# Solapur University, Solapur

# Faculty of Science

## B.Sc.-I-BOTANY

## Credit and Grading System

(June, 2014)
**Solapur University, Solapur**

**Faculty of Science**

**Credit and Grading System**

(W.e.f. June, 2014)

- **Title of the Course:**B.Sc.- I
- **Subject :**  Botany
- **The Credit and Grading System :**
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      With the view to ensure worldwide recognition, acceptability, horizontal as well as vertical mobility for students completing under graduate degree, the Solapur University is implementing Credit and grading system of Evaluation at Undergraduate level.

      Credit is a numerical value that indicates student's work load (Lectures, Lab work, Seminars, Tutorials, Field work, etc.) to complete a course unit. In most of the universities 15 contact hours constitute one credit. The contact hours are transformed into Credits. As per present norms, there are 4 contact hours per paper (subject) per week which works out to be 60 contact hours per paper (subject) per semester.

In Solapur University, for B. Sc.-I, there are 4 optional subject and one (English) compulsory subject. For B. Sc.-I, there are 5 contact hours per paper (subject) per week for optional subject and 4 contact hours for English. Therefore, total contact hours per week are 24. Each subject has 75 contact hours, which are transformed into 5 credits. As there are 4 contact hours per week for English, 4 credits shall be assigned for English subject.

Moreover, the grading system of evaluation is introduced for B. Sc. course, wherein process of Continuous Internal Evaluation is ensured. The candidate has to appear for Internal Evaluation of 30 marks and University Evaluation for 70 marks. It is 70 + 30 pattern of evaluation. It is applicable for theory and practical as well. The details regarding this evaluation system are as under.

- **Conversion of marks into Grades :**

A table for the conversion of the marks obtained by a student in each paper (out of 100) to grade and grade points is given below.

| Sr. No | Range of Marks | Grade | Grade Point |
|--------|----------------|-------|-------------|
| 1. | 80-100 | O | 10 |
| 2. | 70-79 | A+ | 9 |
| 3. | 60-69 | A | 8 |
| 4. | 55-59 | B+ | 7 |
| 5. | 50-54 | B | 6 |
| 6. | 45-49 | C+ | 5 |
| 7. | 40-44 | C | 4 |
| 8. | <39 | FC | 0 (Failed in Term Exam) |
| 9. | <39 | FR | 0 (Failed in Internal Assesment) |

1. **Grade Point Average at the end of the Semester (SGPA)**

$$SGPA = \frac{(G_1 x C_1) + (G_2 x C_2) + \ldots\ldots\ldots}{\Sigma Ci}$$

($\Sigma Ci$- The total number of credits offered by the student during a semester)

2. **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{(G_1 x C_1) + (G_2 x C_2) + \ldots\ldots\ldots}{\Sigma Ci}$$

$\Sigma Ci$ - the total number of credits offered by the student upto and including the semester for which CGPA is calculated.)

3. **Final Grade Point Average (FGPA)** will be calculated in the similar manner for the total number of credits offered for completion of the said course.

Where: $Ci$: Credits allocated for the ith course

$Gi$: Grade point scored in ith paper (Subject)

4. Conversion of average grade points into grades:

| SGPA/CGPA/FGPA | Letter Grade |
|---|---|
| 9.5 – 10 | O |
| 8.5 -9.49 | A+ |
| 7.5 – 8. 49 | A |
| 6.5 – 7.49 | B+ |
| 5.5 – 6. 49 | B |
| 4.5 – 5. 49 | C+ |
| 4.0 – 4. 49 | C |
| < 3.99 | FC /F |
|  | FR |

# Solapur University, Solapur

# Faculty of Science

## Credit System Structure for B.Sc.I Semester I

Abbreviations: L: lectures, T: Tutorials, P: Practicals; UA: University Assessment by End Semester

| Class | Sem | Subject | No. of Papers/ practicals | Hrs/Week | | | Paper Marks | UA | CA | Credits | Total |
|-------|-----|---------|---------------------------|----------|---|---|-------------|-----|-----|---------|-------|
| | | | | L | T | P | | | | | |
| B.Sc.I | I | English | English paper I (compulsory) | 4 | - | - | 100 | 70 | 30 | 4 | |
| | | Botany 1 | Paper I | 5 | - | - | 100 | 70 | 30 | 5 | |
| Grand Total | | | | 9 | | | 200 | | | 9 | 9 credits |

Examination; CA: College assessment by Internal Continuous Examination

UA (University Assessment): University Theory paper shall be of 70 marks for 3.00 hrs duration

CA (College Assessment): The internal examination for Theory and Practical course.

# Solapur University, Solapur

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## Credit System Structure for B.Sc.I Semester II

| Class | Sem | Subject | No. of Papers/ practicals | Hrs/Week | | | Paper Marks | | | Practical | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | UA | CA | Marks | UA | CA | |
| B.Sc. I | II | English | English paper II (compulsory) | 4 | - | - | 100 | 70 | 30 | | | | 4 |
| | | Botany | Paper II | 5 | - | - | 100 | 70 | 30 | | 70 | 30 | 5 |
| Total | | | | 9 | | | 200 | | | | | | 9 |
| | | Practical I | | - | - | 4 | | 70 | 30 | 100 | | | 4 |
| Total | | | | 9 | | 4 | 200 | | | 200 | | | 9 |
| Grand Total | | | | | | | | | | 300 | | | 13 |
| B.Sc. | Part I | | | | | | | | | 300 | | | 9+4=13 |

Abbreviations: L: lectures, T: Tutorials, P: Practicals; UA: University Assessment by End Semester Examination; CA: College assessment by Internal Continuous Examination

UA (University Assessment): University Theory paper shall be of 70 marks for 3.00 hrs duration

CA (College Assessment): The internal examination for theory and Practical course.

# General Guidelines for Credit and Grading System

1. The University follows Semester system
2. An academic year shall consist of two semesters


3. Each B.Sc. course shall consist of three years i.e. six semesters
4. B.Sc.Part-I shall consist of two semesters: Semester I and Semester II. In semester –I, there will be one theory paper of 100 marks for each subject. There shall be four optional science subjects and English paper-I compulsory for every student. Similarly, in semester –II there will be one theory paper of 100 marks for each subject. There shall be four optional science subjects and English paper-II compulsory for every student. The scheme of evaluation of performance of candidates shall be based on University assessment as well as College internal assessment as given below. For B.Sc.Part I Sem I&II the internal assessment will be based on Unit tests, Home assignment, viva, practicalsetc as given below. Practical course examination of 100 marks shall be conducted at the end of second semester. The practical examination of 100 marks shall also consist of 70 marks for University practical assessment and 30 marks for college internal assessment. For University practical examination out of two examiners, one examiner will be internal and another examiner will be External. Both examiners will be appointed by the University. The internal practical assessment shall be done as per scheme given below.

5. **Scheme of evaluation:**

As per the norms of the grading system of evaluation, out of 100 Marks, the candidate has to appear for College internal assessment of 30 marks and external evaluation (University Assessment) of 70 marks. The respective B.O.S. may decide the nature of College internal Assessment after referring to the scheme given below or may be used as it is.
 The details are as follows:
**Semester - I:**
University Examination (70 Marks): No. of Theory papers: 1 Papers/Subject (Total 5 Papers)
Internal Continuous Assessment (30 Marks):
 Scheme of Marking:  20 Marks: Internal Test
 10 Marks: Home assignment/Tutorials/Seminars/ Group discussion/ Viva/Field visit/Industry visit.
**Semester - II:**

**Theory:**
University Examination (70 Marks): No of Theory papers: 1 Papers/Subject (Total 5 Papers)
Internal Evaluation (30 Marks):
Scheme of Marking:  20 Marks: Internal Test
10 Marks: Home assignment/Tutorials/ Seminars/ Group discussion/ Viva/ Field visit/Industry visit.
**Practical**
University Examination (70 Marks): No of Practicals: 1 Papers/Subject (Total 4 Practicals)
Internal Evaluation (30 Marks):
Scheme of Marking:  20 Marks: Internal Test on any two practicals
          10 Marks: Lab Journal/viva, attendance, attitude etc.

6. **Passing Standard**
        The student has to secure a minimum of 4.0 grade points (Grade C) in each paper.  A student who secures less than 4.0 grade point (39% or less marks, Grade FC/FR) will be declared fail in that paper (subject) and shall be required to reappear for respective paper. A student who

failed in University Examination (Theory) & passed in internal assessment of a same paper (subject) shall be given FC Grade. Such student will have to appear for University Examination only. A student who fails in Internal Assessment and passed in University examination (Theory) shall be given FR Grade. Such student will have to appear for both University examination as well as internal assessment. In case of year down candidates from the mark scheme the candidates shall appear for the same 70 marks paper of the external examination and his performance shall be scaled to 100 marks.

- **ATKT**

Candidate passed in all the papers except 5 (five) heads including theory as well as practicalstogether of the semester I and Semester II of B.Sc. Part I examination shall be permitted to enter upon the course of Semester III of B.Sc.Part II

# Solapur University, Solapur

**Nature of Question Paper for Credit-Grading Semester Pattern**
**• Faculty of Science•**
**(w.e.f. June 2014)**
**Time: - 3.00 hrs. Total Marks- 70**

**Section - I**

**Q. No.1) Multiple choice questions**(5)

    1) --------------------------------------------

a)b) c)d)

    2)

    3)

    4)

    5)

**Q.No.2) Answer any five of the following**(10)

    i)

    ii)

    iii)

iv)

    v)

vi)

    vii)

**Q.No.3 A) Write short notes on any Two of the following** (10)

    i)

ii)

    iii)

**B) Answer any one of the following** (10)

    i)

    ii)

**Section - II**

**Q. No.1) Multiple choice questions**.(5)

    1) --------------------------------------------

a)b) c)d)

    2)

    3)

    4)

    5)

**Q.No.2) Answer any five of the following**(10)

    i)

    ii)

    iii)

iv)

    v)

vi)

    vii)

**Q.No.3 A) Write short notes on any Two of the following** (10)

    i)

    ii)

    iii)

**B) Answer any one of the following** (10)

    i)

    ii)

# List of Practicals:

1) Study of <u>Nostoc</u>
2) Study of <u>Spirogyra</u>
3) Study of <u>Mucor</u>
4) Study of Lichens
5) Study of <u>Riccia</u>
6) Study of Plant Diseases-
        i) Yellow vein mosaic of Bhendi    ii) Citrus canker.

        iii) Little leaf of Brinjal          iv) White rust.

7) Study of *Selaginella* : Morphology of sporophyte, stem anatomy and structure of strobilus.

8&9) Study of *Cycas*- Systematic position, Morphology of Sporophyte, anatomy of leaflet, coralloid root (permanent slide), Male cone, microsporophyII, pollen grains, MegasporophyII, and V.S.of ovule (permanent slide)

10,11 and 12) Study of Angiosperm families- as per theory syllabus

13) Study of cell structure in Onion peel ( cataphyII), it's staining and mounting.

14) Study of means of Vegetative Propagation-Sucker, Offset, Stolon, Runner.

15) Study of means of Vegetative Propagation-Tuber, Bulb, Rhizome, Bulbil.

16) Study of Cut flowers-<u>Gladiolus</u>, <u>Gerbera</u>, Rose

17) Techniques of potting and repotting (Demo.)

18) Propagation of Horticultural plants by Air-Layering and Whip grafting

19) Propagation of Horticultural plants by budding methods-'T' shaped(Shield) and Patch budding.

20) Study of Mitosis.

21) Genetic problems based on monohybrid and dihybrid ratio

22) Study of enzyme activity-Catalase and Dehydrogenase

23) Study of vegetative growth analysis.

24) Study of deficiency symptoms of –N, K, Mg, (Either using specimens./photographs)

25) Effect of Biofertilizers-BGA, on seed germination.

26)Identification of Mendelian traits (Using-either specimens/photographs).

## SOLAPUR UNIVERSITY, SOLAPUR.
### B.Sc. Part-I: Practical Examination in Botany.
### March/April 2014.

**Total -70 Marks**

**Q-1**                                                                        **14 Marks**
**A-Nostoc/Spirogyra/Mucor.**
**B-Riccia/Selaginella**
**C-Cycas Microsporophyll (mounting of pollens)/Cycas pinna.**

**Q-2:-D-Polypetalae/Gamopetalae/Apetalae/Monocot-Family.**          **08 Marks**

**Q-3 'E' - Physiology experiments.**                                **08 Marks**

**OR**

**Q-3:- E-'Mitotic stages - -**                                      **08 Marks**

**Q-4:- 'F' Horticultural Techniques-Layering/budding/grafting**     **06Marks**

**Q 5: Problem on Genetics**                                         **06marks**

**Q-6:- Identifications:**                                           **16Marks**

**G) Any one plant disease /Lichen specimen.**                       **04**

**H) Detection of enzyme activity/ Cell structure (Onion peel).**    **04**

**I) Natural methods of veg.propagation any one specimen/  Cut flower -any one.**    **04**

**J) Expt. on Biofertilizer /Mineral deficiency/Mendelian traits.**    **04**

**Q7 a) Journal.**                                                   **06**

**b) Tour report.**                                                  **06**

**Term: SEM-I** separate passing Head: No, Min. Papers:   Max. Papers:   Max:

**The papers under Sem- I are as follows:**

| Paper Name: Botany Paper I | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Paper Code: CSSC1BO1      Min: 0 Max 100 | | | | | | | | | | | | |
| TLM | Hrs | Credits | AM | Min | Max | AT | Min | Max | AT | Min | Max | Evaluation |
| Lectures | 5 | 5 | Theory | -- | 100 | UA | 28 | 70 | CA | 12 | 30 | Marks system |

**Term: Sem-II** Separate passing Head: No, Min. Papers:   Max. Papers:   Max:

**The papers under Sem-II are as follows:**

| Paper Name: Botany Paper II | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Paper Code: CSSC2 BO2      Min: 0 Max 100 | | | | | | | | | | | | |
| TLM | Hrs | Credits | AM | Min | Max | AT | Min | Max | AT | Min | Max | Evaluation |
| Lectures | 5 | 5 | Theory | -- | 100 | UA | 28 | 70 | CA | 12 | 30 | Marks system |

**Sem II Practical Examination**

| Paper Name: Botany Practical | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Paper Code: CSSC2 BTPR      Min: 0 Max 100 | | | | | | | | | | | | |
| TLM | Hrs | Credits | AM | Min | Max | AT | Min | Max | AT | Min | Max | Evaluation |
| Laboratory | 4 | 4 | Practical | -- | 100 | UA | 28 | 70 | CA | 12 | 30 | Marks system |

# Syllabus of B.Sc. Part – I (Botany) Semester System

## (With effect from June2014)

## Semester – I

**Paper – I Microbiology and Cryptogam,Plant Physiology and Horticulture.75 Lectures**

### Section-I

### ( Microbiologyand Cryptogam )

### Microbiology

## Unit-1 –Viruses:-

General characters, structure, classification (plant, animal and bacterial viruses) and economic importance of viruses.(07)

Characteristics of bacteria, size, forms (Shapes), ultra structure of bacterial cell, Economic importance.(Useful and harmful).

— (Phytoplasma and Spiroplasma) Characters, Structure, classification and significance-

### Cryptogams

**Unit-2**General characters and classification of Cryptogams (as per G.M.Smith1955) up to class. (10)

2.1 General characters and classification of algae (As per Smith-1955) up to class.

2.2-Study of *Nostoc*and *Spirogyra* with respect to –classification, distribution, thallus structure and reproduction.

2.3 Brief account of economic importance of algae –

## Unit-3–Fungi

**3.1-**General characters and classification of fungi up to class (as per Ainsworth) (09)

**3.2**-Study of *Mucor*and *Albugo*–with respect to-Classification, occurrence, thallus Structure and reproduction.

**3.3**-Brief account of economic importance of fungi.

**3.4 Lichens**-Characters, types, morphology, anatomy and economic importance.

## Unit-4-Bryophytes:-

**4.1** General characters and economic importance. (05)

**4.2** Study of *Riccia*with respect to classification, distribution, thallus organization and reproduction.

(Development of sex organs and sporophyte not expected), alternation of generation

## Unit-5–Pteridophytes:- (06)

**5.1**General characters and economic importance.

**5.2**Study of *Selaginella*–with respect to-Systematic position with reasons, occurrence, morphology of

sporophyte, anatomy of stem, reproductive structure (Development of sex organs and embryo not

expected).

## Section-II

## Plant Physiology and Horticulture

## Unit-6 -Plant Growth(09)

6.1 Vegetative growth: - Definition, phases of growth, Kinetics of growth.
6.2 Reproductive growth: - Physiology of flowering with respect to photoperiodism

(Definition and classification of plants based on photoperiod)
6.3 Role of phytochrome in flowering
6.4 Vernalisation (definition and mechanism)

6.5  Plant growth regulators:--Definition and classification (Growth promoters and Retardants.
a) Growth promoters: - Auxins (IAA), Gibberellins.

b) Growth retardants: - CCC.

6.6 Role of plant growth regulators (IAA, GA and CCC) in Agriculture.

## Unit -7- Mineral nutrition(05)

7.1 Introduction, macro and micro elements
7.2 Role and deficiency symptoms of Macro elements-N, P K,Ca and Mg and micro

elements-Fe, Cu &Mn.

**Unit-8 Enzymes.** (05)

8.1 Definition and physicochemical structure of enzymes.
8.2 Properties of enzymes, Coenzymes, Co-factors and Isoenzymes.
8.3 Mechanism of enzyme action-Lock and key hypothesis.

**Unit-9- Horticulture** (08)

**9.1** Introduction and Scope of horticulture.
**9.2** Branches of Horticulture- **a)** Olericulture: **b**) Pomoculture**c**) Floriculture.
**9.3** Cultivation practices of Rosewith respect to Climate, soil type, varieties, planting, pruning, manures, irrigation, Pest and disease management.

**Unit-10- Propagation of horticultural plants** (11)

**10.1** Sexual propagation – Merits and Demerits.

**10.2** Vegetative propagation.

A) Natural methods of vegetative propagation:-

i) Runners ii).Suckers, iii). Bulbs, iv) Tubers, v) Rhizomesvi). Bulbils, vii)-Offset, viii) Stolon

B) Artificial methods of vegetative propagation:-

i) **Cutting**– Definition, Types (listing), Stem cutting – Soft wood,Semi hard wood and

Hardwood cuttings.

ii) **Layering** – Definition, Types (listing), Simple and Air layering.

iii) **Grafting** – Definition, Stock and scion relationship, Types (listing),Whip and Approach

Grafting.
iv) **Budding**– Definition, Types – "T" (Shield) and Patch budding.

**10.3** Merits and Demerits of vegetative propagation.

## Reference Books

1) General Microbiology-Vol-II, C B Powar, H F Daginawala, Himalaya Publishing HouseMumbai, 400004.

2) Virology: P Saravanan, MJP, Publishers, Chennai, 600005.

3) Understanding Microbiolgy, S K Prasad, Discovery Publishing House, Pvt.Ltd. New Delhi,110002.

4) An introduction to Viruses,S B Biswas,andAmitaBiswas,Vikas Publishing House,Pvt.Ltd.New

Delhi,110002.

5) Botany for Degree Students- Algae- B.R.Vasistha (1994) S.Chand and Company,Ramnagar New delhi.110055.

6) A Text Book of Algae,R M Johari,SnehaLata,Sandhya Sharma, Dominant Publishersand Distributors, New Delhi,110020.

7) A Text Book on Algae, D Kumar and N Singh, Affiliated East-west Press, PvtLtd.Uravashi Press, Press, Meerut, 250002.

8) Introduction to Algae, SudaraRajan, Anmol Publications, Pvt.Ltd. New Delhi, 110002.

9) An Introduction to Algae, Suresh Kumar, Campus Books International, Daryaganj, NewDelhi, 110002.

10) Cryptogrammic Botany-Smith G.M. (1973) Vol. I –Algae and Fungi, Tata McGrawHIILL,

Book, Company INC, Tokyo, Japan.

11) Introduction to fungi –Dube H.C. (1990).Vikas Publishing House Ltd. New Delhi.

12) The Fungi-Mehrotra B.S. (1980).Oxford and IBH Publishing Co.66, Janapath New Delhi, 110020.

13) Introductory Mycology –Alexopoulos C.J. and C.W.Mims. (1962) Wiley Western Ltd.Ansari Road, Daryaganj, New Delhi, 110020.

14) Botany for Degree students- Fungi - B.R.Vasistha. ,-S.Chand and Company, Ramnagar New Delhi.110055.

15) A Text Book of Fungi:-G L Chopra, and V Verma, Pradeep Publishing, Pratap Road, Jalandahr City, 144008.

16) Introductory Mycology, Sung Huang Sun-Wiley Eastern Ltd.Ansari Road, Daryaganj, New Delhi, 110020.

17). Biology of Lichens –Hale I.E. (1967) Edward Arnold, London.

18) Plant diseases –Singh R.S. (1963) Oxford and IBH Publishing Company Pvt.Ltd.New Delhi, 110001.

19) Disease s of crop plants in India –.Rangaswami and Mahadevan, Prentice Hallof India,Pvt.Ltd.,New Delhi,110001.

20) Botany for Degree Students –Bryophyte- B.R.Vashishta.S.Chand Company, Ramnagar New delhi.110055.

21) An Introduction to Embryophyta-Bryophyta, NS.Parihar, Vol-I, Central Book Depot, Allahabad.

22) A Text Book of Bryophyte, R M Johari, SnehaLata, and Kavitatyagi, Dominant

Publishers and Distributors, New Delhi, 110020.

23) Botany for Degree Students- Pteridophyte, P.C.Vasishta. S.Chand and Company, Ramnagar New Delhi.110055.
24) Introductions to Pteridophytes-Rashid A. (1978).Vikas Publishing house,Pvt.Ltd.Sahibabad, UP.

25). Cryptogrammic Botany-Smith G.M. (1973) Vol. II –Bryophyte and Pteridophyte, TataMcGraw HIILL, Book, Company INC, Tokyo, Japan.

26) Plant Physiology, P.S. Gill. Publisher .S Chand and Company Limited,Ramnagar New Delhi.110055.

27) Fundamentals of Plant Physiology. , J L Jain. .S Chand and CompanyLimited, RamNagar New Delhi.110055.

28) Plant Physiology V. Verma, EMKAY Publications. B-19, East Krishnanagar Delhi.110051.

29) Introductory Plant Physiology .G Ray Noggle&Frtiz.Prentice Hall of India.PvtLtd.New Delhi.110001.

30) Plant Physiology. Salisbury and Ross, CBS Publishers and Distributors. Jain Bhavan Bholanathnagar, Shahadara-Delhi.110032.

31) Plant Physiology, V I Palladin, Arihant Publications, Jaipur. (INDIA).

32) Physiology of Crop plants, F P Gardner B Pearce, R L Mitchell. Scientific Publishers Ratanada Road, P O Box 91, Jodhpur.342001.

33) Fundamentals of Horticulture –J.B.Edmond and J.L.Senn, Tata McGrawHill publishing Company Ltd –New Delhi.

34) Manual of Gardening –W.Burns (Edn)-Saeed International (Regd.)E-9-Jungpura (Extn).New Delhi-110014.
35) Gardening in India-T.K.Bose and D.Mukhargee, Oxford andIBH-Publishing Co.Pvt.Ltd.Culcutta.

36) The Culture of Vegetables and flowers-Martin-Sutton-Ambey-Publications Delhi.

37) PlantPropagation-M.K.Sadhi,WileyEasternLimited,4835/29,AnsariRoad, Daryaganj, New Delhi -110002.

38) Floriculture in India, G.S, Randhava and A. Mukhopadhyay.Allied Publishers, Pvt.Ltd, Mumbai, 40001.

# Semester – II

**Paper – II Gymnosperms and Angiosperms, Cell Biology, Genetics and Plant Biotechnology.**

**75 Lectures**

## Section-I

## (Gymnosperms and Angiosperms)

## Gymnosperms

**Unit-.1** Introduction and salient features of Gymnosperms.(13)

**Unit-.2** Classification of gymnosperms up to orders (According to Sporne1965).

**Unit-3**-Study of Cycas with respect to , occurrence ,Systematic position with reasons, External morphology of sporophyte, anatomy of leaflet and coralloid root,, Reproductive structures – structure of male cone and microsporophyll, Structure of megasporophyll and ovule (L. S.).

**Unit-.4** Brief account of economic importance of Gymnosperms.

## Angiosperms

**Unit-5** Introduction and salient features of angiosperms. (05)
**5.1**- Outline of Bentham and Hooker's system of classification, Merits andDemerits.
**5.2** Principles of International Code of Botanical Nomenclature (ICBN).

**Unit-6-**General account of morphology of Angiosperms with respect to inflorescence, (12) flower, fruit, Concept of floral formula and floral diagram.

**Unit-7** Study of the following families of Angiosperms –with respect to Systematic position with reasons, morphology of vegetative and reproductive parts, diagnostic features and economic importance:-
i) Annonaceae ii) Caesalpinaceae iii) Solanaceae
iv) Convolvulaceae v) Nyctaginaceaeiv) Amaryllidaceae(06)

## Section-II

## Cell Biology, Genetics and Plant Biotechnology

**Unit-1.The cell**
1.1) Definition and Ultra Structure of Prokaryotic and Eukaryotic cell.(02)

**Unit 2. Cell division**
2.1) **Mitosis** – Definition, Various stages of mitosis and significance. (02)

**Unit-3** Study of plant cell organelles- with respect to Occurrence, structure and functions of:-    (5)
3.1) Nucleus
3.2) Chloroplast
3.3) Mitochondrion.

**Unit 4.Microbodies**                                                               **(5)**
Study of Microbodies with respect to Occurrence, Structure and functions of:-
4.1) Peroxisomes
4.2) Glyoxysomes

**Unit 5 Cell wall**                                                                    **(5)**
5.1) Origin and Ultra structure of cell wall.
5.2) Chemical composition and functions of cell wall.

**Unit 6- Cell membrane**                                                            **(8)**
6.1) Ultra structure of cell membrane
6.2) Model of cell membrane (Singer – Nicholson's Fluid – Mosaic Model).
6.3) Chemical composition of cell membrane.
6.4) Functions of cell membrane.

**Unit 7- Genetics**                                                                  **(10)**
**7.1)**. Mendel's work on Pea
a) Introduction and history
b) Selection criteria for Pea plant
c) Genetic terminology (Factors, allels, parent generation, filial generation, self breeding, phenotypes, genotypes, homozygous, heterozygous, Purline , dominant, recessive, Monohybrid cross, Dihybrid cross, Polyhybrid cross , Back cross, Test cross)

d) Monohybrid and Dihybrid Cross.

**7.2**) **Mendel's laws of inheritance**- a) Law of Dominance
b) Law of segregation
c) Law of independent assortment.

**7.3) Interaction of genes-**
A) Complementary genes (9:7),
B) Supplementary genes (9:3:4)
C) Inhibitory genes (13:3)

**Unit-8. Biotechnology** **(1)**
8.1) Introduction, definition and Scope of biotechnology.
8.2) Multidisciplinary nature of biotechnology

**Unit 9. Biotechnology in Agriculture** **(1)**
9.1) **Tissue culture** – General techniques, Applications of tissue culture in Agriculture (04)
9.2) **Biofertilizers**– Definition, Necessity, Types – BGA (02)

# Reference Books

01) Botany for Degree Students-Gymnosperms-P C Vashishta (1976). S Chand and Company Limited, Ramnagar New Delhi.110055.

02). Gymnosperms Structure and Evolution J Chamberlain, CBS Publishers and Distributors, Bholanath Nagar, New Delhi.32.

03). Morphology of Gymnosperms-Coulter and Chamberlain (1978).

04) Gymnosperm and Palaeobotany, S.K.Singh, Campus Book International, Ansari Road, Daryaganj, New Delhi.110002.

05) A Text Book of Bryophyte, Pteridophyte, Gymnosperm and Palaeobotany, AVSS, Sambamurty, IK International, Uphar Cinema Market, New Delhi.110016.

06) Morphology of Angiosperms, J M Coulter and C J Chamberlain, Pointer Publishers, Jaipur.

07) Taxonomy of Angiosperm R Pandey, S Chand and Co. Ltd, Ramnagar New Delhi.110055.

08) An Introduction to Taxonomy of Angiosperms-PritishShukla, Shital P Mishra, Vikas Publishing House, Pvt.Ltd.Gaziabad, UP.

09). A Text Book of Angiosperms-B P Pandey, S Chand and Co Ltd.ramnagar, NewDelhi.110055.

10) A Text Book of Botany -'Angiosperm,'V Singh C Pande, D K Jain, Rastogi Publication,Shivaji Road Meerut.250002.

11) Taxonomy of Angiosperm, NeeruMathur, Sonali Publications, New Delhi, 110002.

12) Angiosperms-G L Chopra, Pradeep Publications, Jalandhar, 144008.

13) Plant cell Biology –Structure and function-Gunning B.E.S and Steer M.W. (1996).

14). Cell Biology –C.B.Powar (1992), Himalaya Publ..House, Delhi.

15) Text Book of Cell and Molecular Biology –Gupta P.K. (1999),Publ.Rastogi Publication, Meerat.

16). Molecular and Cellular Biology-Wolfe S.L. (1993), Wadsworth PublishingCompany, California, U.S.A.

17) A concept of a Cell biology –P.S.Verma, V.K. Agarwal,-S.ChandandCompany Limited, Ramnagar New Delhi.110055.

18) Genetics, A.M Winchester, Oxford and IBH Publishing, Co.New Delhi, 110055.

19) Study of Genetics and Evolution, R.H.Lock, Arihant Publishers, Jaipur.302004.

20)-Genetics, M.P Arora, G.S Sandhu, Himalaya Publishing House, Girgaon Mumbai-40004.

21) Advanced Biotechnology –KagumartiB.Rao.-K.R.S-SambasivaRao.-Discovery Publishing House, New Delhi -110002.

22) Biotechnology (Recent Development)-Dr.VandanMohod, 1999 Book Enclave, Jaipur.

23) Biotechnology in Agriculture –S.Natesh, V.L.Chopra,-S.Ramchandran,-Oxford&IBH Publishing Co.Pvt.Ltd. New Delhi, Bombay, Calcutta.

24)Recent Advances in Biofertilizer Technology-A K Yadav,M R Motsara and S Ray Chauduri,NagariPrinters,Navin Shahadara,Delhi110032.

25) Manures and Fertilizers S Yalwalkar, J P Agarwal and S Bokade, AgriculturalPublishing House, Nagpur, 440010.

26) Biofertilizers-Somani, Bhandari, Vyas, SaxenaScientificPublishers, Jodhapur, 342001.

# Solapur University, Solapur

# B.Sc.-I (Chemistry)
CREDIT-GRADING SYSTEM
# Syllabus- 2014

# SOLAPUR UNIVERSITY, SOLAPUR
## SYLLABUS FOR B.Sc – I (CHEMISTRY)
## (CREDIT-GRADING SYSTEM)

**Structure of the Course:**

• Structure of B.Sc. course in faculty of science has total of 06 semesters for 3 years.

• B.Sc.-I comprises of total two semesters. Each semester will have one theory paper of 70 marks for university external examination and 30 marks for internal examination.

• At the end of academic yeari.e. semester II the practical examination will be conducted. The Weightage of practical is of 70 marks for university external practical examination and 30 marks for internal practical examination.

| Semester | Paper No. | Title of Paper | Total Lectures | Total Marks | | | Total Credit |
|---|---|---|---|---|---|---|---|
| | | | | Univ. Exam | Internal Exam | Total | |
| Semester I | I | Physical and Inorganic Chemistry | 75 | 70 | 30 | 100 | 05 |
| Semester II | II | Organic and Analytical Chemistry | 75 | 70 | 30 | 100 | 05 |
| Practical | I | Chemistry | | 70 | 30 | 100 | 04 |

• Each theory paper has two sections of 35 marks for university external examination.
   Paper –I: Section –I: Physical chemistry of 35 marks with 2.5 credits.
            Section –II: Inorganic Chemistry of 35 marks with 2.5 credits.
Paper –II: Section –I: Organic chemistry of 35 marks with 2.5 credits.
            Section –II: Analytical Chemistry of 35 marks with 2.5 credits

• Continuous Internal Assessment for chemistry:
   1) Each theory paper has 30 marks for internal examination. There will be 20 marks unit test and 10 marks home assignment.
   2) Practical paper has 30 marks for internal examination. There will be two practicals of 15 marks.
   3) Practical paper has 70 marks for external university practical examination. Duration of practical examination is one day. There will be three practicals, one from each physical, inorganic and organic practical work. Out of 70 marks for external university practical examination, the mark distribution is as follows.
      Q. 1 Physical Chemistry experiment : 20 marks
      Q. 2 Inorganic Chemistry experiment: 20 marks
      Q. 3 Organic Chemistry experiment  : 20 marks
      Q. 4 Oral                          : 05 marks
      Q. 5 Journal                       : 05 marks
                              -----------------
                     Total marks : 70 marks

# SOLAPUR UNIVERSITY, SOLAPUR
## SYLLABUS FOR B.Sc – I (CHEMISTRY)
## (CREDIT-GRADING SYSTEM)
## SEMESTER-I
### PAPER –I (Physical and Inorganic Chemistry)
### (Total Credits: 5; Contact hrs: 75)
### SECTION- I: Physical Chemistry

**UNIT –I: Chemical Kinetics and Mathematical concepts**          **Contact hrs: 22.5**
                                             **Credit- 1.5**

**A. Chemical Kinetics**                                          **(Contact hrs: 16.5)**

1.1 Chemical Kinetics and it's scope, Rate of reaction, Definition and units of rate constant.
   Factors affecting rate of reaction. Concentration, pressure, temperature and catalyst.
1.2 Order and Molecularity of reaction.
1.3 First order reaction: Derivation of Rate constant. Characteristics of first order reaction.
   Examples: Decomposition of $N_2O_5$
1.4 Second order reaction: Derivation of rate constant for equal and unequal concentration of the reactants. Characteristics of Second order reaction.
Examples : i) Reaction between $K_2S_2O_8$ and KI .
1.5 Pseudounimolecular reactions such as Hydrolysis of methyl acetate in presence of Acid.
1.6 Methods to determine the order of reaction:
   a) Integration method,              b) Graphical method
   c) Half change method,              d) Ostwald's isolation method
   (Numerical Problems Expected)

**B. Mathematical Concepts**                                      **(Contact hrs: 06)**

2.1 Graphical representation : Graph paper, co-ordinates of a point, equation of straightline and intercept, plotting of graph based on experimental data.
2.2 Derivative : Rules of differentiation (without proof) pertaining to algebraic and exponential functions. Example related to chemistry.
2.3 Integration : Rules of Integration (without proof) pertaining to algebric and exponential functions. Example related to chemistry.
(Numerical Problems not expected)

**UNIT – II: Thermodynamics and gaseous State Contact Hrs: 15**
                                             **Credit- 1**

**A. Thermodynamics:**                                           **(Contact hrs: 05)**

3.1 Spontaneous & non spontaneous processes, Second law of thermodynamics andits different statements.
3.2 Carnot's Theorem (Heat engine), Carnot cycle and its efficiency.
(Numerical Problems Expected)

**B. Gaseous State:**                                            **(Contact hrs:10)**

4.1 a) Ideal and Non ideal gases,      b) Deviation from ideal behaviour. (Only Boyle's law)
c) Causes of deviation, van der Waal's equation, explanation of real gas behavior by van der Waal's equation.
4.2 Critical Phenomena : PV-Isotherms of real gases (Andrew's isotherms), continuity of state, Relationship between critical constants and van der Waal's constants.
4.3 Liquification of gases, Joule-Thomson effect.
(Numerical Problems expected)

## Reference Books:

1) Mathematical preparation of Physical Chemistry : F. Daniel Mc-Graw Hill Book Com.
2) Elements of Physical Chemistry : S. Glasstone and D. Lewis (D. Van Nostrand Co. Inc)
3) Physical Chemistry : W. J. Moore (Orient Longman)
4) Principles of Physical Chemistry :MaronPrutton
5) University Chemistry : B. H. Mahan (Addision - Weseley Publ. Co.)
6) Chemistry Principle &Applications : P.W. Atkins, M. J. Clugsto, M.J. Fiazer, R. A. Y. Jone (Longman)
7) Physical Chemistry : G. M. Barrow (Tata Mc-Graw Hill)
8) Essentials of Physical Chemistry : B. S. Bahl& G.D. Tuli (S. Chand)
9) Physical Chemistry : A. J. Mee.
10) Physical Chemistry : Daniels - Alberty.
11) Principles of Physical Chemistry :Puri - Sharma (S. Nagin)
12) Text Book of Physical Chemistry :SoniDharmarha
13) University General Chemistry : CNR. Rao (McMillan)
14) Chemistry :Sienko - Plane ( Recent Edn,.)
15) Physical Chemistry Through problems :Dogra and Dogra (Wiley Eastern Ltd.,)
16) Physical Chemistry : S. Glasstone.
17) Basic Chemical Thermodynamics : V. V. Rao.

## SECTION-II:  Inorganic Chemistry
## UNIT – III: Atomic Structure, periodic properties and Ionic SolidsContact hrs: 17.5
### Credit- 1.17

**A. Atomic Structure and periodic properties**                    **(Contact hrs:8.5)**

1.1 Atomic Structure

    a) Shapes of s, p, d orbitals.

    b) Aufbau and Pauli's exclusion principle, Hund's rule of maximum multiplicity

    c) General electronic configuration of s and p block elements.

1.2 General Characteristics of s and p block elements w.r.t. Atomic and Ionic radii, Ionization energy, Electron affinity Electronegativity, Reactivity,Melting and Boiling point

**B. Ionic Solids**                                       **(Contact hrs:09)**

2.1 Ionic Bonding

    a) Formation of ionic bond, Energetics of ionic bonding :Ionisation potential, Electron affinity and Lattice energy.

    b) Characteristics of ionic compounds.

    c) Born-Haber Cycle for Alkali metal halide (NaCl).

    (Numerical Problems are expected)

    d) Fajan's rules.

2.2 Radius ratio and crystal structure.

    a) Definition: Radius ratio ($r+ / r-$), Coordination number, Stoichiometry and unit cell.

    b) Concept and calculation of radius ratio ($r+ / r-$) for ionic solid withoctahedral geometry.

    c) Radius ratio effect on geometry.

    d) Crystal structure of NaCl and CsCl w.r.t. unit cell, radius ratio, coordinationnumber and stoichiometry.

**UNIT – IV: Theories of Covalent BondingContact hours- 20**
  **Credit- 1.33**
**A. Valence Bond Theory(VBT) Approach** **(Contact hrs:10)**
3.1 Valence Bond Theory: Heitler – London Theory and Pauling Slater Theory
3.2 Limitations of VBT
3.3 Need of Hybridisation
3.4 Types of hybridization and shapes of simple inorganic molecules: $BeCl_2$, $BF_3$, $SiCl_4$, $PCl_5$, $SF_6$, $IF_7$.
3.5Valence Shell Electron Pair Repulsion (VSEPR) Theory w.r.t. $NH_3$, $H_2O$, $ClF_3$
**B. Molecular Orbital Theory(MOT) Approach** **(Contact hrs:10)**
4.1 Atomic and Molecular orbitals.
4.2 L.C.A.O. Principle
4.3 Bonding, Antibonding and Nonbonding Molecular orbitals.
4.4Conditions for successful overlap
4.5  Different types of overlap (s-s, s-px, px - px and py- py or pz- pz)
4.6Energy level sequence of molecular orbitals for n = 1 and n = 2
4.7 M. O. Diagrams for: a) Mononuclear diatomic molecule. $H_2$, $Li_2$, $Be_2$, $C_2$, $N_2$ and $O_2$
                    b) Heteronuclear diatomic molecules CO and NO w.r.t. bond order
                    stabilityand magnetic properties.

**Reference Books:**
1) Advanced Inorganic Chemistry - Cotton and Wilkinson
2) Inorganic Chemistry - J. E. Huheey
3) Concepts and models of Inorganic Chemistry - Douglas & Mc-Daniel
4) Principles of Inorganic Chemistry - Puri, Sharma
5) New Concise Inorganic Chemistry - (ELBS) - J. D. Lee
6) Text book of Inorganic Chemistry - P. L. Soni
7) Advanced Inorganic Chemistry - Satyaprakash, Tuli, Basu
8) Theoretical Principles of Inorganic Chemistry - G. S. Manku
9) Principles of Inorganic Chemistry - Puri, Sharma &Kalia

**PAPER II: (Organic and Analytical Chemistry)**
**(Total Credits: 5; Contact hrs: 75)**
**SECTION- I: Organic Chemistry**

**UNIT: - I:**                               **Contact hours 22.5**
**Credit- 1.5**

## A. Fundamentals of organic reaction mechanism        (Contact hrs:06)

1.1 Meaning of reaction mechanism.
1.2 Curved arrow notation, Half headed and double headed arrows.
1.3 Types of bond breaking :Homolytic and Heterolytic.
1.4 Types of reagents : Electrophilic and Nucleophilic.
1.5 Types and sub-types of following organic reactions with definition and atleast one example of each. a) Substitution b) Addition c) Elimination d) Rearrangement.
(Mechanism is not expected)
1.6 Reactive Intermediates with examples carbocations, carbanions (formation,structure, stability and reactions are expected). Carbon free radicals, carbenes,arenes, nitrenes
(Definition with example only)

## B. Stereochemistry of organic compounds            (Contact hrs:06)

2.1 Types of stereo-isomerism - Optical isomerism, Geometrical isomerismand Conformational isomerism.
2.2 Chiral center[Explanation with lactic acid]
2.3 Elements of symmetry
2.4 Optical isomerism in lactic acid, tartaric acid and 2,3 - dihydroxybutanic acid
2.5 Enantiomers and diastereoisomers.
2.6 Racemic modification.
2.7 Geometrical isomerism-cause of geometrical isomerism.
2.8 Geometrical isomerism w.r.t. $C = C$
Geometrical isomerismin maleic acid and fumaric acid.

## C. Alkanes and Cycloalkanes                       (Contact hrs:4.5)

3.1 Alkanes : Methods of formation with special reference to Wurtz reaction, Kolbereaction, Corey-House reaction and decarboxylation of carboxylic acid.
3.2 Mechanism of free radical halogenation of alkanes.
3.3 Cycloalkanes - Nomenclature methods of formation
      (a) Internal Wurtz reaction
      (b) Distillation of calcium or barium salt of dicarboxylic acid.
3.4 Chemical properties of cyclopropane
      (i) Free radical substitution of chlorine inpresence of light.
      (ii) Action of HBr and conc. $H_2SO_4$ iii) Catalytic reduction by $H_2$/Ni

## D. Aromaticity and Benzene                          (Contact hrs:06)

4.1 Meaning of the terms - Aromatic, non-aromatic, antiaromaticand psuedoaromatic compounds.
4.2 a) Kekule structure of benzene
b) Resonance structures of benzene.
c) Molecular orbital picture of benzene.
d) Representation of benzene ring.
4.3 Modern theory of aromaticity. Fundamental Concepts - delocalisation of electrons,

coplanarity and Huckel's (4n + 2) $\pi$ rule. Applications of Huckel's rule tonapthalene, pyrroleand pyridine.

4.4 Mechanism of electrophilic aromatic substitution in benzene w.r.t. nitration,sulphonation, halogenation and Friedel - Craft's reaction- alkylation and acylation.

**UNIT: - II:**                                                   **Contact hours 15**
                                                  **Credit- 1**

**A. Alkenes, Dienes and Alkynes**                              **(Contact hrs:08)**

5.1 Nomenclature of alkenes.

5.2 Methods of formation of alkenes with mechanism
       i) By dehydration of lower alcohols.
       ii) By dehydrohalogenation of lower alkyl halides.

5.3 Chemical reactions of alkenes - Hydrogenation, Electrophilic and free radical additions, Hydroboration, Oxidation, Epoxidation, Ozonolysis, Hydration, Hydroxylation,Oxidation with $KMnO_4$, Polymerisation of alkenes - ethylene and propylene

5.4 Nomenclature and classification of dienes.

5.5 Isolated, Conjugated and cumulated dienes.

5.6 Butadiene - Methods of formation, polymerisation, 1 : 2 & 1 : 4 additionsand Diels-Alder reaction.

5.7 Alkynes - Nomenclature, Acidity of alkynes.

5.8 Electrophilic and Nucleophilic addition reactions, Hydroboration, oxidation.

**B. Structure and Bonding**                                         **(Contact hrs:07)**

6.1 Hybridization: $sp^3$, $sp^2$and sp w.r.t. methane, ethylene and acetylene respectively.

6.2 Bond length, Bond angle and Bond energy with factors affecting these properties w.r.t. : $sp^3$, $sp^2$and sp hybridization

6.3 Resonance effect with respect to phenol, and nitrobenzene.

6.4 Hyperconjugation w.r.t. toluene.

6.5 Inductive effect w.r.t. + I and - I .

6.6 Steric effect w.r.t. mesitoic acid.

**Reference Books**

1) Organic Chemistry : Hendrickson, Cram, Hammond.
2) Organic Chemistry : Morrison & Boyd
3) Organic Chemistry : Volume I & II I.L. Finar
4) Organic Chemistry : Pine
5) Advanced Organic Chemistry :SachinkumarGhosh
6) Advanced Organic Chemistry : B.S. Bahl and ArunBahl
7) A Guide book to Mechanism in organic Chemistry : Peter Sykes
8) Stereochemistry of Organic Chemistry :Kalsi,
9) Stereochemistry of Carbon Compounds :Eliel
10) Text book of Organic Chemistry : P. L. Sony
11) Practical Organic Chemistry : By A. I. Vogel
12) Advanced Organic Chemistry - Reactions, Mechanism &Structure : Jerry March
13) Organic Chemistry : M.R. Jain
14) Organic Chemistry : J. M. Shaigel

## SECTION- II: Analytical Chemistry

**UNIT – III:**                                 **Contact hrs: 22.5**
**Credit- 1.5**

### A. Physical properties of liquids                **(Contact hrs:07)**
1.1 Introduction, additive & constitutive properties.
1.2 Viscosity, coefficient of viscosity, determination of viscosity by Ostwald's Viscometer.
1.3 Surface tension:- Determination of surface tension by Drop –Weight method
1.4 Parachor:-Macleod equation & its modification by Sugden, applications of parachorin the determination of molecular structures as benzene, $NO_2$ group (Numerical problems not expected).

### B. Qualitative and Quantitative elemental analysis     **Contact hrs:08**
2.1 Qualitative analysis of Carbon, Hydrogen, Nitrogen & Sulphur
2.2 Quantitative analysis of -
      i) Carbon & hydrogen by Combustion method
      ii) Nitrogen by Kjeldahl's method
      iii) Halogen and by Carius method.
2.3 Determination of molecular weight of an acid by titration method.
2.4 Empirical formula and molecular formula determination. (Numerical Problems Expected)

### C. Chemistry in day-to-day life                 **Contact hrs:7.5**
3.1 Types of water, desalination, Fresh water, Dissolved Oxygen and water quality.
3.2 Milk: Definition, Chemical composition of milk of different species such as cow, buffalo and goat.
3.3 Adulteration in milk like Sugar, Urea, Starch.
3.4 Essential nutrients for plants, Classification, Major, minor & trace their sources and forms.
3.5 Importance of Inorganic Compounds as Medicine- Antacid products $Na_2CO_3$, $Al(OH)_3$, $AlPO_4$, $Mg(OH)_2$, Cis-Platin

**UNIT – IV:**                                 **Contact Hrs: 15**
                                          **Credit- 1**

### A. Distribution Law                       **Contact hrs:05**
4.1 Nernst distribution law, its limitations & modification with reference to association & dissociation of solute in one of the solvent.
4.2 Applications of distribution law in:
      a) Process of extraction (derivation expected)
      b) Determination of solubility
      c) Distribution Indicators
      d) Determination of molecular weight
      (Numerical problems expected)

### B. Metallurgy                            **Contact hrs:06**
5.1 Introduction: - Terms used in Metallurgy, Metallurgy, Mineral, Ore, Gangue, Flux, Slag
5.2 Occurrence of metals: Types of Ores.
5.3 Steps Involved in Metallurgical Processes:
      A) Concentration of Ores:
      i) Physical Methods: a) Gravity separation method
                              b) Magneticseparation method
      c) Froth floatation method.

ii) Chemical Methods: a) Calcination and b) Roasting

B) Reduction: Mention various methods of reduction. Extraction of Iron by blast furnace.

## C. Environmental Chemistry             Contact hrs:04

6.1 Introduction: Meaning of terms: Environment, Pollution, Pollutant, Threshold Limit Value (TLV), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD)

6.2 Types of Pollution (Only Introduction): Air pollution, Water pollution, Sound pollution, Soil pollution, Automobile pollution and nuclear pollution.

6.3 Air Pollution: Classification of Air pollutants, Oxides of carbon, Sulphur and Nitrogen as air pollutants with respect to source and health hazards.

# Reference Books

1) Chemistry - Central Science, Brown, Lemay, Bursten 8th Edition.
2) Outline of Dairy Technology - Sukumar De Oxford university Press.
3) Introduction to Agronomy & soil water management - V. G. Vaidya, N.R.Sahastrabudhye.
4) Principles of Soil Science - M. M. Raj, Millian Co. of India, Bombay 1977
5) Inorganic Medicinal & Pharmaceutical Chemistry- Block, Roche, Soine –Wilson, Varghese Publishing House.
6) Environmental Chemistry - A.K. De
7) Environmental pollution analysis - S.M. Khopkar
8) Organic Chemistry : Hendrickson, Cram, Hammond.
9) Organic Chemistry : Morrison & Boyd
10) Organic Chemistry : Volume I & II I.L. Finar
11) Organic Chemistry : Pine
12) Advanced Organic Chemistry :SachinkumarGhosh
13) Advanced Organic Chemistry : B.S. Bahl and ArunBahl
14) A Guide book to Mechanism in organic Chemistry : Peter Sykes
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18) Practical Organic Chemistry : By A. I. Vogel
19) Advanced Organic Chemistry - Reactions, Mechanism &Structure : Jerry March
20) Organic Chemistry : M.R. Jain
21) Organic Chemistry : J. M. Shaigel
22) Industrial Chemistry : Rogers
23) Industrial Chemistry :R.K.Das

# B.Sc. – I (Chemistry Practical Course)

**Credits: 4**

**Marks: 100(70+30)**

**N.B.** i) Use of Digital balance is allowed.

ii) Use S.I. Units Wherever Necessary.

## A) Physical Chemistry.

1) Determination of viscosity of given liquids A and B. (Density data of liquids, viscosityof water to be given.) [Any two liquids from, Acetone, $CCl_4$, Ethyl alcohol, Ethylene glycol and n-propyl alcohol]

2) Determination of equivalent weight of Mgby Eudiometer.

3) Study of specific reaction rate of hydrolysis of methyl acetate in presence of HCl.

4) Study of specific reaction rate of hydrolysis of methyl acetate in presence of $H_2SO_4$

5) Study of reaction between $K_2S_2O_8$ and KI (Equal Concentrations)

6) Determination of heat of ionization of weak acid.

### Reference Books :

1) Practical book of Physical Chemistry :Nadkarni, Kothari &Lawande.

2) Experimental Physical Chemistry : A. Findlay.

3) Systematic Experimental Physical Chemistry : S.W. Rajbhoj, Chondhekar (Anjali Pub.)

4) Experiments in Physical Chemistry :R.C.Das and B. Behra. (Tata Mc. Graw Hill)

5) Advanced Practical Physical Chemistry : J. B. Yadav (Goel Publishing House)

6) Practical Physical Chemistry : B. D. Khosala ( R. Chand & Sons.)

7) Experiments in Chemistry : D. V. Jagirdar

## B) Inorganic Chemistry

### 1) Inorganic Quantitative Analysis :

1) Study of analytical balance and calibration of fractional weights.

2) Volumetric Analysis :

   i)  To prepare a standard solution of Oxalic acid and determine the strength of Potassium permanganate solution in terms of normality and $Kg/dm^3$

   ii)To prepare standard solution of Potassium dichromate and determine strength of Ferrous Ammonium Sulphate solution in terms of normality and $Kg/dm^3$(Use internal indicator)

   iii) To prepare standard solution of calcium chloride from calcium carbonate and determine the total hardness of given water sample.

### 2) Qualitative Analysis:

1) Spot Tests: Detection of following cations using spot tests : $Cu^{2+}$, $Co^{2+}$, $Ni^{2+}$, $Fe^{3+}$, $Zn^{2+}$, $Mg^{2+}$, $Al^{3+}$, $Pb^{2+}$.

2) Chromatography :Separation and identification of cations by Paper Chromatographic technique from the following mixtures :

        a) $Ni^{2+}$+ $Cu^{2+}$

        b) $Ni^{2+}$+$Co^{2+}$

        c) $Cu^{2+}$+ $Co^{2+}$

### Reference Books :

1) Vogel's Text Book of Quantitative Chemical Analysis (Longman ELBS Edition)

2) Vogel's Text Book of Qualitative Chemical Analysis (Longman ELBS Edition)

3) Basic Concepts in Analytical Chemistry (Wiley Eastern Ltd.) : S. M. Khopkar.

# C) Organic Chemistry

## 1) Estimations :
i) Estimation of aniline and ii) Estimation of acetamide

## 2) Organic Qualitative Analysis.
Identification of at least five organic compounds with reactions including one from acids, one form phenols, one from bases and two from neutrals from the list of the compounds given below-

i) Acids : Oxalic acid, Benzoic acid and Cinnamic acid

ii) Phenols : β - Napthol, Resorcinol.

iii) Bases : Aniline, p - toluidine.

iv) Neutrals : Acetone, Ethyl acetate, Glucose, Chloroform, Chlorobenzene,

m-dinitrobenzene, Thiourea.

*Note :*A systematic study of an organic compound involves the following operations which should be taught in details with reactions in the detection of elements and functional group.

1) Preliminary tests and physical examination.

2) Determination of physical constant.

3) Detection of Elements.

4) Determination of functional group.

5) A search into the literature.

6) Special Test.

7) Summary.

8) Result.

## 3) Organic Preparation: (Any one)
i) Preparation of benzoic acid from benzamide.

ii) Preparation of succinimide form succinic acid.

(Wt. of crude product is expected. M.P. of the recrystallized product is not expected.)

## Reference Books:
1) Vogel's Text Book of Quantitative Chemical Analysis, (Longman) ELBS. Edition

2) Vogel's Text Book of Qualitative Chemical Analysis, (Longman) ELBS. Edition

3) Hand book of Organic Qualitative Analysis : Clarke

4) Comprehensive Practical Organic Chemistry - Quantitative Analysis by V.K. Ahluwalia, SunitaDhingra, University Press. Distributor - Orient Longman Ltd.,

5) Comprehensive Practical Organic Chemistry preperation and Quantitative Analysis. :
V.K. Ahluwalia, RenuAgarwal, University Press. Distributor - Orient Longman Ltd.,

6) A laboratory Hand-Book of organic Qualitative Analysis and separation :V. S. Kulkarni, DastaneRamchandra and Co. Pune

# Solapur University, Solapur
## Nature of Question Paper for Credit-Grading System Semester Pattern
### • Faculty of Science •
### (w.e.f. June 2014)
### Time: - 3.00 hrs. Total Marks- 70

**Instructions:**
1. Section **I and II** are compulsory
2. Answers to the **two sections** should be written in **separate** answer books
3. All questions are compulsory.
4. Draw **neat diagrams** and give **equations** wherever necessary.
5. Figures to the **right** indicate **full marks**.
6. Use of logarithmic table and calculator is allowed.
   (At.Wts.: H=1, C=12, O=16, N= 14, Na =23, Cl = 35.5)

## Section - I

**Q. No.1) Multiple choice questions** (5)

      1) --------------------------------------------

a)      b)      c)      d)

      2)

      3)

      4)

      5)

**Q.No.2) Answer any Five of the following** (10)

      i)

      ii)

      iii)

iv)

v)

vi)

vii)

**Q.No.3 A) Write short notes on any Two of the following** (10)

      i)

ii)

      iii)

      **B) Answer any One of the following** (10)

      i)

      ii)

## Section - II

**Q. No.4) Multiple choice questions**. (5)

      1) --------------------------------------------

a)      b)      c)      d)

      2)

      3)

      4)

      5)

**Q.No.5) Answer any Five of the following** (10)

      i)

      ii)

      iii)

iv)
     v)
vi)
     vii)

**Q.No.6 A) Write short notes on any Two of the following**           (10)
     i)
     ii)
     iii)
     **B) Answer any One of the following**           (10)
     i)
     ii)

# Solapur University, Solapur

## Credit-Grading Semester Pattern Syllabus

# B.Sc.I

## Mathematics

### (w.e.f. June 2014)

**For undergraduate course as per the sanctioned workload of Thirty Six (36) Periods.**

### Syllabus of B. Sc. Part-I (MATHEMATICS)
### According to Credit and Grading System
### Semester-wise pattern (Commencing from JUNE – 2014)

B.Sc.I (Mathematics) (Honours) semester-wise pattern to be implemented from June 2014. This syllabus of Mathematics carries 300 marks. In semester –I university examination of Theory paper –I (100=70+30) only and in semester – II university examination of Theory paper –II (100=70+30) and the university examination of Problem Solving Session [PSS – I] (100=70+30) will be held. The distribution of marks is as follows.

## Semester –I

**Paper-I: ALGEBRA  &  CALCULUS**

  **(Marks 70: University Exam.)**

## Semester –II

**Paper-II: GEOMETRY & DIFFERENTIALEQUATIONS**

  **(Marks 70: University  Exam.)**

**Problem Solving Session-I [PSS – I]  (Marks 70: University Exam.)**

**Internal   Evaluation:** Marks 30 = 20 for one Unit Test+10 for Home Assignments/Tutorials/Seminars/Group  discussion/Viva/Field Visit/Industry visit For Each Theory Papers and  Marks 30 = 20 for one Unit Test on any two Practicals+10 for Lab Journal/viva, attendance, attitude etc.

**Note:-**

1. Total teaching periods for Paper –I and for Paper –II are five (5) per week for each semester.
2. Total teaching periods for PSS –I are four (4) per week for whole class as one batch.

**Duration of Annual Examination:**

    (i) For Paper –I (Three hours) in semester –I

   (ii) For Paper –II (Three hours) in semester -II

  (iii) For PSS –I (Three hours for a batch of 20 students) annually.

# Semester -I

## Paper –I (Algebra & Calculus) [Marks:70 University Exam.]

## (5 Periods per week)

### Section-I (Algebra) [Marks:35]

**Unit 1: Matrices:** Symmetric and Skew symmetric, Elementary transformations, Rank of a Matrix (Echelon and Normal form), Characteristic equation of a matrix, Cayley Hamilton theorem and its use in finding the inverse of a matrix. **[10]**

**Unit 2: Linear Equations:** Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations. Eigen values and eigen vectors**.**

**[10]**

**Unit 3: Complex Number:** Modulus and Argument of a Complex Number, DeMoivre's theorem and its applications, Roots of Unity, Roots of Complex Numbers. **[10]**

**Unit 4: Transcendental Functions:** Circular Functions with their inverses and Hyperbolic function of a complex variable along with their inverses. **[10]**

### Section-II (Calculus) [Marks:35]

**Unit 1: Differentiation:** Indeterminate forms and L' Hospital's Rule, Successive differentiations, $n_{th}$ derivatives of standard functions, Leibnitz rule. Taylor's

theorem and Maclaurin's Theorem (Only Statements). Series expansions of $e^x$, cos x, sin x, $(1+x)^n$, $\log(1+x)$ **[15]**

**Unit 2: Function of two variables:** Limit and Continuity of functions of two variables, Partial derivative, partial derivative of higher orders, Homogeneous functions, Euler's theorem on Homogeneous functions. **[10]**

**Unit 3: Reduction formulae:** **[05]**

$$\int_0^{\frac{\pi}{2}} \sin^n x\, dx \qquad , \qquad \int_0^{\frac{\pi}{2}} \cos^n x\, dx \qquad , \qquad \int_0^{\frac{\pi}{2}} \sin^n x \cos^m x\, dx$$

(Note that reductions to these forms are not expected)

**Unit 4: Vector Calculus:** Scalar point function, Vector point function, Directional derivative, Gradient, divergence and Curl and its properties. **[10]**

# Semester –II

**Paper –II (Geometry & Differential Equation) [Marks:70 University Exam.]**

## (5 Periods per Week)

### Section-I (Geometry) [Marks:35]

**Unit 1:- Change of Axis:** Translations, Rotations, Invariants, Identifications of conics from general form of second degree equations, Polar Coordinates, Conversion formulae. **[10]**

**Unit 2:- Plane:** General equation of plane, Normal equation, Intercept form Angle between two planes, Plane through three points, Plane through a given point, Sides of a plane, Distance of a point from a plane, Family of planes. **[15]**

**Unit 3:- Sphere:** Centre radius form, General form , Diameter form, Equation of Tangent Plane and condition for tangency, Family of spheres $S+\lambda S'=0$, $S+\lambda P=0$. **[15]**

## Section-II (Differential Equation) [Marks:35]

**Unit 1:- Differential Equations of first order and first degree: [Part-I]**
Variables separable, Homogeneous, non- homogeneous differential equations [**10**]

**Unit 2:- Differential Equations of first order and first degree: [Part-II]**
Exact differential equations, Necessary and sufficient condition for exactness, Integrating factor with four rules, Linear differential equations of the form: $dy/dx+py=Q$; Bernoulli'sEquation $dy/dx+Py=Qy_n$. [**10**]

**Unit 3:- Linear Differential Equations with Constant Coefficients: [Part-I]**
Complementary function and particular integral, General solution of $f(D)$ $y=X$, Solution of $f(D)y=0$ for non-repeated , repeated, real and complex root. [**10**]

**Unit 4:- Linear Differential Equations with Constant Coefficients: [Part-II]**
Solution of $f(D)y = X$, where $X$ is of the form

$$e^{ax}, \quad \sin(ax), \quad \cos(ax), \quad x^m, \quad e^{ax}V, \quad xV \qquad [\mathbf{10}]$$

**Problem Solving Session [PSS –I] [Marks:70 University Exam.]**

**(4 Periods per week)**

**Assignment –1:** Inverse of Matrix by Cayley-Hamilton Method.

**Assignment –2:** Solution of system of Linear Homogeneous Equation

**Assignment –3:** Solution of system of Linear non-homogeneous Equation.

**Assignment –4:** $n^{th}$ roots of a complex number.

**Assignment –5:** Leibnitz Rule

**Assignment –6:** Reduction formulae

**Assignment– 7:** Partial differentiation

**Assignment –8:** Numerical examples on gradient, divergence and curl.

**Assignment – 9:** Change of axis and invariants.

**Assignment –10:** Conversion between Polar and Cartesian of points and equations

**Assignment –11:** Family of Planes.

**Assignment –12:** Family of Spheres.

**Assignment – 13:** Linear differential equations.

**Assignment –14:** Particular Integrals of $e^{ax}$ and $x^m$.

**Assignment –15:** Particular Integrals of **sin(ax) and cos(ax).**

**Assignment –16:** Particular Integrals of $e^{ax}V, xV$.

# Reference Books

**Paper -I:** Algebra & Calculus

**Paper – II:** Geometry & Differential Equation

**Problem Solving Session – I [PSS – I]**

1.Algebra and Geometry by R. B. Kulkarni, J. D. Yadav, S. J. Alandkar, N. I. Dhanshetti. (SUMS Publication) B.Sc.-I Paper-I

**2.** Algebra and Geometry (B.Sc.-I Paper-I) by L. G. Kulkarni , Dr. B. P. Jadhav, Dr. Mrs. P. D. Patwardhan , Dr. M. K. Kubade. [Phadke Prakashan]

**3.** Text Books of Matrices by Shanti Narayan.

**4.** A Text Book of Analytical Geometry of Two dimensions, by P. K. Jain and Khalil Ahmid , Wiley Eartern Ltd. 1994.

**5.** Calculus and Differential Equations (B.Sc. –I, Paper –II)

   By H. T. Dinde , A. D. Lokhande , P. D. Sutar , U. H. Naik.(SUMS Pub.)

**6.** Calculus and Differential Equations (B. Sc. I , Paper- II) by L. G. Kulkarni, Dr. B. P. Jadhav , Dr. Mrs P. D. Patwardhan , Dr. M. K. Kubade [Phadke Prakashan]

**7.** Differential Calculus by Shanti Narayan

**8.** A text book of Vector Calculus, by Shanti Narayan.

**9.**Differential equations, by G. S. Diwan, D. S. Agashe. Popular Prakashn, Bombay.

**10.** Introductory course in Differential Equation by D. A. Murray Orient Longma.

# Solapur University, Solapur

**Nature of Question Paper for  Credit-Grading Semester Pattern Syllabus**
**B.Sc.I**
## Mathematics
**(w.e.f. June 2014)**
**Time:- 3.00 hrs. Total Marks-70.**

**N.B.:- 1. Answers to the two sections should be written in separate answerbooks.**
**2. All questions are compulsory.**

### Section – I

**Q. N0. 1) Multiple choice questions** (5)
    1)……………………………………….....
        a)        b)      c)      d)
    2)
    3)
    4)
    5)

**Q. No. 2) Answer any five of the following** (10)
    i)
    ii)
    iii)
    iv)
    v)
    vi)
    vii)

**Q. No. 3) Attempt any two of the following** (10)
    i)
    ii)
    iii)

**Q.No. 4)  Attempt any one of the following** (10)
      i)
      ii)


## Section - II

**Q. N0. 1) Multiple choice questions** (5)
      1)………………………………………………....
         a)        b)        c)        d)
      2)
      3)
      4)
      5)

**Q. No. 2) Answer any five of the following** (10)
      i)
      ii)
      iii)
      iv)
      v)
      vi)
      vii)

**Q. No. 3) Attempt any two of the following** (10)
      i)
      ii)
      iii)

**Q.No. 4) Attempt any one of the following** (10)
      i)
      ii)


…………………………………………….…………………………………….

# SOLAPUR UNIVERSITY, SOLAPUR

## New Semester Pattern
## Credit Based Grade System Syllabus
## B.Sc. Part I Physics (w. e. f. June 2014)

**N. B.:-**

**i)** There will be single theory paper of 70 marks for each semester (Section I and Section II of 35 Marks each) Annual practical of 70 marks at the end of second semester.

The total marks for physics subject will be 300 (70 % University Assessment & 30 % College Assessment). There will 5 Credits for theory and 4 Credits for Practical.

**ii)** There shall be 2.5 periods per section i.e. 5 periods per week for theory and 4 periods per week for each practical batch of 20 students.

**iii)** The duration of theory examination paper will be 3 hours each and that for practical will be 2 sessions of 3 hours each.

**iv)** 30 % internal College Assessment and 70 % University Assessment for both T & P.

**v)** University will conduct practical examination of 70 marks at the end of semester II.

Every student will have to perform two experiments (one from each Group).

**vi)** All Colleges will conduct the internal assessment of theory (30 Mark) in both semesters and Practical (30 Mark) at the end of second semester by their convenience and only marks will be sent to the University before the start of University examinations.

## *Semester-I*

## *Physics Paper – I (Mechanics, Properties of Matter and Optics*

| | |
|---|---|
| Section: - I Mechanics and properties of matter | 50 Marks |
| Section: - II Optics and Laser | 50 Marks |

## *Semester-II*

## *Physics Paper – II (Heat, Thermodynamics, Electricity, Magnetism and Basic Electronics)*

| | |
|---|---|
| Section: - I Heat and Thermodynamics | 50 Marks |
| Section: - II Electricity, Magnetism and Basic Electronics | 50 Marks |
| Practical at the end of Second Semester | 100 Marks |

# Physics Paper I

## Section I - Mechanics and Properties of Matter.

### Topic 1 – Moment of Inertia                                      06

Review of M.I., Moment of Inertia of 1) Circular disc 2) Rectangular lamina 3) Spherical Shell 4) Fly wheel.

### Topic 2 – Pendulums                                             10

Introduction, Theory of compound Pendulum, Bar Pendulum, Kater's Pendulum, Bassel's Theory, Bifilar pendulum (parallel suspensions of equal lengths), Torsional Pendulum.

### Topic 3 – Elasticity                                            07

Introduction, Equivalence of shear strain to compression and extension strains, Relation between elastic constants, Poisson's ratio of rubber tube (Theory and experimental method)

### Topic 4 – Surface Tension                                       08

Review of S.T., relation between excess pressure and surface tension, excess pressure inside a liquid drop and soap bubble, Jaeger's method to determine Surface Tension, Factors affecting Surface Tension, Applications of Surface Tension.

### Topic 5 – Viscosity and Fluid dynamics                          08

Introduction, Newton's law of viscosity, streamline and turbulent flow, Critical velocity and Reynolds number, Equation of continuity, Energy possessed by liquid, Poiseuille's equation, Bernoulli's theorem and its applications to 1) Venturimeter 2) Automiser. Factors Affecting on viscosity.

**Reference books:-** 1) Properties of matter - D.S. Mathur.

2) A Text book of properties of matter - N.S. Khare and S. Kumar.
3) Physics Volume I – David & Robert Resnick.
4) University Physics-Mechanics of a particle - Anvar Kamal.

# Physics Paper I

## Section – II (Optics and Laser)

### Topic 1 – Geometrical Optics and aberrations      10

Introduction, Fermat's principle, Deduction of laws of reflection and refraction by Fermat's principle, Chromatic and Spherical aberration, methods to minimize Chromatic and Spherical aberrations.

### Topic 2 – Optical Instruments      08

Introduction, Types of eye-pieces, Gauss eye piece, Ramsden's eye-piece, Huygen's eye-piece, Construction, working and Application of Spectrometer and Optical bench.

### Topic 3 – Interference      08

Introduction, Interference in parallel faced thin film (Reflected light only), wedge shaped film, Newton's rings and its applications.

### Topic 4 – Diffraction      08

Introduction, Types of diffraction, Plane diffraction grating and its elementary theory, its application to determine wavelength, Comparison between prism and grating spectra

### Topic 5 – Laser      08

Introduction, Spontaneous and Stimulated emission and absorption, Einstein's Coefficients, Population inversion, Optical Pumping, Cavity resonator, He-Ne and Ruby Laser, Properties and application.

**Reference books: 1.** Ray Optics by R K Verma.

2. Text Book of Optics ( new edition ) – Brijlal and Subramanyam

3. Optics( second edition ) – Ajay Ghatak

4. Concept of Physics – H C Verma

5. Laser and Optics – B. B. Loud

6. Optics by Mathur

# Physics Paper II

## Section - I (Heat and Thermodynamics)

### Topic 1 –Transport Phenomenon                                08

Introduction, mean free path, Claussius expression for mean free path ( Collision cross section), Transport Phenomenon, Coefficient of Viscosity, Thermal Conductivity and its dependence on temperature and pressure

### Topic 2   - Liquefaction of Gases                                08

Liquefaction of gases by J-T effect, Linde's air liqefier; cooling by adiabatic demagnetization and expression for fall in temperature, experimental setup for adiabatic demagnetisation of paramagnetic substances, properties of liquid helium

### Topic 3 – Thermodynamics                                10

Laws of thermodynamics, Reversible and Irreversible processes, Isothermal and adiabatic process, Adiabatic relations, work done during isothermal and adiabatic processes, Entropy change in reversible and irreversible processes

### Topic 4 – Heat engines                                08

Introduction, Carnot's heat engine and its efficiency; Heat engine, Otto cycle and its efficiency, Diesel cycle and its efficiency, comparison between Otto and diesel engine.

### Topic 5 –Refrigerator                                08

General principle, Refrigeration Cycle, coefficient of performance of refrigerator, Vapor compression Refrigerator, Air conditioning (principle and applications)

### Reference books:-

1) Treatise on heat – Saha & Shrivastav
2) Kinetic theory of gases – V.N. Kelkar
3) Heat and Thermodynamics – Brijlal & Subrahmanyam

# Physics Paper II

## Section - II (Electricity, Magnetism and Basic Electronics)

**Topic 1 – Varying Current:**                                        08

Introduction, Growth and decay of current in L-R circuit, Charging and discharging of capacitor through resistor and inductor separately. Time constant of LR and CR circuit

**Topic 2 – A.C. Circuits:**                                        08

Complex number, J-Operator and its applications to AC circuits, Reactance, Susceptance, Impedance, Admittance and power factor, L-C-R circuit, series and parallel resonance circuits, sharpness of resonance and quality factor, AC bridge(Owen's bridge).

**Topic 3 – Magnetostatics and Ballistic Galvanometer:**                08

Introduction, Biot-Savart's law and its application to determine magnetic induction at a point on the axis of current carrying coil of single turn and Solenoid.

Ballistic Galvanometer: Construction, theory, working Principle and its constants.

**Topic 4 – Electronic circuit components and Devices:**                09

Classification of electronic circuit components: Passive and active circuit component (Resistor, Capacitor, Inductor, Transformer, Switches, Relays, Diodes, Transistor, FET, SCR, UJT and IC with their symbol and specification).

Bridge rectifier with Pie-Filter., Clippers., Clampers, Zener diode and its application as a voltage regulator.

**Topic 5 – Bi-junction transistor:**                                09

Construction and working of transistor, input-output and transfer characteristics of CE & CB mode, Relation between $\alpha$ and $\beta$. Transistor as amplifier (CE mode)

**Reference books:-** 1) Principles of electronics –V.K. Mehta 2) Electronics principles - Malvino

3) Basic electronics & linear circuits- Bhargav, Kulshrstha &Gupta
4) Electricity and Magnetism – Khare & Shrivastav
5) Foundations of electromagnetic theory- Reitz & Milford
6) Electronic devices & circuits-Allen Mottershed

## Practical (4 Credits) – 100 Marks (30 % internal + 70 % University)

## Group I – General Physics, Heat

1. Bar pendulum to determine acceleration due to gravity.

2. Bifiler's pendulum to determine acceleration due to gravity.

3. Tortional pendulum to determine rigidity of modulus of a given metal wire.

4. Moment of Inertia of a disc by annular ring method.

5. Poisson's ratio of rubber tube.

6. Surface Tension of any liquid by drop method.

7. Thermal conductivity of any insulator by Lee's method..

8. Viscosity of water by Poiseullie's modified method.

9. Viscosity any liquid by Stoke's method.

10. Frequency of AC mains by Sonometer using magnetic and nonmagnetic wire

## Group II – Electricity, electronics, and optics

1. Use of Spectrometer to determine Angle of prism.

2. Use of Spectrometer to determine Dispersive Power of Prism.

3. Diffraction grating to determine its grating element and wavelength of sodium source.

4. LASER (to determine its wavelength by using diffraction grating).

5. Newton's ring ( to determine Wavelength and Radius of curvature of Plano-convex lens).

6. Photo cell (verification of inverse square law $I \propto 1/d^2$).

7. Bridge rectifier with $\pi$ filter - (Voltage regulation percentage $\beta$ and Ripple factor $\gamma$)

8. Transistor Characteristics in CE mode (Output impedance $Z_{out}$ and amplification factor $\beta$)

9. Zener diode as a voltage regulator.

10. Temperature coefficient of resistance of a Copper wire.

**NB:**

Any 8 experiments from each group are required to certify the Journal. 05 Marks for certified journal. Marks of Journal should not be given to the student if He/She fails to produce the certified journal at the time of examination. Student may allow appearing for practical examination only after the submission of permission letter from his/her Principal.

**Reference Books**: -   1) Advanced Practical physics –Nelkon
2) Practical physics - Rajopadhye and Purohit

# Solapur University, Solapur

**Nature of Question paper for Credit-Grading Semester pattern**

**(With effect from June 2014)**

**Time: - 3.00 hrs.**                                  **Total Marks-70**

## SECTION - I

**Q. No.1) Multiple choice questions**                                **(05)**

1) -------------------------------------------
     a)……………          b)……………          c)……………          d)……………
2) …….do……
3) …….do……
4) …….do……
5) …….do……

**Q.No.2) Answer any five of the following**                          **(10)**

i)                        ii)                      iii)
iv)                     v)                      vi)
 vii)

**Q.No.3A Answer any Two of the following**                         **(10)**

i)                        ii)                      iii)

**Q.No.3B Answer any one of the following**                        **(10)**

i)                        ii)

## SECTION - II
## (Same as above)

*N.B: -*
     **1. At least one numerical based sub-question must be asked in questiona number 1.**
     **2. One mathematical example of 2 marks must be asked in questions number 2.**
     **3. One mathematical example of 5 marks must be asked in questions number 3A.**
     **5. Example of 3 marks related with the asked derivation may be added in questions 3B.**
     **5. Equal Weightage (at least 10 marks) should be given to each topic.**
     **6. Separate answer sheets should be used to solve the both sections of the paper.**
     **7. Use of Log-table and scientific calculators is allowed to in University examination.**

# SOLAPUR UNIVERSITY, SOLAPUR
## New Semester Pattern
## Credit Based Grade System Syllabus
## B.Sc. Part I Physics (w. e. f. June 2014)

**N. B.:-**
**i)** There will be single theory paper of 70 marks for each semester (Section I and Section II of 35 Marks each) Annual practical of 70 marks at the end of second semester.
The total marks for physics subject will be 300 (70 % University Assessment & 30 % College Assessment). There will 5 Credits for theory and 4 Credits for Practical.
**ii)** There shall be 2.5 periods per section i.e. 5 periods per week for theory and 4 periods per week for each practical batch of 20 students.
**iii)** The duration of theory examination paper will be 3 hours each and that for practical will be 2 sessions of 3 hours each.
**iv)** 30 % internal College Assessment and 70 % University Assessment for both T & P.
**v)** University will conduct practical examination of 70 marks at the end of semester II.
   Every student will have to perform two experiments (one from each Group).
**vi)** All Colleges will conduct the internal assessment of theory (30 Mark) in both semesters and Practical (30 Mark) at the end of second semester by their convenience and only marks will be sent to the University before the start of University examinations.

## *Semester-I*

## *Physics Paper – I (Mechanics, Properties of Matter and Optics*

| | |
|---|---|
| Section: - I Mechanics and properties of matter | 50 Marks |
| Section: - II Optics and Laser | 50 Marks |

## *Semester-II*

## *Physics Paper – II (Heat, Thermodynamics, Electricity, Magnetism and Basic Electronics)*

| | |
|---|---|
| Section: - I Heat and Thermodynamics | 50 Marks |
| Section: - II Electricity, Magnetism and Basic Electronics | 50 Marks |
| Practical at the end of Second Semester | 100 Marks |

# Physics Paper I

## Section I - Mechanics and Properties of Matter.

### Topic 1 – Moment of Inertia                                         06

Review of M.I., Moment of Inertia of 1) Circular disc 2) Rectangular lamina 3) Spherical Shell 4) Fly wheel.

### Topic 2 – Pendulums                                                 10

Introduction, Theory of compound Pendulum, Bar Pendulum, Kater's Pendulum, Bassel's Theory, Bifilar pendulum (parallel suspensions of equal lengths), Torsional Pendulum.

### Topic 3 – Elasticity                                                07

Introduction, Equivalence of shear strain to compression and extension strains, Relation between elastic constants, Poisson's ratio of rubber tube (Theory and experimental method)

### Topic 4 – Surface Tension                                           08

Review of S.T., relation between excess pressure and surface tension, excess pressure inside a liquid drop and soap bubble, Jaeger's method to determine Surface Tension, Factors affecting Surface Tension, Applications of Surface Tension.

### Topic 5 – Viscosity and Fluid dynamics                              08

Introduction, Newton's law of viscosity, streamline and turbulent flow, Critical velocity and Reynolds number, Equation of continuity, Energy possessed by liquid,  Poiseuille's equation, Bernoulli's theorem and its applications to 1) Venturimeter 2) Automiser. Factors Affecting on viscosity.

**Reference books:-** 1) Properties of matter - D.S. Mathur.

2) A Text book of properties of matter - N.S. Khare and S. Kumar.
3) Physics Volume I – David & Robert Resnick.
4) University Physics-Mechanics of a particle -  Anvar Kamal.

# Physics Paper I

## Section – II (Optics and Laser)

### Topic 1 – Geometrical Optics and aberrations                 10

Introduction, Fermat's principle, Deduction of laws of reflection and refraction by Fermat's principle, Chromatic and Spherical aberration, methods to minimize Chromatic and Spherical aberrations.

### Topic 2 – Optical Instruments                 08

Introduction, Types of eye-pieces, Gauss eye piece, Ramsden's eye-piece, Huygen's eye-piece, Construction, working and Application of Spectrometer and Optical bench.

### Topic 3 – Interference                 08

Introduction, Interference in parallel faced thin film (Reflected light only), wedge shaped film, Newton's rings and its applications.

### Topic 4 – Diffraction                 08

Introduction, Types of diffraction, Plane diffraction grating and its elementary theory, its application to determine wavelength, Comparison between prism and grating spectra

### Topic 5 – Laser                 08

Introduction, Spontaneous and Stimulated emission and absorption, Einstein's Coefficients, Population inversion, Optical Pumping, Cavity resonator, He-Ne and Ruby Laser, Properties and application.

**Reference books: 1.**  Ray Optics by R K Verma.

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3.  Optics( second edition ) – Ajay Ghatak

4.  Concept of Physics – H C Verma

5.  Laser and Optics – B. B. Loud

6.  Optics by Mathur

# Physics Paper II

## Section - I (Heat and Thermodynamics)

### Topic 1 –Transport Phenomenon                                    08

Introduction, mean free path, Claussius expression for mean free path ( Collision cross section), Transport Phenomenon, Coefficient of Viscosity, Thermal Conductivity and its dependence on temperature and pressure

### Topic 2   - Liquefaction of Gases                                  08

Liquefaction of gases by J-T effect, Linde's air liqefier; cooling by adiabatic demagnetization and expression for fall in temperature, experimental setup for adiabatic demagnetisation of paramagnetic substances, properties of liquid helium

### Topic 3 – Thermodynamics                                          10

Laws of thermodynamics, Reversible and Irreversible processes, Isothermal and adiabatic process, Adiabatic relations, work done during isothermal and adiabatic processes, Entropy change in reversible and irreversible processes

### Topic 4 – Heat engines                                            08

Introduction, Carnot's heat engine and its efficiency; Heat engine, Otto cycle and its efficiency, Diesel cycle and its efficiency, comparison between Otto and diesel engine.

### Topic 5 –Refrigerator                                             08

General principle, Refrigeration Cycle, coefficient of performance of refrigerator, Vapor compression Refrigerator, Air conditioning (principle and applications)

### Reference books:-

1) Treatise on heat – Saha & Shrivastav
2) Kinetic theory of gases – V.N. Kelkar
3) Heat and Thermodynamics – Brijlal & Subrahmanyam

# Physics Paper II

## Section - II (Electricity, Magnetism and Basic Electronics)

**Topic 1 – Varying Current:**      **08**

Introduction, Growth and decay of current in L-R circuit, Charging and discharging of capacitor through resistor and inductor separately. Time constant of LR and CR circuit

**Topic 2 – A.C. Circuits:**      **08**

Complex number, J-Operator and its applications to AC circuits, Reactance, Susceptance, Impedance, Admittance and power factor, L-C-R circuit, series and parallel resonance circuits, sharpness of resonance and quality factor, AC bridge(Owen's bridge).

**Topic 3 – Magnetostatics and Ballistic Galvanometer:**      **08**

Introduction, Biot-Savart's law and its application to determine magnetic induction at a point on the axis of current carrying coil of single turn and Solenoid.

Ballistic Galvanometer: Construction, theory, working Principle and its constants.

**Topic 4 – Electronic circuit components and Devices:**      **09**

Classification of electronic circuit components: Passive and active circuit component (Resistor, Capacitor, Inductor, Transformer, Switches, Relays, Diodes, Transistor, FET, SCR, UJT and IC with their symbol and specification).

Bridge rectifier with Pie-Filter., Clippers., Clampers, Zener diode and its application as a voltage regulator.

**Topic 5 – Bi-junction transistor:**      **09**

Construction and working of transistor, input-output and transfer characteristics of CE & CB mode, Relation between $\alpha$ and $\beta$. Transistor as amplifier (CE mode)

**Reference books:-** 1) Principles of electronics –V.K. Mehta 2) Electronics principles - Malvino

3) Basic electronics & linear circuits- Bhargav, Kulshrstha &Gupta
4) Electricity and Magnetism – Khare & Shrivastav
5) Foundations of electromagnetic theory- Reitz & Milford
6) Electronic devices & circuits-Allen Mottershed

# Practical (4 Credits) – 100 Marks (30 % internal + 70 % University)

## Group I – General Physics, Heat

1. Bar pendulum to determine acceleration due to gravity.

2. Bifiler's pendulum to determine acceleration due to gravity.

3. Tortional pendulum to determine rigidity of modulus of a given metal wire.

4. Moment of Inertia of a disc by annular ring method.

5. Poisson's ratio of rubber tube.

6. Surface Tension of any liquid by drop method.

7. Thermal conductivity of any insulator by Lee's method..

8. Viscosity of water by Poiseullie's modified method.

9. Viscosity any liquid by Stoke's method.

10. Frequency of AC mains by Sonometer using magnetic and nonmagnetic wire

## Group II – Electricity, electronics, and optics

1. Use of Spectrometer to determine Angle of prism.

2. Use of Spectrometer to determine Dispersive Power of Prism.

3. Diffraction grating to determine its grating element and wavelength of sodium source.

4. LASER (to determine its wavelength by using diffraction grating).

5. Newton's ring ( to determine Wavelength and Radius of curvature of Plano-convex lens).

6. Photo cell (verification of inverse square law I $\propto$ 1/d$^2$).

7. Bridge rectifier with $\pi$ filter - (Voltage regulation percentage $\beta$ and Ripple factor $\gamma$)

8. Transistor Characteristics in CE mode (Output impedance $Z_{out}$ and amplification factor $\beta$)

9. Zener diode as a voltage regulator.

10. Temperature coefficient of resistance of a Copper wire.

**NB:**

Any 8 experiments from each group are required to certify the Journal. 05 Marks for certified journal. Marks of Journal should not be given to the student if He/She fails to produce the certified journal at the time of examination. Student may allow appearing for practical examination only after the submission of permission letter from his/her Principal.

**Reference Books**: -    1) Advanced Practical physics –Nelkon
                        2) Practical physics - Rajopadhye and Purohit

# Solapur University, Solapur

**Nature of Question paper for Credit-Grading Semester pattern**

**(With effect from June 2014)**

**Time: - 3.00 hrs.**                                                        **Total Marks-70**

## SECTION - I

**Q. No.1) Multiple choice questions**                                            **(05)**

1) ------------------------------------------
    a)……………         b)……………         c)……………         d)……………
2) …….do……
3) …….do……
4) …….do……
5) …….do……

**Q.No.2) Answer any five of the following**                                       **(10)**

i)                          ii)                          iii)
iv)                         v)                           vi)
 **vii)**
**Q.No.3A Answer any Two of the following**                                        **(10)**

i)                          ii)                          iii)

**Q.No.3B Answer any one of the following**                                        **(10)**

i)                          ii)

## SECTION - II
## (Same as above)

*N.B: -*
    **1. At least one numerical based sub-question must be asked in questiona number 1.**
    **2. One mathematical example of 2 marks must be asked in questions number 2.**
    **3. One mathematical example of 5 marks must be asked in questions number 3A.**
    **5. Example of 3 marks related with the asked derivation may be added in questions 3B.**
    **5. Equal Weightage (at least 10 marks) should be given to each topic.**
    **6. Separate answer sheets should be used to solve the both sections of the paper.**
    **7. Use of Log-table and scientific calculators is allowed to in University examination.**