

Solapur University, Solapur



Faculty of Science

B.Sc.-III-BOTANY

Credit and Grading System (CGPA)

(w.e.f. June, 2016)

- **Title of the Course:** B. Sc.- III
- **Subject :** Botany
- **credit and grading 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.-III, there is one Principal compulsory subject with 8 paper carrying 100 marks each. There are there 3 contact hours per paper per week. Therefore total contact hours per week are 12.

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 Assessment)

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

$$SGPA = \frac{(G1 \times C1) + (G2 \times C2) + \dots}{\sum Ci}$$

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

2. Cumulative Grade Point Average (CGPA)

$$CGPA = \frac{(G1 \times C1) + (G2 \times C2) + \dots}{\sum Ci}$$

$\sum Ci$ - 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: 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

SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Science

Credit System Structure for B.Sc. III Semester V

Class	Sem	Subject	No. of Papers/ practicals	Hrs/Week			Paper Marks	UA	CA	Credits	Total
				L	T	P					
B.Sc.III	V	Botany	Paper IX	3	-	-	100	70	30	3	3
B.Sc.III	V	Botany	Paper X	3	-	-	100	70	30	3	3
B.Sc.III	V	Botany	Paper XI	3	-	-	100	70	30	3	3
B.Sc.III	V	Botany	Paper XII	3	-	-	100	70	30	3	3
Grand Total				12			400			12	12

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

Credit System Structure for B.Sc. III Semester VI

Class	Sem	Subject	No. of Papers/ practicals	Hrs/Week			Paper Marks			Practical		Credits	
				L	T	P		UA	CA	Marks	UA		CA
B.Sc. III	VI	Botany	Paper XIII	3	-	-	100	70	30		70	30	3
B.Sc. III	VI	Botany	Paper XIV	3	-	-	100	70	30		70	30	3
B.Sc. III	VI	Botany	Paper XV	3	-	-	100	70	30		70	30	3
B.Sc. III	VI	Botany	Paper XVI	3	-	-	100	70	30		70	30	3
Total				12			400						12
		Practical I		-	-	5	100	70	30	100	70	30	5
		Practical II		-	-	5	100	70	30	100	70	30	5
		Practical III		-	-	5	100	70	30	100	70	30	5
		Practical IV		-	-	5	100	70	30	100	70	30	5
Total						20	400			400			20
Grand Total										300			12
B.Sc. III										300			32

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-III shall consist of two semesters: Semester V and Semester VI. In semester –V, there will be four theory papers of 100 marks for each. Similarly, in semester –VI there will be four theory paper of 100 marks for each. 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 III Sem V& VI the internal assessment will be based on Unit tests, Home assignment, viva, practicals etc. as given below. Practical course examination of 400 marks shall be conducted at the end of second semester. Each 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 there will be two external examiners and 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 – V (Total Marks 400):

University Examination (280) No. of Theory papers (4):

Paper – IX, X, XI, XII	:	UA 70 marks (for each paper)
Internal Continuous Assessment (120)	:	CA 30 Marks (for each paper)
Scheme of Marking (for each paper) CA	:	15 Marks: Internal Test 15 Marks: Home assignment/Tutorials/Seminars/ Group discussion/ Viva/Field visit/Industry visit.

Semester – VI (Total Marks 400):

University Examination (280) No. of Theory papers (4):

Paper – XIII, XIV, XV, XVI	:	UA 70 marks (for each paper)
Internal Continuous Assessment	:	CA 30 Marks (for each paper)
Scheme of Marking (for each paper) CA	:	15 Marks: Internal Test 15 Marks: Home assignment/Tutorials/Seminars/ Group discussion/ Viva/Field visit/Industry visit.

Practicals (Total Marks 400):

University Examination (280 Marks)	:	No of Practical: I, II, III, IV (U. A. 70 marks for each practical)
Internal Continuous Assessment (120Marks)	:	CA 30 Marks (for each paper)
Scheme of Marking (for each paper) CA	:	20 Marks: Internal Test on any two practicals 10 Marks: Lab Journal/viva, attendance, attitude etc.(for each practical)

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.

Solapur University, Solapur
Nature of Question Paper for CGPA pattern
B. Sc. III
• 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)
- Q3. B)** (1X4) =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)

∴
∴

SOLAPUR UNIVERSITY, SOLAPUR.

Theory syllabus (Semester pattern)

In Botany at B.Sc. III

W.E.F. June 2016

The present syllabus is in continuation with the previous class B.Sc. Part II. This syllabus has been prepared as per UGC curriculum. There will be **four** theory papers for Semester **Vth** and **four** papers for semester **VIth** which will be covered by engaging three lectures per paper per week. Each theory paper will carry **70** Marks. So the total marks for theory will be **280**. There will be **four** practicals per week, each of five periods. At the end of the year (**Sem-VIth**), there will be a practical examination to be conducted on **four** consecutive days for not less than five hours per day. Each practical will be of 70 marks. So the total marks for practicals will be **280**.

SEMESTER V

Paper IX	: Biology of Cryptogams	45 Periods.
Paper X	: Gymnosperms and palaeobotany.	45 Periods.
Paper XI	: Genetics	45 Periods.
Paper XII	: Plant Biochemistry	45 Periods.

SEMESTER VI

Paper XIII	: Microbiology and Plant Pathology	45 Periods.
Paper XIV	: Systematics of Angiosperms	45 Periods.
Paper XV	: Microbial Genetics, Plant Breeding and Biostatistics	45 Periods.
Paper XVI	: Molecular Biology and Biotechnology	45 Periods.

SEMESTER:-V

PAPER: IX:-BIOLOGY OF CRYPTOGAMS (45 Periods)

Unit:- 1 Algae : (12)

- 1.1) Occurrence and Distribution of algae.
- 1.2) Thallus organization in algae.
- 1.3) Origin and evolution of sex in algae.
- 1.4) Types of life cycles in algae: - Haplontic, Diplontic, Haplodiplontic-Isomorphic and Heteromorphic, Haplobiontic- Triphasic, Diplobiontic.
- 1.5) Study of life cycles of:-*Chara and Ectocarpus* (Excluding the development of sex organs and sporophyte).

Unit: 2 Fungi: (12)

- 2.1) Reproduction in fungi.
- 2.2) Study of the following types with emphasis on classification, structure of mycelium, nutrition, reproduction and economic importance. a) *Uncinula* b) *Polyporus* (Excluding the developmental stages).
- 2.3) Mushroom cultivation (*Pleurotus*), Economic importance of mushroom.

Unit: 3 Bryophytes: (10)

- 3.1) Evolution of gametophyte and sporophyte.

- 3.2) Alternation of generation in Bryophytes.
- 3.3) Study of life cycle of *Marchantia* (excluding the developmental stages).

Unit: 4 Pteridophytes: (11)

- 4.1) General account of Pteridophytes with reference to:
 a) Structure of sporophyte. b) Structure of gametophytes.
 c) Alternation of generation in pteridophytes.
- 4.2) Study of life cycle of *Marsilea*. (excluding the development of gametophyte and sporophyte).

Reference Books:

- 1) An Introduction to Algae. S. Sundara Rajan, Anmol Publications Pvt .Ltd., New Delhi.110002.
- 2) A Text Book of Phycology, Pooja, Discovery Publishing House, Pvt. Ltd. New Delhi.110002
- 3) Algae-Botany for degree Students: B. R Vasishta, S. Chand and Co. Ltd. New Delhi.110055.
- 4) Fungi: Botany for degree Students, B. R Vasishta, S. Chand and Co. Ltd. New Delhi.110055.
- 5) The Fungi, B S Mehrotra, Oxford and IBH Publishing Co., New Delhi, 110055.
- 6) A Text Book of Mycology: S.R Mishra, .Discovery publishing House, Pvt. Ltd, New Delhi, 110002.
- 7) Introduction to Mycology. C J Alexopolous, C N Mims, Wiley Eastern Publ. Ltd Ansari Road Daryaganj.New Delhi.110002.
- 8) Morphology of plant and fungi (2nd Edition) Blod, I. C., Alexopoulos, G. J. and Delevoryas, T, 1980 Harper and Foul Co., New York.
- 9) An Introduction to fungi Dube, I.C. 1990. Vikas Publishing House Pvt. Ltd., Delhi.
- 10) An Introduction to field Mycology: EN. Swanton. Surbhi Publications ,Jaipur.102001.
- 11) The Fungi. P. D. Sharma, Rastogi Publications, Shivaji Road Meerut.250002.
- 12) Cryptogamic Botany Vol. I&II (2nd edition) Smith G.M. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
- 13) Beneficial fungi and their Utilization, M.C. Nair, S. Balkrishnan, Scientific publishers, Jodhapur,122001
- 14) A Text book of Bryophyte: R.M Johr, Snehlata, KavitaTyagi.Dominant Publishers and Distributors, New Delhi.110002.
- 15) An Introduction to, Bryophyta, (Embryophyta) N.S.Parihar., Vol-I, Central Book Depot. Alahabad.
- 16) Botany for Degree Student-Bryophyta, B.R Vasishta, S.Chand and Co.Ltd.New Delhi.110055.
- 17) Botany for Degree Student –Pteridophyta, B.R Vasishta, S.Chand and Co.Ltd.New Delhi.110055.
- 18) An Introduction to Pteridophytes. A Rashid-Vikas Publishing house, Pvt.Ltd.Gaziabad U.P.
- 19) Morphology of Pteridophyte, K.R Sporne., B I Publications ,New Delhi.110001
- 20) Vascular Cryptogams (Pteridophytes). P. C. Vasishta, S. Chand and Co. Ltd. New Delhi.110055.

PAPER: X: GYMNOSPERMS AND PALAEOBOTANY (45 Periods)

- Unit:1 Gymnosperms:** (17)
Study of *cycadales- Zamia* and *Gnetales- Gnetum* with reference to distribution, organography, anatomy and reproductive structure- Sporophytes and gametophytes, fertilization, seed structure and phylogeny.
- Unit: 2 Palaeobotany:** (5)
2.1 a: Geological time scale
b: Carbon dating
- Unit:3** a: Process of fossilization and their types (5)
b: Concept of form genera and nomenclature.
- Unit: 4 Study of following form genera with reference to:-** (9)
Systematic position, external morphology, anatomy and affinities of:
a: *Calamites*
b: *Cycadeoidea*
c: *Lyginopteris*
d: *Enigmocarpon*.
- Unit: 5** Applications of palaeobotany in oil and coal exploration (9)
a: Oil and coal as fossil fuels.
b: Role of microfossils in exploration.
c: Biotic origin of oil and coal.
d: Oil excavation.

Reference Books:

- 1) The Morphology of Gymnosperms. Sporne, K.R.1991 B. I. Publication Pvt., Bombay, Calcutta, Delhi.
- 2) Palaeobotany and the Evolution of Plants (2nd edition). Wilson, N.S. and Rothwell, G.W. Cambridge University Press U.K.
- 3) Morphology and Evolution of vascular plants Gifford, E.M. And poster, A.S. W.H. Freeman and Co., New York.
- 4) Morphology of Gymnosperms. J M Coulter and C J Chamberlain
- 5) Gymnosperm-Structure and Evolution. C J Chamberlain
- 6) Morphology of Gymnosperms. K K Sporne
- 7) An Introduction to Palaeobotany. C A Arnold
- 8) Studies in Palaeobotany. H N Andrews –
- 9) Essentials of Palaeobotany. A C Shukla, S P Mishra-
- 10) Morphology of Vascular plants. A J Eames

PAPER: XI: GENETICS. (45 Periods)

- Unit: 1 Multiple allelism** (7)
- 1.1) Introduction and definition.
 - 1.2) Eye colour in *Drosophila*.
 - 1.3) Blood groups in man.
 - 1.4) Self incompatibility in plants.
- Unit: 2 Sex Determination** (13)
- 2.1) Autosomes and sex chromosomes.
 - 2.2) Mechanism of sex determination.
 - 2.3) Sex chromosomes in *Drosophila*.
 - 2.4) Sex chromosomes in man.
 - 2.5) Balance concept of sex determination in *Drosophila*.—Bridge's Experiment.
 - 2.6) Sex linked inheritance in man:
 - a) Colour blindness
 - b) Haemophilia.
 - c) Holandric genes.
- Unit: 3 Quantitative inheritance** (8)
- 3.1) Polygene theory.
 - 3.2) Population genetics. Hardy –Weinberg's law.
- Unit: 4 Extra chromosomal inheritance** (9)
- 4.1) Mendelian versus extra chromosomal inheritance.
 - 4.2) Examples of maternal inheritance
 - a) Mitochondrial inheritance.
 - b) Plastid inheritance
- Unit: 5 Alteration in the genetic make-up and its significance** (8)
- 5.1) Introduction.
 - 5.2) Changes in chromosome number.

Reference Books:

- 1) Cytology and Genetics: Dnyansagar
- 2) Fundamentals of Cytology L W. Sharp
- 3) Principles of Gene Manipulation. Old R. W. and Primrose, S.B. Blackwell Scientific Publications. Oxford UK.
- 4) Plant Chromosomes. Laboratory Methods. Fuikui K and Nakayama S., CRC Press. Boca Raton, Florida.
- 5) Plant Chromosomes: Analysis Manipulation and Engineering. Hawood Sharma A K and Sharma A.1999: Academic Publishing Co. Ausrtalia.
- 6) Principles of Gene Manipulation. Old R. W. and Primrose, S. B.1989 Blackwell Scientific Publications. Oxford UK.
- 7) Genetics: M.L Shrivastav, Shri Publishers and Distributors,, Ansari Road New Delhi,110002.
- 8) Genetics, P.K Gupta, Rastogi Publications, Meerut, 250002
- 9) Genetics and Evolution, H.S Bhamrah, KavitaJuneja, Anmol Publications, Pvt.Ltd. New Delhi,110002
- 10) Study of Genetics and Evolution, R.H lock, Arihant Publisher, Jaipur.
- 11) Heredity and Genetics, H.V.Bhaskar, Campus Books International. New Delhi.110002.
- 12) Genetics: M.P.Arora and G.S Sandhu, Himalaya Publishing House, Nagpur, Bombay, Delhi.
- 13) An Introduction to Modern Genetics, C.H Waddington, Vandana Publications, New Delhi.
- 14) Genetics, A.M Winchester, Oxford and IBH Publishing Co.,New Delhi.110002.
- 15) Genetics and Developmental Biology,,M.SRanganathan and P Sharma,Wisdom Press ,New Delhi.

PAPER XII: PLANT BIOCHEMISTRY (45 Periods)

Unit 1 Carbohydrate Metabolism (14)

- 1.1 Introduction and broad classification.
- 1.2 **Monosaccharides:** Properties and Examples: Trioses, Tetroses, Pentoses and Hexoses.
- 1.3 **Oligosaccharides:** Properties and Examples: Sucrose, Maltose and Lactose.
- 1.4 **Polysaccharides**—Properties and Examples—Starch and Cellulose.
- 1.5 Isomers, enantiomers and epimers
- 1.6 Biosynthesis of sucrose and starch
- 1.7 Degradation of sucrose and starch.

Unit 2 Lipid Metabolism (14)

- 2.1 Introduction and classification
- 2.2 Saturated fatty acids—properties and examples—Stearic and palmitic acids.
- 2.3 Unsaturated fatty acids—Properties and Examples—Linoleic and linolenic acids.
- 2.4 General outline of fatty acid biosynthesis.
- 2.5 Beta oxidation of fatty acids.
- 2.6 Gluconeogenesis of fatty acids during germination.
- 2.7 Properties and significance of lipids.

Unit 3 Protein Metabolism (17)

- 3.1 Introduction.
- 3.2 General structure, properties and characteristics of essential amino acids.
- 3.3 Brief outline of biosynthesis of amino acids –Aspartate, Cysteine, Phenylalanine and proline.
- 3.4 Protein physico-chemical structure (-primary, secondary, tertiary and quaternary) and outline of classification.
- 3.5 Brief outline of protein biosynthesis in prokaryotes and eukaryotes.
- 3.6 Post translational modifications

Reference Books:

- 1) Plant Physiology by P.S. Gill. Publisher S. Chand and company Limited, Ram nagar New Delhi.110055.
- 2) Fundamentals of Plant Physiology. , J L Jain. .S Chand and Company Limited, Ram nagar New Delhi.110055.Plant Physiology V. Verma, EMKAY Publications. B-19, East Krishnanagar Delhi.110051.
- 3) Introductory Plant Physiology .G Ray Noggle&Frtiz.Prentice Hall of India.PvtLtd.New Delhi.110001.Plant Physiology. Salisbury and Ross, CBS Publishers and Distributors. Jain Bhavan Bholanathnagar, Shahadara-Delhi.110012.
- 4) Plant Physiology, V I Palladin, Arihant Publications, Jaipur. (INDIA)
- 5) Physiology of Transpiration in Plants by .SundaraRajan. Anmol Publications, Pvt.Ltd. New Delhi.110002.
- 6) Laboratory Plant Physiology, Bernard S Meyer, D B Underson, C A Swanson. East west Press Pvt.Ltd.New Delhi.
- 7) Physiology of Crop plants, F P Gardner B Pearce, R L Mitchell. Scientific Publishers Ratanada Road, P O Box 91, jodhpur.122001.
- 8) Plant Physiology , R C Grewal Campus Books International, Prahlad Street, Ansari Road, Daryaganj.New Delhi.110002
- 9) Plant Physiology , Robert M.devlin.East west-Press Pvt.Ltd.New Delhi.
- 10)Plant Physiology , Devlin and Witham-CBS Publishers and Distributors. Jain Bhavan Bholanathnagar, Shahadara-Delhi.110012.
- 11) A Text Book of Plant Physiology.C P Maik&A K Shrivastava, Kalyani Publishers, New Delhi.
- 12)Plant Growth and Development, Leopold, A C (1972) McGraw-Hill Book Company, Inc.NewYork.
- 13)Elements of Enzymology.A N Shukla, Discovery Publishing House, Ansari Road, Daryaganj, New Delhi.110002
- 14)Fundamental Laboratory Approaches for Biochemistry and Biotechnology. Ninfa, AJ. And Ballou D P.1998 Fitzgerald Science Press Inc.Maryland USA.
- 15)Techniques and Practices of Chromatography Scott, R P W.1995 .Marcel Dekker inc.New York.
- 16)Experimental Biochemistry. Dryer R L and Lata G F1989 Oxford University Press.New York.

Semester: VI
PAPER XIII: MICROBIOLOGY AND PLANT PATHOLOGY
(45 Periods)

MICROBIOLOGY

- Unit: 1** Methods in Microbiology:--Sterilization Methods, types of Culture Media, Pure culture methods. (8)
- Unit: 2** Introduction to microbiology, (8)
Classification and characteristics
Features of different groups of microbes.
- Unit: 3** Industrial applications of micro-organisms- Organic acids (Citric acid), Ethyl Alcohol, food processing, Milk products, Antibiotics and Biopesticides (8)

PLANT PATHOLOGY

- Unit:4** Classification of plant diseases based on pathogen,Crops, Symptoms and Transmissions of pathogens – seed born, soil born, air born. (7)
- Unit:5 Plant Diseases:**
- a) **Phytoplasma:** Grassy shoot disease of Sugarcane (7)
- b) **Viral disease:** Leaf curl of Chillies.
- c) **Bacterial disease:** Bangadi disease of Potato
- d) **Fungal diseases:** (7)
- i) Downy mildew of Bajara.
- ii) Tikka disease of Groundnut.
- iii) Grain Smut of Jowar.
- iv) Anthracnose of Bean.

Reference Books: Paper XIII

- 1) Plant pathology. P.D.Sharma.RastogiPublication.Shivaji Road Meerut.250002.
- 2) Fundamentals of Plant pathology.V.N.Pathak, N.M.Khatrri and M.Pathak Publ. Agro bios (India).Agro house Chopasani Road Jodhpur 122002.
- 3) Agricultural Microbiology.G.Rangaswamy and D.J.Bagyaraj Prentice Hall of India. Pvt. Ltd.New Delhi.110001 MycorrhizalSymbiosis.Harley, J.L. and smith S.E. (1981), Academic press London.
- 4) Experiments in Microbiology, Plant Pathology and Biotechnology. K R Aneja. New Age International (pvt.Ltd) Publishers.Ansari Road Daryaganj New Delhi 110002.

- 5) Mycorrhizal Symbiosis Harley J L and Smith S E (.1981) Academic Press London.
- 6) C J Alexopolous, C N Mims, Introduction to Mycology. Wiley Eastern Ltd Ansari Road Daryaganj.New Delhi.110002.
- 7) Josef Charles Walker Diseases of Vegetable crops.SrishtiDisrtibutors, JMD House, Ansari Road Daryaganj.New Delhi.110002.
- 8) G Ragaswamy and A Mahadevan.Diseases of crop plants in India. Prentice Hall of India Pvt Ltd.New Delhi, 110001
- 9) S.Nagarajan. Plant disease Epidemiology, Oxford and IBH Publ. Coy.Ltd.New Delhi. (1981):
- 10) S.A Tarr.Principles of Plant pathology. Mac Millan Publishers Ltd.London
- 11) V.N.Pathak: Laboratory Manual of Plant Pathology (2nd.Ed.) Oxford and IBH Publishers, New Delhi. (1982).
- 12) R.S. Singh, Introduction to Principles of Plant Pathology. Oxford and IBH Publishers, New Delhi (1982).
- 13) Text book of Plant Pathology. S.K.Singh and Seema, Shrivastava, Campus books International, Ansari Road New Dehli.
- 14) Plant pathology. G.K.Gupta, Discovery publishing house New Delhi.
- 15) Molecular Plant Pathology.laxman Desai, Paragon International publishers, Ansari Road New Dehli.
- 16) Plant Protection. K.M. Chandniwala, Anmolpubs.Pvt.ltd. New Delhi.
- 17) Emerging Trends in Mycology, Plant pathology and Microbial Biotechnology G.Bagyanarayana, Bhadraiah, I.K.Kunwar. B.S. Publication Sultan bazaar Hyderabad.
- 18) Mandahar, C.L. 1998 Introduction to plant Viruses Chand & Ltd., Delhi.
- 19) Clifton, A. 1958 Introduction to the Bacteria McGraw Hill Co., New York.
- 20) Mehrotra R S. Plant Pathology Tata McGraw-Hill Co. New Delhi.
- 21) D A Johnson- Plant Micro techniques.
- 22) Mahadevan and Sridhar R.1986; Methods in Physiological Plant Pathology.Sivakami Publication Madras.
- 23) S. Chad N W.1988: Plant Pathogenic Bacteria. Laboratory Guide for Identification of Plant Pathogenic Bacteria.Academic Press.
- 24) Cunasekaran, P.1995: Laboratory Manual in Microbiology. New Age International Pvt .Ltd.
- 25) Pawse P K.1972: Techniques with Bacteria-A Guide Book for Teachers. Hutchinson Educational.
- 26) Eklund C. and Lankiord, C W E.1967.Laboratory Manual for General Microbiolgy.Prentice Hall Inc.Engle-Wood cliffs N J.
- 27) Agrios G.N. 1997.Plant Pathology, Academic Press London.
- 28) Albajes, R., Gullino, M. L.VanLentern, J.C. and Elad, Y.2000.Integrated Pest and disease management in greenhouse crops, Kluwer Academic Publishers. Agricultural Microbiology.G.Rangaswamy and D.J.Bagyaraj Prentice Hall of India. Pvt. Ltd.New Delhi.110001
- 29) Experiments in Microbiology, Plant Pathology and Biotechnology. K R Aneja. New Age International (pvt. Ltd) Publishers. Ansari Road Daryaganj New Delhi 110002.

PAPER XIV: SYSTEMATICS OF ANGIOSPERMS (45 Periods)

- Unit: 1 Phylogeny of Angiosperms (4)**
- 1.1 A general account of the origin and evolution of Angiosperms (with special reference to Bennettitalean and Gnetalean theory).
- 1.2 Primitive and advanced features of flower.
- Unit: 2 Systems of Classification (4)**
- Engler and Prantl's system. Its Merits and demerits
- Unit: 3 Modern Taxonomy (4)**
- 3.1 Taxonomy in relation to anatomy, embryology, palynology, Cytology. (Cytotaxonomy).
- Unit:4 Flower (4)**
- 4.1 Concept of flower as a modified shoot.
- 4.2 Structure and development of anther, Microsporogenesis, Development of Male gametophyte. (4)
- 4.3 Structure of pistil -Structure of typical ovule, ovule types. Megasporogenesis, Female gametophyte (Embryo sac) Embryo sac types: Monosporic, Bisporic and Tetrasporic (5)
- Unit:5 Pollination and fertilization (5)**
- 5.1 Mechanism of pollination and agencies.
- 5.2 Pollen germination and pollen tube growth.
- 5.3 Fertilization.
- 5.4 Double fertilization.
- 5.5 Endosperm.
- Unit:6 Seed and Fruit (3)**
- 6.1 Development of embryo in Dicotyledons.
- 6.2 Seed and fruit dispersal
- Unit:7 Angiosperm families (12)**
- Study of the following angiosperm families with respect to systematic Position, morphological characters, distinguishing features and economic importance.
- | | | |
|------------------|-------------------|------------------|
| i) Ranunculaceae | ii) Capparidaceae | iii) Rutaceae |
| iv) Myrtaceae | v) Cucurbitaceae | vi) Rubiaceae |
| vii) Apocynaceae | viii) Lamiaceae | ix) Polygonaceae |
| x) Cannaceae | xi) Poaceae. | |

Reference Books: Paper XIV

- 1) Cronquist, A. 1968 The Evolution and Classification of flowering plants. Thomas Nelson (Printers) Ltd., London and Edinburgh.
- 2) Delevoryas, 1965 The Plant Diversifications. Modern Biology series. Half Rinehart and Wiston, New York.
- 3) Foster, A.S. and Gifford, A.E. M. Jr. 1967 Comparative Morphology of vascular plants Vakils Peffer and Simons Pvt. Ltd.
- 4) Sporne, K. R. 1977. The Morphology of Angiosperms B.I. Publication Bombay.
- 5) Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms 2nd revised and enlarged edition, Vikas Publishing House, Delhi.
- 6) Johri, B.M. 1982. Embryology of Angiosperms. Springer – Verlag Berlin.
- 7) Raghavan, V.1997. Molecular Embryology of Flowering plants. Cambridge University press, New York.
- 8) T C Cook:-The Angiosperm Floras. Vol - I, II & III.
- 9) A J Eames.-Taxonomy of Angiosperms.
- 10) R N Sutar- Text Book of Taxonomic Botany.
- 11) A.S Hitchcock-Methods of Descriptive Systematic Botany.
- 12) V N Naik –Taxonomy of Angiosperm.
- 13) H. Santapan-Flora of Khandala.
- 14) P Maheshwery-An Introduction to Embryology of Angiosperm
- 15) Davis P H.and Haywood, V H.1961 Principles of Angiosperm Taxonomy, Oliver and Royd.London.
- 16) Heywood, V H.and Moore D M.1982, Current concept in Plant Taxonomy, Academic Press, London.
- 17) Jones, S.B.and Luchsinger, A E.1986, Plant Systematics (2nd Edn.) TATA McGraw-Hill Co.NewYork.
- 18) Lawrance, G.H.M.1951.Taxonomy of vascular Plants .MacMillan, New York.
- 19) Naik, V.N.1982.Taxonomy of Angiosperm. TATA McGraw-Hill Co.NewYork.
- 20) Radford, A.E.1986.Fundamentals of Plant Systematics. Harper and Row, New York.
- 21) Singh G.1999.Plant Systematics: Theory and Practice. Oxford and IBH PvtLtd.New Delhi.
- 22) Jeffrey, C.1982.An Introduction to Plant Taxonomy. Cambridge University Press. Cambridge London.
- 23) Stace C.A.1989.Plant Taxonomy and Biosystematics.2nd.Edn.Edward Arnold. London.
- 24) Woodland D.E.1991.Contemporary plant Systematics.Prentice Hall, New Jarsay.
- 25) A J Eames and M C Danialls; An Introduction to Plant Anatomy
- 26) P K Nair Pollen Grains of Western Himalayan Plants.
- 27) G Erdtman.Pollen Morphology and Plant Taxonomy.
- 28) Raghavan V.1986. Embryogenesis in Angiosperm: Development and Experimental Studies Cambridge University Press New York, USA.
- 29) Nordenstam.B, El-Gazaly., G and Kassas, M.2000 Plant Systematics for 21st Century.Port Press Ltd.London.

PAPER: XV
MICROBIAL GENETICS, PLANT BREEDING AND BIOSTATISTICS
(45 Periods)

- Unit 1 Microbial Genetics** (11)
- 1.1 Introduction.
 - 1.2 Bacterial genome
 - 1.3 DNA Viruses
 - 1.4 RNA Viruses.
 - 1.5 Recombination in bacteria –Conjugation, Transformation and Transduction.
- Unit 2 Methods of Plant improvement** (13)
- 2.1 Introduction
 - 2.2 Aims and Objectives of plant breeding
 - 2.3 Scope of plant breeding
 - 2.4 **Methods of plant breeding**
 - I) Introduction and Acclimatization
 - II) Selection.-Mass selection, Pure line selection and Clonal selection.
 - III) Hybridization.
 - Breeding In self and cross pollinated crops.** (8)
 - 2.5) **Breeding in field crops.**
 - a) Breeding in Cotton.
 - b) Breeding in Sugarcane.
- Unit 3 Role of Mutation and Polyploidy in plant breeding** (2)
- Unit 4 Biostatistics** (8)
- 4.1 Collection and presentation of data.
 - 4.2 Measures of central tendency-Mean, Mode and Median
 - 4.3 Tests of significance (T- test), Chi- square (x²-test.)
- Unit 5 Applications of computer in Plant science** (3)

Reference Books:(Paper XV)

- 1) Atherly A G. Girton J R. and S. nustad D P.1991: Principles of Genetics.(8th Edn.)John Wiley and Sons, New York.
- 2) Gupta P K.Genetics.Rastogi Publications, Shivaji Road Meerut.
- 3) Hartal D L and Jones E W1998: Genetics: Principles and Analysis. (2nd Ed.) Jones and Barlett Publishers.Massachusetts., USA.
- 4) Russel, P J 1998: Genetics (5 thEdn.) The Benjamin/Cummings Publishing Co.Inc.USA.
- 5) Snustad.D P and Simmons M J.:2000 Principles of Genetics. (2 ndEdn) john Wiley and sons. Inc.USA.
- 6) Dnyansagar—Cytology and Genetics
- 7) Plant Breeding-Principles and Methods: B D Singh,Kalyani Publishers Ludhiana.
- 8) A Text Book of Biostatistics:-Vol-I and II.,A.KSharma,DiscoveryPublishigHouse,New Delhi,110002.
- 9) Understanding Biostatistics:- Sharad Shrivastav. Discovery Publishig House, New Delhi,110002.
- 10)Poehlmann, J M.and Sleeper d R.1995: Breeding Field Crops. Panima Publishing House. New Delhi.
- 11)Simmonds N W.1979: Principles of Crop Improvement Longman, London and New York.
- 12)Sharma J R 1992: Principles and Practice of Plant Breeding. Tata McGraw _Hill Publishin Co. Ltd. New Delhi.
- 13)A K Aiyer Field Crops of India.

PAPER: XVI: MOLECULAR BIOLOGY AND BIOTECHNOLOGY.
(45 Periods)

- Unit 1 DNA replication and recombination. (6)**
- 1.1 Structure and forms of DNA
 - 1.2 Replication of DNA.—Types and Mechanism
 - 1.3 Denaturation and renaturation of DNA.
 - 1.4 Recombination at molecular level.
- Unit 2 Gene structure, expression and regulation (9)**
- 2.1 Gene organization in prokaryotes and eukaryotes.
 - 2.2 Operon concept.-lac operon
 - 2.3 Gene regulation in prokaryotes and eukaryotes.
- Unit 3 Recombinant DNA Technology (13)**
- 3.1 Introduction and principles.
 - 3.2 Enzymes involved in recombinant DNA Technology
 - 3.3 Vectors.
 - 3.4 Southern and northern blotting technique.
 - 3.5 DNA finger printing.
 - 3.6 PCR
 - 3.7 DNA libraries
- Unit 4 Genetic Engineering (7)**
- 4.1) Marker and Reporter genes.
 - 4.2) Methods of gene delivery-Physical, Chemical and Biological. (*Agrobacterium* mediated gene transfer).
 - 4.3 Introduction to transgenic plants.
 - 4.4 Achievements in plant Biotechnology
- Unit 5 Plant Tissue culture (10)**
- 5.1 Introduction and terminology
 - 5.2 Micro propagation.
 - 5.3 Anther culture.
 - 5.4 Protoplast isolation and culture.
 - 5.5 Somatic Hybridization.

Reference Books: Paper XVI

- 1) Albert B, Bray D, Lewis J. Raff M. Roberts K. and Wastsons J D.1999 Molecular Biology of Cell. Garland Publishing Co. Inc. New York.
- 2) Bhojwani S S.1990: Plant Tissue Culture Applications and Limitations Elsevier Science Publishers. New York USA.
- 3) Devi P 2000: Principles and Methods of Plant Molecular Biology, Biochemistry and Genetics. Agrobios, Jodhpur, India.
- 4) Dixon R A 1987: Plant Cell Culture A Practical Approach, IRL Press, Oxford.
- 5) Buchanan, B.B.Grussem W and Jones R.L 2000 Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists Maryland USA.
- 6) Lea P J. and Leegood, R.C.1999 Plant Biochemistry and Molecular Biology. 2nd Edn. John Wiley and Sons. Chichester, England.
- 7) Lodish, H Berk, A .Zipersky, S. L. Matsudaira. P. Baltimored. And Darnel. J. 2000 Molecular Cell Biology.2nd Edn. W. H Freeman and Co. New York, USA.
- 8) Vasil L K.and Thorpe, T A.1992.Plant Cell and Tissue Culture. Cluwer Academic Publishers, Netherlands.
- 9) Hackett, P B.Fuchs, J A. and Messing J W.1998.An Introduction to Recombinant DNA Techniques: Basic Experiments in Gene Manipulation. Bengamin/Cummings Publishing Co. Inc. Menlo Park California.
- 10) Hall R D.1999.Plant Cell Culture. Protocols. Humana Press Inc.NewJarsey, USA.
- 11) Glick B R and Tompso, J E 1991: Methods in Plant Molecular Biology and Biotechnology. CRC Press Boca. Raton .Florida.
- 12) Dryer R L and Lata G F1989: Experimental Biochemistry. Oxford University Press.New York.
- 13) Persely, G J.1996.Biotechnology and Integrated Pest Management. CAB International UK.

SOLAPUR UNIVERSITY, SOLAPUR

PRACTICALS IN BOTANY at B. Sc.III

W.E.F. June 2016

Practical - I	:	(Based on Paper- IX and XIII)	=70 Marks
Practical- II	:	(Based on Paper X and XIV)	=70 Marks
Practical- III	:	(Based on Paper XI and XV)	=70 Marks
Practical- IV	:	(Based on Paper XII and XVI)	=70 Marks

Scheme of Marking for	:	20 Marks	Internal Test on any two practicals
Internal assessment	:	10 Marks	Lab Journal/viva, attendance,
(30 marks) for each			attitude etc. (for each practical)
practical			

PRACTICAL EXAMINATION B Sc. Part III (BOTANY)

Each candidate must produce a certificate from Head of the Department stating that He/She has completed the practical course in a satisfactory manner, on the lines laid down from time to time by the Academic Council on the recommendations of the Board of Studies and that the Laboratory Journal has been properly maintained. The candidate must have recorded his /her observations directly in his/her laboratory journal and written their report of each exercise performed. Every journal shall be checked and signed periodically by concerned teacher and certified by the head of the Botany Dept. at the end of academic year.

Candidate shall present the followings at the time of Examination.

- 1) Certified Laboratory Journal/s, with tour report and fieldwork report.
- 2) At least 10 herbarium specimens well mounted on sheets, 10 preserved specimens, 10 permanent slides (5 microtomy and 5 cytological). The candidates shall be orally examined (Viva-voce) for their submission. The student will not be allowed to appear for the practical examination unless he/she submits the Journal, submission report and Excursion report duly certified by Head of the Botany Dept.

Fieldwork and Tour report:

In addition to the number of practicals prescribed, the students are required to undertake field excursions to the places of botanical interests, Research centres / Industrial places under the guidance of teachers. There shall be frequent study tours in local areas. One of excursions shall be to an area having different botanical characters for not more than 12 days. There shall be one teacher in- charge for a batch of student up to 12 and one additional lady teacher is allowed whenever there are female candidates and T.A and D.A be paid to the teachers, peon and field collector as per University rules.

The record of fieldwork, visit report and report of the excursion have to be written in the journal or separately which will be duly signed by the teacher in-charge and certified by the Head of Botany Department. Collection of rare flowering and non flowering plants such as **Orchids, Ceropogia, Gnetum, Isoetes, Ophioglossum, Equisetum, Osmunda** etc. should be avoided during the excursion. Avoid massive collection of plants. Collection of common weed plants should be preferred. Certified journal and excursion report will be considered for assessment by the examiners. There are 70 marks for each practical. Distribution of marks for each practical is as follows.

Distribution of Marks for Practicals B. Sc. III –Botany (UA)

Based on Paper IX and XIII) Total Marks: 70

Cryptogams (Algae, Fungi, Bryophytes, Pteridophytes each for six marks.)	30 Marks
Plant pathology	6Marks
Culture technique	6Marks
Fermentation technique	8Marks
Micrometry	8Marks
Submission	6Marks
Journal	6Marks

Practical:-II (Based on Paper X and XIV) Total Marks: 70

Gymnosperms	15 Marks
Palaeobotany	6 Marks
Angiosperm Families	10 Marks
Genus and Species	6 Marks
Morphology.	3 Marks
Embryology	8 Marks
Microtomy slide submission	10 marks
Submission	6 Marks
Journal	6 Marks

Practical: - III (Based on Paper XI and XV) Total Marks: 70

Genetic Example	8 Marks
Karyotype/Abnormalities/Variations in chromosome number	16 Marks
Identification of mutants/pollination mechanism	8 Marks
Breeding Technique/Crop Varieties Identification	10 Marks
Male Sterility/self incompatibility/Meiosis technique	6 Marks
Biostatistics	10 Marks
Submission	6 Marks
Journal	6 Marks

Practical: - IV (Based on Paper XII and XVI) Total Marks: 70.

Biochemistry	20 marks
Molecular Biology	20 Marks
Biotechnology	14 Marks
Tour Report	10 Marks
Journal	6 Marks

B.Sc. Part- III
BOTANY PRACTICALS

Practical –I (Based on Paper IX and XIII)

- 1 & 2 Identification of following algae. (Any four.)
a) *Oscillatoria* b) *Volvox* c) *Pediaea* d) *Caulerpa*. e) Diatoms.
- 3 Life cycle of *Chara*
- 4 Life cycle of *Ectocarpus*
- 5 Identification of following fungi.(Any four)
a) *Phyllachora* b) *Alternaria* c) *Clavaria* d) *Melanospora*. e) *Rhizopus*.
- 6 Life cycle of *Uncinula*.
- 7 Life cycle of *Polyporus*.
- 8 Cultivation of Mushrooms. (Demo.)
- 9 & 10 Identification of following Bryophytes. (Any four)
a) *Plagiochasma*. b) *Anthoceros*. c) *Cyathodium*.
d) *Notothylas*. e) *Fossombronia*. f) *Asterella*.
- 11 & 12 Life cycle of *Marchantia*
- 13 & 14 Identification of following Pteridophytes. (Any four.)
a) *Isoetes* b) *Adiantum* c) *Lycopodium*. d) *Osmunda*.
e) *Asplenium*. f) *Azolla*. g) *Blechnum*. h) *Ophioglossum*
- 15 Life cycle of *Marsilea*
- 16 Preparation of PDA and Sterilization.
- 17 & 18 Isolation of soil fungi and Inoculation of agar slants
- 19 Micrometry
- 20,21 & 22 Plant Diseases as per theory
- 23 Study of Fermentation by yeast, by Kuhne's tube Method.
- 24 & 25 Microbial Staining. (Demo.)

Practical –II (Based on Paper X and XIV)

- 1:-Study of Anatomical structure in rachis of *Cycas* and *Zamia*. (by Section)
- 2:- Study of Anatomical structure in wood of *Pinus* (by section and maceration).
- 3:- Study of male and female cones of *Gnetum*.
- 4:- Study of pollen grain structure of *Gnetum* (shape, size Exine, germ pore, number and number of constituent cells).
- 5:- Study of fossil types-Impression, Compression and Petrification.
- 6:- Study of fossils –*Calamites*, *Cycadeoidea*, *Lyginopteris* and *Enigmocarpon*.
- 7:-Study of V.S. of typical ovule and ovule types.
- 8:-Study of pollen grain germination. (hanging drop and sitting drop techniques in *Impatiens* and *Catharanthus roseus* or any other suitable material).
- 9:-Diversity in structure of stigma, style, stigmatic papillae and transmitting tissue of style in suitable material (*Clitoria*, *Hibiscus*, Maize, *Ocimum* and *Citrus*).
- 10:-Study of embryo with suspensor in cucurbitaceae. (Micro dissection).
- 11:-Study of seed dispersal with suitable materials.
- 12:- Study of fruit dispersal with suitable materials.
- 13& 14 - Study of Herbarium technique. (Demo.)
- 15 to 24:-Study of the following plant families.
i) Capparidaceae ii) Rutaceae iii) Myrtaceae iv) Rubiaceae v) Apocynaceae vi) Lamiaceae vii) Polygonaceae viii)Poaceae.
- 25:- Identification of genus and species with the help of any flora.
26. Study of microtome technique.

Practical:- III (Based on paper- XI and XV)

- 1:- Examples on polygene inheritance.
- 2 And 3 Determination of chromosome count in *Allium cepa/Iphigenia* root tips.
- 4 And 5 Study of meiosis in PMC of *Allium* or any other suitable material.
- 6:- Preparation of karyotypes-idiograms by using photographs.
- 7:- Determination of interspecific variation in chromosome number in *Allium*.
- 8:- Culture of *Drosophila*.
- 9:- Study of giant chromosomes in *Drosophila*.
- 10 & 11 Detection of meiotic anomalies in chromosomes in *Rhoeo*.
- 12 and 13 Identification of mutant phenotypes. –Body shape/nature of wings/eye colour /nature of eye-Normal and Bar in *Drosophila*.(with photographs)
- 14:- Study of correlation of floral structure in insect pollinated plants. (Any two) *Salvia, Sesamum, Pisum, Plectranthus, Helianthus, Calotropis, Tridax*.
- 15:- Study of correlation of floral structure with pollination system in Castor and Maize.
- 16:- Field exploration for detection of male sterile line in Jowar/Maize.
- 17:- Demonstration of pollen fertility by using staining technique.
- 18:- Breeding technique in Brassicaceae.
- 19:- Breeding technique in Fabaceae
- 20:- Breeding technique in Malvaceae.
- 21:- Breeding technique in Poaceae.
- 22:- Measures of central tendency of given plant material.
- 23 And 25 Analysis of the given data using computer or Study of frequency distribution and its graphic representation.

Practical-IV (Based on Paper –XII and XVI)

- 1:- Qualitative tests for sugars in plant material.
- 2:- Qualitative tests for starch and cellulose .in plant material.
- 3:- Qualitative tests for proteins in plant material.
- 4:- Qualitative tests for lipids in plant material.
- 5:- Determination of isoelectric point of protein in plant material.
- 6:- Determination of fatty acid value of oil sample.
- 7 & 8 Separation of amino acids in plant extract by ascending paper chromatography.
- 9:- Estimation of proteins in plant sample by Biuret method.
- 10:- Colorimetric estimation of DNA using Diphenyl amine.
- 11:- Isolation of plant genomic DNA and its spooling.
- 12:- colorimetric estimation of RNA
- 13and 14 Preparation of tissue culture medium (M.S) and its sterilization.
- 15,16 and 17 Demonstration of techniques of in vitro culture of various explants.
- 18 to 25 Micro- technique preparations of permanent stained slides using microtome.

SOLAPUR UNIVERSITY, SOLAPUR.

(Practical Question paper)

B.Sc. Part-III/Practical Examination in Botany, Mar/.Apr.2016

Practical –I (Based on paper IX and XIII)

Time:-11 a.m. onwards

Marks: 70

Date:

Centre-

- N.B.** I) Do not write about points of theoretical information unless asked specifically.
II) Draw neat and labeled diagrams wherever necessary.

Q-1 Identify and classify the specimen A, B, C and D. Draw neat and labeled sketches. **(24)**

Leave at least one slide of each specimen for inspection.

Q-2 Isolate the fungi from the given soil sample-E (No Written answer) **(6)**

OR

Q-2 Inoculate the given culture- E of the fungus on the slants of PDA. (No Written answer) **(6)**

Q-3 Measure the dimensions of the given spore/pollen grain –F under the low and high **(8)**
power of Microscope Record your readings.

Q-4 Set up the experiment showing fermentation. (No written answer). **(8)**

Q-5 Identifications **(12)**

a) Identify and describe the slide/specimen-G-(Algal/fungal specimen) and- **(6)**
H (Bryophytic/Pteridopytic Specimen).

b) Identify the plant diseases-I and J. Give their causal organism, symptoms/control **(6)**
measures.

Q-6 a) Submission **(6)**

b) Journal **(6)**

SOLAPUR UNIVERSITY, SOLAPUR.

(Practical Question paper)

B.Sc. Part-III/Practical Examination in Botany, Mar/.Apr.2016

Practical –II (Based on paper X and XIV)

Time:-11 a.m. onwards

Marks: 70

Date:

Centre

-
- N.B.** I) Do not write about points of theoretical information unless asked specifically.
II) Use of Angiosperm key is allowed
III) Draw neat and labeled diagrams wherever necessary
- Q-1** Identify and show the important structures observed by you in the specimens A (by section) and B (by maceration). Leave at least one slide of each specimen for inspection (Gymnosperms sp.) (No written answer) **(12)**
- Q-2** Assign the Specimens C and D to their respective families on the basis of vegetative and floral (reproductive) characters observed by you in them. Draw the floral diagram of Specimen C and write the floral formula of specimen D. **(10)**
- Q-3** With the help of flora, identify the genus and species of the given specimen –E. **(6)**
- Q-4** Dissect the specimen F to expose the embryo. (No written answer). **(5)**
- OR**
- Q-4** Show the structure of style and stigma in the specimen F (No written answer). **(5)**
- Q-5 Identifications** **(15)**
- a) Identify and describe the slide/specimen-G (Gymnosperm) **(3)**
- b) Identify and describe the specimen /slide-H (Palaeobotany) **(3)**
- c) Identify and describe the specimen /slide –I (Palaeobotany) **(3)**
- Identify and describe the specimen /slide-J (Morphology-fruit/seed dispersal) **(3)**
- d) Identify and describe the slide-K (Embryology) **(3)**
- Q-6** a) Tour report **(10)**
- b) **Herbaria submission** **(6)**
- c) Journal **(6)**

SOLAPUR UNIVERSITY, SOLAPUR.

(Practical Question paper)

B.Sc. Part-III/Practical Examination in Botany, Mar/.Apr.2016

Practical –III (Based on paper XI and XV)

Time:-11 a.m. onwards

Marks: 70

Date:

Centre

-
- N.B.** I) Do not write about points of theoretical information unless asked specifically.
II) Draw neat and labeled diagrams wherever necessary.
- Q-1** Solve the given problem on Polygene inheritance. (8)
- Q-2** Expose the chromosomal abnormalities from the specimen-A (No written answer) (8)
- Q-3** a) Prepare the idiogram of specimen-B (8)
b) Determine the Mean, Median and Mode by using the Sample –C (8)
- OR**
- b) Determine the frequency distribution and prepare a histogram/polygon/line graph from the specimen-C (8)
- Q-4** a) Show the breeding techniques in the given plant Material-D and E (10)
(No written answer)
b) Demonstrate the pollen fertility in the given specimen F (No written answer) (8)
- Q-5** **Identifications** (8)
- a) Comment upon the floral structure and pollination Mechanism (Species may be given as per practical syllabus) (4)
- b) Identify and describe (Mutant types in *Drosophila*/Giant chromosome) (4)
- Q-6** a) Submissions (6)
b) Journal (6)

SOLAPUR UNIVERSITY, SOLAPUR.

(Practical Question paper)

B.Sc. Part-III/Practical Examination in Botany, Mar/.Apr.2016

Practical –IV (Based on paper XII and XVI)

Time:-11 a.m. onwards

Marks: 70

Date:

Centre

N.B. I) Do not write about points of theoretical information unless asked specifically.

II) Chart for biochemical tests is allowed.

Q-1 Demonstrate the presence of carbohydrates/lipids/proteins by using **any two** (12)
biochemical tests from the given plant material A.

Q-2 Estimate the DNA/ isolation of DNA from the plant material B (10)

OR

Q-2 Determine the fatty acid value of oil sample –B (10)

Q-3 Estimate the Proteins/RNA from the sample – B (10)

OR

Q-3 Separation of amino acids from the given sample/plant Material-B- by ascending paper (10)
chromatography.

Q-4 Demonstrate the techniques of inoculation of Explant -C on the culture medium (12)

(No Written answer)

Q-5 **Identifications** (10)

a) Identify and comment upon the biochemical test-D (Which is not kept above) (5)

b) Identify and describe the specimen-E (5)

(DPA/culture media/isoelectric point of protein/Orcinol stain)

Q-6 a) Microtomy slide submission (10)

b) Journal (6)

Solapur University, Solapur.
B.Sc. Part –III- Botany
Practical no -III
(Based on Paper No- XI and XV)
Examples on Polygene Inheritance

- 1) Assuming the height in a particular plant to be determined by two pairs of unlinked Polygenes. Each effective (contributing) allele contributing 5 cm to the base height of 5cm. The cross AABB x aabb is made.
 - a) What height is to be expected in the F1 plants, if there is no environmental factor?
 - b) What is the expected phenotypic ratio in F2?

- 2) In a corn, the length of ear (cob) is controlled by two independent polygenes say- A & B. The black Mexican corn with the genotype AABB having ear length 17 cm is crossed with a Tomthum pop corn variety with the genotype aabb having ear length 7 cm.
 - i) What will be the ear length of F1?
 - ii) What will be the result of F2?
 - iii) Give the ear length of F2?
 - iv) What is the contribution of each allele in the length of ear?

- 3) Two races of corn averaging ‘28’ inches & ‘72’ inches in height respectively are crossed. The F1 is quite uniform, averaging ‘60’ inches in height. Out of the 500 plants of F2, two are as short as ‘28’ inches parent and two are as tall as ‘72’ inches parent.
 - a) What is the no. of polygenes involved?
 - b) How much does each effective allele contribute to the height?

- 4) In human beings, the eye colour is being controlled by the four polygenes say-A, B, C and D (no. of alleles =8).The eye colour and the no. of alleles for a particular eye colour is shown in the table below

Sr. No.	Eye colour (Phenotype)	No. of alleles	Genotypes
1	Dark brown	8	AA, BB, CC, DD
2	Medium brown	7	AA, BB, CC, Dd
1	Light brown	6	AA, BB, CC, dd
2	Hazel	5	AA, BB, Cc, dd
5	Green	2	AA, BB, cc, dd
6	Grey	1	AA, Bb, cc, dd
7	Dark blue	2	AA, bb, cc, dd
8	Medium blue	1	Aa, bb, cc, dd
9	Light blue	0	aa, bb, cc, dd

Mr. A has dark brown eyes and his wife Mrs. –B has light blue eye. Based on the hypothesis that 2 pairs of polygenes are responsible for brown eye colour. Give the genotype of Mr. and Mrs. and their child.

© Pascle’s triangle may be provided for Polygene inheritance Examples.