v) भ्रमसंशोधन (Correction of sentences)
- vi) णिजन्त - (Nijanta) – भू, स्था, पठ्, गम्, कृ, दा, ज्ञा, पा, नी

**Books Recommenced :**

1. Unit-I :  
कुमारसम्भवम्-पञ्चमः सर्गः - Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.
2. Unit-II :  
संस्कृतमन्दाकिनी - Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.
3. Unit-III :  
संस्कृत-साहित्य-इतिहास – History of Sanskrit Literature by A. B. Keith, Translation by B. Kar Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.
4. Unit-IV :  
व्याकरणदर्पण - Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.  
संस्कृत-कवि-परम्परा - Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.

## QUESTION PATTERN AND MARK DISTRIBUTION

### SANSKRIT (ELECTIVE)

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Marks – 100

Time:03 Hrs

#### GROUP –A (Objective Type – Compulsory)

Q.1. Multiple Choices :

1 × 15 = 15 Marks

<i>Mark-Division</i>	: Prose	1×3 = 3
	: Poetry	1×2 = 2
	;Hist of Sans Lit.	1×3 = 3
	:Sentence formation	1×3 = 3
	: Karaka - Vibhakti	1×4 = 4

Q.2. One word Answer / Correction / Fill up the Blanks :

1×15 =15 Marks

<i>Mark Division</i>	: Prose	1×2 =2
	: Poetry	1×3 =3
	: Prakruti-pratyaya	1×2 =2
	: Samasa	1×2 =2
	: Karaka-Vibhakti	1×2 = 2
	Hist. of sans lit.	1*4 =4

#### GROUP -B (Short Answer Type)

Q.3. Short Answer Type (within 2/3 sentences / 15words) :

2×11 = 22 Marks

(Out of 14 bits ,one has to answer 11 questions)

*Correction of sentences: 2bits out of 3*

Vacya parivartana: 2bits out of 3

Prakrti prataya: 2bits out of3

Translation from Sans into odia/ English: 5 bits

Q.4. Short Type Answer ( within 06 sentences / 25words) :

3×6 = 18 Marks

*Mark Division* : (a) Prose - 3×2 = 6 (2 out of 3 Qs.)

(b) Poetry - 3×2 = 6 (2 out of 3 Qs.)

(c ) Hist. of Sans Lit.-3-2=6(2 out of 3)

#### GROUP – C (Long Type Questions)

Q.5. 04 Long Questions out of 06 Qs, (within 08 sentences / 40 words )

7 ½ × 4 = 30 Marks

- a ) PROSE (long question)
- b) POETRY(Long Question )
- c) Explanation (PROSE/ POETRY)
- d) Expansion of ideas (moral teaching from prose/ poetry)
- e Hist. of Sans lit.(Authors)
- f) Hist. of Sans lit. Works)

*N.B. Answers in Sanskrit are to be written either in Sanskrit or Odia or in English if not otherwise specified.*

**SANSKRIT (ELECTIVE)**  
**+2 2<sup>nd</sup> Year Science**  
( Detailed Syllabus)

**No. of periods : Yearly - 80**

**Unit – I : Drama**

**20 Periods**

**Svapnavasavadattam of Bhasa**

स्वप्नवासवदत्तम्

(Act-I, II, III & IV)

**Unit – II : Drama**

**15 Periods**

**Svapnavasavadattam of Bhasa**

स्वप्नवासवदत्तम्

(Act- V & VI)

**Unit – III : Poetry**

**20 Periods**

**Samskrtamandakini (Padyabhagah)**

शंस्कृतमन्दाकिनी (पद्यभागः)

(Act-I, II, III & IV)

The following poetry pieces from the above mentioned book are to be studied.

1. चाणक्यनीतिः (Chanakyanitih) Verses 01 to 24
2. रघुवंशम् (Raghuvamsam) Verses 01 to 20
3. दमचन्तीस्वयंवरः (Damayantisvayamvarah)

**Unit – IV : Grammar from and outside the text.**

**15 Periods**

**A) Grammar (Textual)**

- i) कारक-विभक्ति (Karakavibhakti)
- ii) सन्धी (Sandhi)
- iii) सन्धिविच्छेद (Sandhivichheda)
- iv) समास (Samasah)

**(B) Grammar (General / out side the text)**

1. शब्दरूप (Sabdarupa)
  - i) पुंलिङ्ग – Pumlinga – देव, कवि, पति, सखि, भ्रातृ, वणिक्, सम्राट्, गच्छत्, भवत्, महत्, सुहृत्, राजन्, गृणिन्, पथित्
  - ii) स्त्रीलिङ्ग – Strilinga – लता, मति, नदी, स्त्री, वधु, मातृ, दिश्, विपद्
  - iii) क्लीवलिङ्ग – Klivalinga – फल, वारि, अक्षि, मधु, कर्मन्, नामन्, पयस्

iv) सर्वनाम – Sarvanama – तद्, किम्, इदम्, सर्व, युष्मद्, अस्मद्

v) संख्यावाचक – Samkhyavacaka – एक, द्वि, त्रि, चतुर्, पञ्चन्

2. धातुरूप (Dhaturupa) – भु, गम्, दृश्, कृ, पठ्, अस्, ज्ञा, नी, पा, प्रच्छ्, लभ्, दा, विद्, पुज्

3. स्त्रीप्रत्यय (Stripratyaya)

## Unit – V

10 Periods

Translation (General) from English / Odia into Sanskrit are to be worked out.

### Books Recommended :

1. संस्कृतपन्दाकिनी - Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.
2. व्याकरणदर्पणः - Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.
3. स्वप्नवासवदत्तम् - Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.

## QUESTION PATTERN AND MARK DISTRIBUTION

SANSKRIT (ELECTIVE)

+ 2, 2nd Year Science (For H.S Exam 2015)

Full Marks – 100

Time:03 Hrs

### GROUP –A (Objective Type – Compulsory)

Q.1. Multiple Choices :

1 × 15 = 15 Marks

Mark-Division	: Drama	1×5 = 5
	: Poetry	1×4 = 4
	: Sabdarupa	1×2 = 2
	: Dhaturupa	1×2 = 2
	: Karaka - Vibhakti	1×2 = 2

Q.2. One word Answer / Correction / Fill up the Blanks :

1×15 =15 Marks

Mark Division	: Drama	1×3 =3
	: Poetry	1×3 =3
	: Ekapadikaranam(sripratya)	1×2 =2
	: Sandhi	1×2 =2
	: Sandhivichheda	1×2 = 2
	: Samas	1×3 =3

### GROUP -B (Short Answer Type)

Q.3. Short Answer Type (within 2/3 sentences / 12words) :

2×11 = 22 Marks

(Out of 14 bits ,one has to answer 11 questions)

Drama: 4 bits out of 5

Prakrti prataya: 2 bits out of 3

Translation from Sans into Odia / English: 5 bits out of 6

Q.4. Short Type Answer ( within 06 sentences / 25words) :

3×6 = 18 Marks

Mark Division : (a) Drama - 3×4 = 12 (3 out of 5 Qs.)

(b) Poetry - 3×2 = 6 (2 out of 3 Qs.)

### GROUP – C (Long Type Questions)

Q.5. 04 Long Questions out of 06 Qs, (within 08 sentences / 40 words )

7 ½ × 4 = 30 Marks

- a ) Drama ( 3 long questions)
- b) POETRY( 1 Long Question )
- c) Explanation (1 from Drama)
- d) Expansion (1 from Poetry)

N.B. Answers in Sanskrit are to be written either in Sanskrit or Odia or in English if not otherwise specified.

**ECONOMICS**  
**+ 2, 1<sup>st</sup> Year Science**  
**(Detailed syllabus)**

**No. of periods: Yearly-80**

**Indian Economic Development and Elementary Statistics**

- 1. Status and Structure of Indian Economy [10 periods]**
  - v Status of Indian Economy on the eve of Independence.
  - v Basic characteristics of Indian economy.
  - v Structural changes in the Indian economy; Relative contributions of Primary, Secondary and Tertiary sectors.
  - v Infrastructure and its role in the Indian economy - Economic Infrastructure (Energy, Transport and Communications), Social Infrastructure (Education and Health).
- 2. Sectoral Development, Planning and Economic Reforms. [15 periods]**
  - v Agriculture - its importance, causes of low productivity, and Green Revolution; Present Agricultural situation.
  - v Industry - its importance, Industrial policy of 1948, 1956 and 1991.
  - v Foreign trade - its role, composition and direction, Export-import Policy.
  - v Objectives and goals of Five Year Plans.
  - v Economic Reforms since 1991 - need, main features of Liberalisation, Privatisation and Globalisation.
- 3. Current challenges facing the Indian Economy. [15 periods]**
  - v The population problem - Demographic features, causes of population growth, adverse effects of population growth, and population control.
  - v Poverty - Absolute and Relative poverty, causes of poverty, and poverty alleviation programmes.
  - v Unemployment - Types of unemployment, causes of unemployment and measures to solve them.
  - v Inflation - problems and policies.
  - v Sustainable Development - Meaning, indicators, effects of economic growth on environment, and the problem of global warming.
- 4. Introductory Statistics. [20 periods]**
  - v Meaning, scope, importance and limitations of statistics.
  - v Sources of statistical data - Primary and Secondary, NSSO and Census of India as sources of secondary data
  - v Methods of data collection - census and sampling methods and their relative merits and demerits.
  - v Meaning and types of variables, frequency distribution.
  - v Tabular and Diagrammatic presentation of data, Bar diagram, Pie diagram, Histogram, Polygon, Ogive, Time series graph.
- 5. Statistical Methods. [20 periods]**
  - v Measures of Central Tendency —Simple and weighted arithmetic mean, median and mode.
  - v Measures of dispersion -Absolute measures: Range, Quartile Deviation, Mean Deviation and Standard Deviation and their merits and demerits.
  - v Relative Measures: Coefficient of Range, Quartile Deviation, Mean Deviation and Standard Deviation.
  - v Lorenz Curve : Meaning and application.
  - v Correlation - Meaning, Types, Karl Pearson's Method of computing correlation coefficient in the context of 2-variable ungrouped data.

**Books Prescribed:**

Bureau's Higher Secondary (+2) Economics, Part-I,  
Published by Odisha State Bureau of Text Book Preparation & Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**ECONOMICS**

+ 2, 1<sup>st</sup> Year Science (For College Level Exam)

Full Mark:100

Time:3 hrs

**Group – A (Objective Type – Compulsory)**

**Q.1** Multiple choice (15 bits from all units) 1 mark each x 15 =15 marks

**Q.2** One word answer / Very short answer/  
correct the sentence / filling up the blanks 1 mark each x 15=15 marks

**Group B (Short type Answer)**

**Q.3** Answer within Two/three sentences 2 marks each x 11 =22 marks  
(out of 14 bits, one has to answer 11 bits)

**Q.4.** Answer within six sentences 3 marks each x 6 = 18 marks  
(Out of eight bits, one has to answer six bits)

**Group C(Long answer type)**

**Q5.** Out of six Questions from all units, one has to 7.5 marks each x 4 = 30 marks  
to answer 4 questions.

**Q.10**

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**ECONOMICS**  
**+ 2, 2<sup>nd</sup> Year Science**  
(Detailed syllabus)

No. of periods: Yearly-80

**Elementary Micro and Macro Economics**

- 1. Basics of Microeconomics and Consumer Behaviour. [15 periods]**
  - a) Meaning of Economics and Microeconomics.
  - b) Central problems of an Economy- Scarcity- and Choice; What; how and for whom to produce ?
  - c) Basic concepts - Human wants, Utility, Goods, Value, Price and Wealth.
  - d) Laws of Consumption - Marginal and Total utility, Law of Diminishing Marginal Utility, Law of Equimarginal utility.
  - e) Demand - Meaning and determinants, Law of demand, Movement along and shifts in demand curve, Price elasticity of demand and its determinants.
- 2. Production, Cost, Revenue, Supply and Forms of Market. [15 periods]**
  - a) Meaning of production and production function; Total, Average and Marginal Product; Law of Variable Proportions.
  - b) Cost - Money and Real cost; Implicit and Explicit cost; Opportunity Cost; Fixed and Variable costs;
  - c) Total, Average and Marginal costs in the short run and their relationship.
  - d) Revenue- Total, Average and Marginal Revenue and their relationship.
  - e) Supply - Meaning and Law of supply.
  - f) Market - Meaning; Forms of Market: Pure and Perfect competition, Monopoly, Monopolistic Competition and Oligopoly; Price Determination under perfect competition; market price and normal price.
- 3. Distribution. [10 periods]**
  - a) Meaning of Distribution, Ricardian Theory of Rent and Quasi-Rent, Money and Real Wages,
  - b) Determinants of Real wage, Causes of Wage Differences, Gross and Net Interest, Gross and Net Profit, Constituents of Profit.
- 4. Introductory Macroeconomics. [20 periods]**

- a) Meaning of Macroeconomics, Difference between Macro-and Micro-Economics.
- b) National Income - Meaning and Aggregates related to National Income (GNP, GDP, NNP and NDP at Factor Cost and Market Price), National Disposable Income (Gross and Net), Private Income, Personal Income, Personal Disposable Income, Real and Nominal GDP, GDP and Welfare, Circular Flow of Income in a Two sector Economy, Methods of Computing National Income : Product (Value added), Income and Expenditure Methods.
- c) Income Determination - Aggregate Demand and its Components, Aggregate Supply, Simple Keynesian Theory of Income Determination,

**5. Money, Banking and Public Finance.**

**[20 periods]**

- a) Definition and functions of money.
- b) Meaning and functions of commercial Banks, Functions of Central Bank.
- c) Meaning of Public Finance, Sources of Public Revenue, Concepts of Revenue and Capital Expenditure, Plan and Non-Plan Expenditure, Developmental and Non-Developmental Expenditure.
- d) Meaning and objectives of Government Budget, Difference between balanced and unbalanced budgets, surplus and deficit budgets.

**Books Prescribed:**

Bureau's Higher Secondary (+2) Economics, Part-II,  
Published by Odisha State Bureau of Text Book Preparation & Production, Bhubaneswar

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS  
ECONOMICS**

**+ 2, 2<sup>nd</sup> Year Science (For H.S. Exam - 2015)**

**Full Marks:100**

**Time:3 hrs**

**Group – A (Objective Type – Compulsory)**

- Q.1** Multiple choice (15 bits from all units) 1 mark each x 15 =15 marks
- Q.2** One word answer / Very short answer/  
correct the sentence / filling up the blanks 1 mark each x 15=15 marks

**Group B (Short Answer Type)**

- Q.3** Answer within Two/three sentences 2 markseach x 11 =22 marks  
(out of 14 bits, one has to answer 11 bits)
- Q4.** Answer within six sentences 3 marks each x 6 = 18 marks  
(Out of eight bits, one has to answer six bits)

**Group C(Long Answer type)**

- Q5.** Out of six Questions from all units, one has to 7.5 marks each x 4 = 30 marks  
**to** answer 4 questions.

**Q.10**

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