

# Solapur University, Solapur



## Faculty of Science

### B.Sc.-I-BOTANY

#### (Sem-I&II)

### Faculty of Science

### CHOICE BASED CREDIT SYSTEM (CBCS)

(W.e.f. June, 2016)

- **Title of the Course:** B. Sc.- I
- **Subject :** Botany
- **Choice based credit system :**

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)**

$$(G_1 \times C_1) + (G_2 \times C_2) + \dots$$

$$SGPA = \frac{\dots}{\dots}$$

$$\Sigma C_i$$

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

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

$$(G_1 \times C_1) + (G_2 \times C_2) + \dots$$

$$CGPA = \frac{\dots}{\dots}$$

$$\Sigma C_i$$

$\Sigma C_i$  - 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:  $C_i$ : Credits allocated for the  $i$ th course

$G_i$ : Grade point scored in  $i$ th 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

Class	Sem	Subject	No. of Papers/ practicals	Hrs/Week			Paper Mark s	U A	C A	Credits	Total
				L	T	P					
B.Sc. I	I	English	English paper I (communication skill)	4	-	-	100	70	30	4	
		Botany	Paper I( <b>Microbiology and Phycology</b> )	2. 5	-	-	100	70	30	2.5	
			Paper II( <b>Biomolecules and Cell Biology</b> )	2. 5			100	70	30	2.5	
Gran d Total				09			300			09	09cre dits

**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 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.

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

Class	Sem	Subject	No. of Papers/ practicals	Hrs/Week			Paper Mark s	Practical		U A	C A	Credits	
				L	T	P		Marks	U A				C A
B.Sc. I	II	English	English paper II (Communication skill)	4	-	-	100	70	30			4	
		Botany	Paper III(Mycology and Phytopathology)	2. 5	- -	- -	100	70	30		70	30	2.5
			Paper IV(Archegoniate (Bryophytes, Pteridophytes ,Gymnosperms))	2. 5			100	70	30		70	30	2.5
Total				14			300					09	
		Practical II		-	-	4		70	30	100			4
Total				14		4	300			200			09
Grand Total										300			13
B.Sc.	Part I									300			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.

# Solapur University, Solapur

Faculty of Science  
Choice Based Credit System (CBCS)  
(w.e.f.2016-17)  
Structure for B. Sc-I

Subject/ Core Course	Name and Type of the Paper		No. of papers/ Practical	Hrs/week			Total Marks Per Paper	UA	CA	Credits
	Type	Name		L	T	P				
<b>Class :→</b>	<b>B.Sc.- I Semester - I</b>									
	<b>Ability Enhanceme nt Course(AE CC)</b>	English Paper I (communication skill)		4			100	70	30	4
	<b>Core</b>	Botany	Paper I	2.5	--	--	100	70	30	2.5
		Botany	Paper II	2.5	--	--	100	70	30	2.5
	<b>Core</b>	Subject 2	Paper I	2.5	--	--	100	70	30	2.5
			Paper II	2.5	--	--	100	70	30	2.5
	<b>Core</b>	Subject 3	Paper I	2.5	--	--	100	70	30	2.5
			Paper II	2.5	--	--	100	70	30	2.5
	<b>Core</b>	Subject 4	Paper I	2.5	--	--	100	70	30	2.5
			Paper II	2.5	--	--	100	70	30	2.5
<b>Total</b>				<b>24</b>	--	--	<b>900</b>	<b>630</b>	<b>270</b>	<b>24</b>
<b>Class :→</b>	<b>B.Sc.- I Semester - II</b>									
	<b>Ability Enhanceme nt Course(AE CC)</b>	English Paper I (communication skill)		4			100	70	30	4
	<b>Core</b>	Botany	Paper III	2.5	--	--	100	70	30	2.5
		Botany	Paper IV	2.5	--	--	100	70	30	2.5
	<b>Core</b>	Subject 2	Paper III	2.5	--	--	100	70	30	2.5
			Paper IV	2.5	--	--	100	70	30	2.5
	<b>Core</b>	Subject 3	Paper III	2.5	--	--	100	70	30	2.5
			Paper IV	2.5	--	--	100	70	30	2.5
	<b>Core</b>	Subject 4	Paper III	2.5	--	--	100	70	30	2.5
			Paper IV	2.5	--	--	100	70	30	2.5
<b>Total (Theory)</b>				<b>24</b>	--	--	<b>900</b>	<b>630</b>	<b>270</b>	<b>24</b>
	<b>Core</b>	Botany	Practical I	--	--	4	100	70	30	4
	<b>Core</b>	Subject 2	Practical I	--	--	4	100	70	30	4
	<b>Core</b>	Subject 3	Practical I	--	--	4	100	70	30	4
	<b>Core</b>	Subject 4	Practical I	--	--	4	100	70	30	4
<b>Total (Pract.)</b>						<b>16</b>	<b>400</b>	<b>280</b>	<b>120</b>	<b>16</b>
<b>Grand Total</b>				<b>24</b>		<b>16</b>	<b>1300</b>	<b>910</b>	<b>390</b>	<b>40</b>

## 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 two theory paper of 100 marks for each. There shall be four optional science subjects and English paper-I compulsory for every student. Similarly, in semester –II there will be two theory paper of 100 marks for each. There shall be four optional science subjects and English paper-II shall be 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, practicals etc. 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 (140 Marks): No. of Theory papers (2): Paper – I UA 70 marks, Paper – II UA 70 marks.

Internal Continuous Assessment (30 Marks):

Scheme of Marking: 15 Marks: Internal Test

15 Marks: Home assignment/Tutorials/Seminars/ Group discussion/ Viva/Field visit/Industry visit.

#### **Semester - II:**

##### **Theory:**

University Examination (140 Marks): No. of Theory papers (2): Paper – III UA 70 marks, Paper – IV UA 70 marks.

Scheme of Marking: 15 Marks: Internal Test

15 Marks: Home assignment/Tutorials/ Seminars/ Group discussion/ Viva/ Field visit/Industry visit.

##### **Practical**

University Examination (70 Marks): No of Practicals: 1

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 practicals together 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 Choice Based Credit System (CBCS)**  
**B. Sc-I**  
**• Faculty of Science •**  
**(w.e.f. June 2016)**

**Time: - 2 ½ hrs.**

**Total Marks- 70**

**Q1. Multiple choice questions.**

**(1x14) = 14**

**Q2. Answer any seven of the followings.**

**(7x2) = 14**

i)

ii)

iii)

iv)

v)

vi)

vii)

viii)

ix)

**Q3: A) Attempt any two of the followings.**

**(2x5) = 10**

i)

ii)

iii)

**B)**

**=04**

**Q4: Attempt any two of the followings.**

**(2x7) = 14**

i)

ii)

iii)

**Q5: Answer any two of the followings.**

**(2x7) = 14**

i)

ii)

iii)



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

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

<b>Paper I-Microbiology and Phycology</b> <b>Paper II-Biomolecules and Cell biology</b> 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:**

<b>Paper III – Mycology and Phytopathology</b> <b>Paper – IV - Archegoniate</b> 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

<b>Practicals- Based on Paper No. I to IV.</b> 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) CBCS System**

**(With effect from June 2016)**

**Semester – I**

**Paper – I : Microbiology and Phycology**

**45 Lectures**

**Microbiology**

**Unit-1 – Introduction of microbiology (2 lectures)**

**Unit-2 – Viruses:- (5 lectures)**

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

**Unit-3 – Bacteria:- (5 lectures)**

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

**Unit-4 – Mycoplasma (5 lectures)**

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

**Phycology**

**Unit-5 Algae (8 lectures)**

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

5.2 Range of thallus organization

5.4 Methods of reproduction

**Unit-6– Cyanophyta (5 lectures)**

6.1 General Characters

6.2 Study of *Nostoc* – Occurrence, Classification, thallus structure and reproduction

**Unit-7– Chlorophyta (5 lectures)**

7.1 General Characters

7.2 Study of *Spirogyra* - Occurrence, Classification, thallus structure and reproduction

**Unit-8– Phaeophyta (5 lectures)**

8.1 General Characters

8.2 Study of *Sargassum* - Occurrence, Classification, thallus structure and reproduction (excluding development)

**Unit 9: Applied Phycology** (5 lectures)

9.1 Role of algae in the environment, agriculture, biotechnology and industry.

**References Book**

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Prescott, L.M., Harley J.P., Klein D. A. (2005). Microbiology, McGraw Hill, India. 6th edition.
3. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
4. Sahoo, D. (2000). Farming the ocean: seaweeds cultivation and utilization. Aravali International, New Delhi.
5. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition.
6. Pelczar, M.J. (2001) Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.

**Paper – II**

**Biomolecules and Cell Biology**

**45 Lectures**

**Unit 1: Biomolecules** (10 lectures)

- 1.1 Types and significance of chemical bonds; Structure and properties of water; pH and buffers.
- 1.2 **Carbohydrates:** Definition, General, Physical and chemical properties of monosaccharides (glucose), Oligosaccharides (sucrose) and polysaccharides (starch).
- 1.3 **Nucleic acids:** Definition, Structure of - RNA; DNA.

**Unit-2 Enzymes.** (06)

- 2.1 Definition and physicochemical structure of enzymes.
- 2.2 Properties of enzymes, Coenzymes, Co-factors and Isoenzymes.
- 3.3 Mechanism of enzyme action-Lock and key hypothesis.

**Unit-3.The cell** (04)

- 3.1 Definition and Ultra Structure of Prokaryotic and Eukaryotic cell.

**Unit 4 Cell wall** (07)

- 4.1) Origin and Ultra structure of cell wall.
- 4.2) Chemical composition and functions of cell wall.

**Unit 5- Cell membrane** (9)

- 5.1 Ultra structure of cell membrane
- 5.2 Model of cell membrane (Singer – Nicholson’s Fluid – Mosaic Model).
- 5.3 Chemical composition of cell membrane.

**Unit 7.Microbodies** (6)

- 7.1 Study of Microbodies with respect to Occurrence, Structure and functions of:-
- 7.2 Peroxisomes
- 7.3 Glyoxysomes

**Unit 8. Cell division** (03)

8.1 **Mitosis** – Definition, Various stages of mitosis and significance.

**References Book**

1. Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning
2. Campbell, PN and Smith AD (2011) Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone
3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman
4. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company
5. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
6. Karp, G. (2010). Cell Biology, John Wiley & Sons, U.S.A. 6th edition.
7. Hardin, J., Becker, G., Skliensmith, L.J. (2012). Becker's World of the Cell, Pearson Education Inc. U.S.A. 8th edition.
8. Cooper, G.M. and Hausman, R.E. 2009 The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
9. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco

**Semester – II**

**Paper – III:**

**Mycology and Phytopathology**

**45 Lectures**

**Unit-1–Introduction to true fungi (7 lectures)**

- 1.1 Definition, General characteristics; Thallus organization; Cellwall composition; Nutrition; classification of fungi up to class (as per Ainsworth).

**Unit 2: Zygomycotina (5 lectures)**

- 2.1 General characteristics; Occurrence; Thallus organisation; Life cycle with reference to *Mucor*.

**Unit 3: Ascomycotina (05 lectures)**

- 3.1 General characteristics, Occurrence; classification life cycle of *Saccharomyces (Yeast)*.

**Unit 4: Oomycetes (05 lectures)**

- 4.1 General characteristic; Occurrence; Classification and Life cycle of *Albugo*.

**Unit 5: Symbiotic associations (5 lectures)**

- 5.1 **Lichens-** General Characters, types (Crustose, Fruticose and foliose), morphology, anatomy and economic importance.
- 5.2 **Mycorrhiza:** Ectomycorrhiza, Endomycorrhiza and their significance.

**Unit 6: Applied Mycology (06 Lectures)**

- 6.1 Role of fungi in biotechnology,
- 6.2 Agriculture (Biofertilizers);
- 6.3 Biological control ( Mycoherbicides, Mycoinsecticides).

**Unit 7: Phytopathology** (12 lectures)

- 7.1 Terms and concepts
- 7.2 Classification of plant diseases based on symptoms.
- 7.3 Study of plants diseases with respect to symptoms causal organisms and control measures.
  - a. Phytoplasma – Little leaf of Brinjal
  - b. Viral disease –Yellow vein Mosaic of bhendi,
  - c. Bacterial disease – Citrus canker,
  - d. Fungal disease – Grain smut of Jowar.,

**References Book**

- 1. Agrios, G.N. 1997 Plant Pathology, 4th edition, Academic Press, U.K.
- 2. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley & Sons (Asia) Singapore. 4th edition.
- 3. Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition.
- 4. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, Macmillan Publishers India Ltd.
- 5. Sharma, P.D. (2011). Plant Pathology, Rastogi Publication, Meerut, India.

**Paper – IV:**

**Archegoniate (Bryophytes, Pteridophytes ,Gymnosperms) 45 Lectures**

**Unit 1: Introduction** (2 lectures)

- 1.1 Unifying characters of archegoniates and Alternation of generations.

**Unit 2: Bryophytes** (14 lectures)

- 2.1 General characteristics; Classification(As per G.M.Smith );
- 2.2. Study of Riccia with respect to occurrence, classification, thallus structure and reproduction ( without developmental stages)
- 2.3. Economic importance

**Unit 3: Pteridophytes** (14 lectures)

- 3.1 General characteristics and classification, up to class (as per smith).
- 3.2 Study of morphology *Selaginella* with respect to occurrence, classification morphology of sporophyte, anatomy (stem) and reproduction (without developmental stages)
- 3.3 Economic importance

**Unit 4: Gymnosperms** (14 lectures)

- 4.1 General characteristics and classification (Sporne),
- 4.2 Study of morphology *Cycas* with respect to occurrence, classification morphology, corollloid roots, anatomy (leaf) and reproduction - structure of male and megasporophyll (without developmental stages)
- 4.3 Economic importance.

**References Book**

- 1. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. Delhi, India.
- 2. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers,

New Delhi, India.

3. Parihar, N.S. (1991). An introduction to Embryophyta: Vol. I. Bryophyta. Central Book Depot.

Allahabad.

4. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.

5. Vander-Poorteri 2009 Introduction to Bryophytes. COP.

**List of Practical (based on paper no I to IV):**

1. Study of dissecting and compound microscope
2. Electron micrographs/Models of viruses – T-Phage and TMV (Photographs/models)
3. Gram staining (demonstration)
4. Types of Bacteria to be observed from temporary/permanent slides/photographs.
5. Study of vegetative and reproductive structures of *Nostoc*
6. Study of vegetative and reproductive structures of *Spirogyra*
7. Study of vegetative and reproductive structures of *Sargassum*
8. Qualitative tests for carbohydrates, reducing sugars and starch (with the help of charts)
9. Study of plant cell structure with the help of epidermal peel mount of Onion/ *Rhoeo*.
10. Study of enzyme activities of Catalase
11. Study of enzyme activities of Dehydrogenase
12. Study different stages of mitosis
13. To study the permeability of plasma membrane.
14. Study of *Mucor*:
15. Study of *Albugo*.
16. Study of *Yeast*:
17. Study of *Lichens*.
18. Study of Plant diseases as per theory
19. Study of Plant diseases as per theory
20. Study of *Riccia* –
21. Study of *Selaginella* - Morphology of sporophyte, anatomy (stem).
22. Study of *Selaginella* – reproduction - structure of strobilus.
23. Study of *Cycas* - Morphology of sporophyte, corolloid root, anatomy (leaf)
24. Study of *Cycas* - reproduction - structure of male cone and megasporophyll.
25. Excursion report and submissions.

**SOLAPUR UNIVERSITY, SOLAPUR.**  
**B.Sc. Part-I: Practical Examination in Botany.**  
**March/April 2016.**

**Batch:**

**Centre:**

**Date:**

**Total -70 Marks.**

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- N. B.** 1. Draw neat and labeled diagrams wherever necessary.  
2. Do not write about points of theoretical information unless asked specifically.  
3. Perform the experiment as per instructions given by the examiners.
- Q-1 Identify and show the important structures observed by you in the given specimen A, B, C and D. leave you preparation for inspection (No Written) 20 marks
- Q. 2. To demonstrate the activities an enzyme catalase or dehydrogenase – E. 7 marks  
(No written answer)  
Or
- Q. 2 To study the permeability of cell membrane from the given sample – E. 7 marks
- Q. 3 Demonstrate the presence of carbohydrate by using any one biochemical test from the given sample 6 marks
- Q.4 Prepare the root tip squash and show the different stages of mitosis observed in the specimen – G 7 marks
- Q. 5 Identifications 10 marks  
H- Identify and comment upon the specimen  
I - Identify and describe the slide/ specimen  
J - Identify and describe the slide/ specimen  
K - Identify and comment upon the plant disease  
L - Identify and comment upon the plant disease
- Q. 6 a. Excurtion report 10 marks  
b. Journal 10 marks

**Distribution of marks:**

<b>S. N.</b>	<b>Name of the topics</b>	<b>Marks</b>
1	Algae	05
2	Fungi	05
3	Bryophytes/	05
4	Pteridophytes	05
5	Gymnosperms	6
6	Biomolecules/ Cell biology	20
7	Pathology	4
8	Tour Report	10
9	Journal	10