VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Web: www.vskub.ac.in, Email: Phone : 08392-242703 and Fax: 08392-242806

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Semester	Major 1 (A)	Major 2 (B)	Major 3 (C)	Elective /Optional	Language	Compulsory / Skill Courses	Total Credits
1	**24MJBOT1L: Microbial World (L:T:P = 4:0:0)** **24MJBOT1P: Microbial World Lab (L:T:P = 0:0:4)**	B1(6) (L:T:P = 4:0:4)	C1(6) (L:T:P = 4:0:4)	-	L1 (4) (L:T:P = 4:0:0) L2 (4) (L:T:P = 4:0:0)	Constitutional Values (2) (L:T:P = 3:0:0)	26
2	**24MJBOT2L: Non-Flowering plants (L:T:P = 4:0:0)** **24MJBOT2P: Non-Flowering plants Lab (L:T:P = 0:0:4)**	B2(6) (L:T:P = 4:0:4)	C2(6) (L:T:P = 4:0:4)	-	L1(4) (L:T:P = 4:0:0) L2 (4) (L:T:P = 4:0:0)	Environmental Studies (2) (L:T:P = 3:0:0)	26
3	**24MJBOT3L: Plant -Histology, Anatomy and Reproductive Biology (L:T:P = 4:0:0)** **24MJBOT3P: Plant -History, Anatomy, Developmental Biology Lab (L:T:P = 0:0:4)**	B3(6) (L:T:P = 4:0:4)	C3(6) (L:T:P = 4:0:4)	-	L1 (4) (L:T:P = 4:0:0) L2 (4) (L:T:P = 4:0:0)	SEC-1 (2) Skill Course B1: **24MJBOTC3S Phytochemistry and Pharmacognostic studies** Skill Course C1 (L:T:P = 1:0:2)	26
4	**24MJBOT4L: Ecology and Conservation Biology (L:T:P = 4:0:0)** **24MJBOT4P: Ecology and Conservation Biology Lab (L:T:P = 0:0:4)**	B4(6) (L:T:P = 4:0:4)	C4(6) (L:T:P = 4:0:4)	-	L1 (4) (L:T:P = 4:0:0) L2 (4) (L:T:P = 4:0:0)	SEC-2 (2) Skill Course B2: **24MJBOTC4S Methods in plant sciences** Skill Course C2 (L:T:P = 1:0:2)	26

5	**24MJBOT5L: 5.1: Plant Morphology and Taxonomy (L:T:P = 4:0:0)** **24MJBOT5P: 5.1: Plant Morphology and Taxonomy Lab (L:T:P = 0:0:4)**	B5(6) (L:T:P = 4:0:4)	C5(6) (L:T:P = 4:0:4)	**24MJBOT5E:** Elective Course **B1: Plants for Human Welfare** Elective Course C1 (2) (L:T:P = 2:0:0)	-	SEC-3 (2) **24RMBS5S : Elementary Research Methodology** (L:T:P = 2:0:0)	22
6	**24MJBOT6L: 6.2 Plant Physiology and Biochemistry (L:T:P = 4:0:0)** **24MJBOT6P: 6.2 Plant Physiology and Biochemistry Lab (L:T:P = 0:0:4)**	B6(6) (L:T:P = 4:0:4)	C6(6) (L:T:P = 4:0:4)	**A24MJBOT6E:** Elective Course **B2: Floriculture** Elective Course C2 (2) (L:T:P = 2:0:0)	-	**24MJOBOT6R Elementary Research Project** (2) (L:T:P = 0:0:4)	22
Total	**36**	**36**	**36**	**04**	**24**	**12**	**148**
Total 148 Credits							

Note:

1. The curriculum for all Courses except L1, L2, Constitutional Values, Environmental values and Elementary Research Methodology will be framed by the respective Board of Studies (A/B/C). Here for example A – Physics, B – Chemistry and C – Mathematics.

2. The Curriculum for Languages L1 & L2 will be framed by respective Board of Studies (BoS) (Example Kannada/ English/ Hindi/ Sanskrit/ Telugu etc.).

3. The curriculum for Constitutional values will be framed by Board of Studies (BoS) in Political Science.

4. The curriculum for Environmental Science will be framed by special/common Board of Studies (BoS) set up by the University.

5. The curriculum for Elementary Research Methodology will be set by special/common Board of Studies (BoS - Faculty of Science & Applied Science) set up by the University.

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Course 'A' as one of the Majors
1st Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of SEE (Hrs)
		IA	SEE	Total	L	T	P		
24MJAA1L	A1 Major Theory	20	80	100	4	0	0	4	03
24MJAA1P	A1 Major Lab	10	40	50	0	0	4	2	03
24MJBB1L	2nd Major Theory-B1	20	80	100	4	0	0	4	03
24MJBB1P	2nd Major Lab-B1	10	40	50	0	0	4	2	03
24MJCC1L	3rd Major Theory-C1	20	80	100	4	0	0	4	03
24MJCC1P	3rd Major Lab-C1	10	40	50	0	0	4	2	03
24LGCC1L	Language 1	20	80	100	3	0	0	3	03
24LGCC1L	Language 2	20	80	100	3	0	0	3	03
24CVCM1L	Constitutional Values	10	40	50	2	0	0	2	1.5*
TOTAL		**140**	**560**	**700**	**20**	**0**	**12**	**26**	**-**

*** 40 Multiple Choice Questions for 40 Marks (OMR Based)**

Course Code Description:

24MJAA1L: For Example 24MJPH1L

24 – Year of Curriculum Implementation / Revision

MJ – Major, LG – Language , CV – Constitutional Values

AA/BB/CC – Course Specific (Example for Physics AA – PH, Chemistry AA – CH, Maths – MA etc.)

CM – Common Course
1 – Semester Number
L – Lecture, P - Practical

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Course 'A' as one of the Majors
2nd Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJAA2L	A2 Major Theory	20	80	100	4	0	0	4	03
24MJAA2P	A2 Major Lab	10	40	50	0	0	4	2	03
24MJBB2L	2nd Major Theory-B2	20	80	100	4	0	0	4	03
24MJBB2P	2nd Major Lab-B2	10	40	50	0	0	4	2	03
24MJCC2L	3rd Major Theory-C2	20	80	100	4	0	0	4	03
24MJCC2P	3rd Major Lab-C2	10	40	50	0	0	4	2	03
24LGCC2L	Language 1	20	80	100	3	0	0	3	03
24LGCC2L	Language 2	20	80	100	3	0	0	3	03
24ESCM2L	Environmental Studies	10	40	50	2	0	0	2	1.5*
TOTAL		**140**	**560**	**700**	**20**	**0**	**12**	**26**	**-**

*** 40 Multiple Choice Questions for 40 Marks (OMR Based)**

Course Code Description:

24MJAA2L:

24 – Year of Curriculum Implementation / Revision

MJ – Major, LG – Language , ES – Environmental Science

AA/BB/CC – Course Specific (Example for Physics AA – PH, Chemistry AA – CH, Maths – MA etc.)

CM – Common Course

2 – Semester Number

L – Lecture, P - Practical

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Course 'A' as one of the Majors
3rd Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJAA3L	A3 Major Theory	20	80	100	4	0	0	4	03
24MJAA3P	A3 Major Lab	10	40	50	0	0	4	2	03
24MJBB3L	2nd Major Theory-B3	20	80	100	4	0	0	4	03
24MJBB3P	2nd Major Lab-B3	10	40	50	0	0	4	2	03
24MJCC3L	3rd Major Theory-C3	20	80	100	4	0	0	4	03
24MJCC3P	3rd Major Lab-C3	10	40	50	0	0	4	2	03
24LGCC3L	Language 1	20	80	100	3	0	0	3	03
24LGCC3L	Language 2	20	80	100	3	0	0	3	03
24MJAA3S	Skill Course A1	10	40	50	1	0	2	2	1.5*
TOTAL		**140**	**560**	**700**	**20**	**0**	**12**	**26**	**-**

*** 40 Multiple Choice Questions for 40 Marks (OMR Based)**

Course Code Description:

24MJAA3L:

24 – Year of Curriculum Implementation / Revision

MJ – Major, LG – Language

AA/BB/CC – Course Specific (Example for Physics AA – PH, Chemistry AA – CH, Maths – MA etc.)

3 – Semester Number

L – Lecture, P – Practical, S - Skill

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Course 'A' as one of the Majors
4th Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJAA4L	A4 Major Theory	20	80	100	4	0	0	4	03
24MJAA4P	A4 Major Lab	10	40	50	0	0	4	2	03
24MJBB4L	2nd Major Theory-B4	20	80	100	4	0	0	4	03
24MJBB4P	2nd Major Lab-B4	10	40	50	0	0	4	2	03
24MJCC4L	3rd Major Theory-C4	20	80	100	4	0	0	4	03
24MJCC4P	3rd Major Lab-C4	10	40	50	0	0	4	2	03
24LGCC4L	Language 1	20	80	100	3	0	0	3	03
24LGCC4L	Language 2	20	80	100	3	0	0	3	03
24MJAA4S	Skill Course A2	10	40	50	1	0	2	2	1.5*
TOTAL		**140**	**560**	**700**	**20**	**0**	**12**	**26**	**-**

*** 40 Multiple Choice Questions for 40 Marks (OMR Based)**

Course Code Description:

24MJAA4L:

24 – Year of Curriculum Implementation / Revision

MJ – Major, LG – Language

AA/BB/CC – Course Specific (Example for Physics AA – PH, Chemistry AA – CH, Maths – MA etc.)

4 – Semester Number

L – Lecture, P – Practical, S - Skill

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Course 'A' as one of the Majors
5th Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJAA5L	A5 Major Theory	20	80	100	4	0	0	4	03
24MJAA5P	A5 Major Lab	10	40	50	0	0	4	2	03
24MJBB5L	2nd Major Theory-B5	20	80	100	4	0	0	4	03
24MJBB5P	2nd Major Lab-B5	10	40	50	0	0	4	2	03
24MJCC5L	3rd Major Theory-C5	20	80	100	4	0	0	4	03
24MJCC5P	3rd Major Lab-C5	10	40	50	0	0	4	2	03
24MJAA5E	Elective Course A1	10	40	50	2	0	0	2	02
24RMBS5S	Elementary Research Methodology#	10	40	50	2	0	0	2	01*
TOTAL		**110**	**440**	**550**	**16**	**0**	**12**	**22**	**-**

*** 40 Multiple Choice Questions for 40 Marks (OMR Based)**

 # The curriculum for Elementary Research Methodology will be set by special/common Board of Studies (BoS - Faculty of Science & Applied Science) set up by the University. The course code for Elementary Research Methodology shall be 24RMBS5S.

Course Code Description:

24MJAA5L:

24 – Year of Curriculum Implementation / Revision

MJ – Major, LG – Language, RM – Research Methodology

AA/BB/CC – Course Specific (Example for Physics AA – PH, Chemistry AA – CH, Maths – MA etc.)

BS – Bachelor of Science

4 – Semester Number, L – Lecture, P – Practical, S – Skill, E – Elective Course

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Course 'A' as one of the Majors
6th Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJAA6L	A6 Major Theory	20	80	100	4	0	0	4	03
24MJAA6P	A6 Major Lab	10	40	50	0	0	4	2	03
24MJBB6L	2nd Major Theory-B6	20	80	100	4	0	0	4	03
24MJBB6P	2nd Major Lab-B6	10	40	50	0	0	4	2	03
24MJCC6L	3rd Major Theory-C6	20	80	100	4	0	0	4	03
24MJCC6P	3rd Major Lab-C6	10	40	50	0	0	4	2	03
24MJAA6E	Elective Course A2	10	40	50	2	0	0	2	02
24MJAA6R	Elementary Research Project	10	40	50**	0	0	4	2	01**
TOTAL		**110**	**440**	**550**	**14**	**0**	**16**	**22**	**-**

**** Internally conducted based on project report and presentation. The evaluation scheme will be provided by respective BoS.**

Course Code Description:

24MJAA6L:

24 – Year of Curriculum Implementation / Revision
MJ – Major, LG – Language, CM – Common Course,
AA/BB/CC – Course Specific (Example for Physics AA – PH, Chemistry AA – CH, Maths – MA etc.)
BS – Bachelor of Science
6 – Semester Number
L – Lecture, P – Practical, E – Elective Course, R – Research Project

Concept Note, Abbreviation Explanation and Coding:

Concept Note:

1. CBCS is a mode of learning in higher education which facilitates a student to have some freedom in selecting his/her own choices, across various disciplines for completing a UG/PG program.
2. A credit is a unit of study of a fixed duration. For the purpose of computation of workload as per UGC norms the following is mechanism be adopted in the university:
   One credit (01) = One Theory Lecture (L) period of one (1) hour;
   One credit (01) = One Tutorial (T) period of one (1) hour;
   One credit (01) = One practical (P) period of two (2) hours.
   One Credit (01) = One Field Study (F) period of one (1) hour
3. Students shall select any two languages during 1-IV semesters.
4. Student shall select only one Skill course from any one of the major courses opted in 3rd and 4th semesters.
5. Student shall select Elective course from any one of the major courses opted one in each in 5th and 6th semesters.
6. Elementary Research Methodology Course is common for all B.Sc. students.
7. Student shall perform Elementary Research Project in any one of the major courses opted in 6th semester.

Abbreviation Explanations:

1. SEC: Skill Enhancement Course;
2. L1: Language One
3. L2: Language One
4. L= Lecture; T= Tutorial; P=Practical; S= Skill; E = Elective; R = Research Project
5. MJ – Major
6. LG – Language
7. RM – Research Methodology
8. CM – Common Course

NOTE:

1. FOR A THEORY COURSE WITH 4 CREDITS, SYLLABUS HAS TO SET FOR TOTAL OF 52-56 HOURS.
2. FOR A THEORY COURSE WITH 3 CREDITS, SYLLABUS HAS TO SET FOR TOTAL OF 40-42 HOURS.
3. FOR A THEORY COURSE WITH 2 CREDITS, SYLLABUS HAS TO SET FOR TOTAL OF 26-28 HOURS.
4. FOR A LAB COURSE/RESEARCH PROJECT WITH 2 CREDITS, SYLLABUS HAS TO SET FOR TOTAL OF 52-56 HOURS.
5. FOR A SKILL COURSE WITH 1 HOUR THEORY AND 2 HOUR LAB OF 2 CREDITS, SYLLABUS HAS TO BE SET FOR 40-42 HOURS.

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Bachelor of Science in Botany

With Effective from 2024-25 onwards

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Semester – III: PLANT HISTOLOGY, ANATOMY AND REPRODUCTIVE BIOLOGY

Course Title:: Plant Histology, Anatomy andReproductive Biology	**Course Code:24MJBOT3L**
Total Contact Hours: 56 Hrs	**No. of Credits:**04
L:T:P – 4:0:0	
Internal Assessment Marks: 20	**Duration of SEE:** 3 Hrs
Semester End Exam Marks: 80	

Course Outcomes (COs):

On completion of this course, the students will be able to:

1. Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept.
2. Skill development for the proper description of internal structure using botanical terms, their identification and further classification.
3. Induction of the enthusiasm on internal structure of locally available plants.
4. Understanding various levels of organization in a plant body with an outlook in the relationship between the structure and function through comparative studies.
5. Observation and classification of the floral variations from the premises of college and house.
6. Understanding the various reproductive methods sub-stages in the life cycle of plants
7. Observation and classification of the embryological variations in angiosperms.
8. Enthusiasm to understand evolution based on the variations in reproduction among plants.

…

Unit	Description	Hours
1	**Plant Anatomy :** **Introduction**: Objective and scope of Plant Anatomy Tools and Techniques in plant anatomy **Plant cell structure**: Ultra structure of plant cell; Nature of plant cell wall. **Tissue and tissue systems**: Meristematic tissue, permanent tissue and secretary cells. **Classification of meristem**: (apical, intercalary and lateral), primary and secondary meristem. **Theories on organization of Root and Shoot meristem**: Apical cell theory, Tunica-Corpus theory, Histogen theory and Korper-Kappe theory), quiescent centre, Root cap. Evolution and concept of organization of shoot apex (Apical cell theory, Histogen theory, Tunica Corpus theory continuing meristematic residue, cytohistological zonation).	12

2	**MORPHOGENESIS AND DIFFERENTIATION** **Theories of Tissue differentiation:** Mantle Core Concept, Promeristem (Primordial Meristem) Theory, Anneau initial or meristemed'attente theory, Cytohistological zonation theory. **Morphogenesis in plants** - Differentiation of root, stems and leaf. Types of vascular bundles and Vascular cambium, Origin, development, arrangement and diversity in size and shape of leaves. **Primary Structure**: Dicot root (Tridax/Sunflower), monocot root (Maize); Dicot stem(Tridax/Sunflower), Monocot stem (Maize), Nodal anatomy; Dicot leaf(Tridax/Sunflower), Monocot leaf (Maize), Stomatal types. **Secondary Growth**: Definition of Secondary growth, Intra-stelar secondary growth and Extra-stelar secondary growth with suitable examples. **Anomalous secondary growth**: Definition of Anomalous Secondary growth; Anomalous secondary growth in Bougainvillea, Boerhaavia (dicot stem) Dracaena (monocot stem) Relationships of Anatomy with reference to systematics, forensics and Pharmacognosy.	10
3	**REPRODUCTIVE BIOLOGY** **Introduction**: Scope and contributions of Indian embryologists: P. Maheswari, B. G. L. Swamy and B.M. Johri. Microsporangium: Development and structure of mature anther, Antherwall layers, Tapetum -types, structure and functions and sporogenous tissue. **Microsporogenesis:** Development of Microspore,Microspore mother cells, microspore tetrad types, Pollinia. Structure and Types of pollen grains (wet and dry) **Microgametogenesis:** Formation of vegetative and generative cells,structure of male gametophyte. Pollen embryosac (Nemec phenomenon).	10
4	**Megasporangium and its Development:** **Megasporogenesis**: Development of Megasporangium, Structure of typical Angiosperm ovule. Types of ovule. **Megagametogenesis**: Types of development of Female gametophyte/embryosac-monosporic- Polygonum type, bisporic – Allium type, tetrasporic- Fritillaria type. Structure of mature embryosac. **Pollination and Fertilization** **Pollination:** What is pollination, Types of Pollination**,** Agents of Pollination**,** Reasonsfor cross-pollination/ contrivances of cross-pollination. Types of stigma and style, Pollen-Pistil Interaction; **Post pollination events**: Mechanisms of Fertilization in Angiosperms, Double fertilization Triple fusion mechanism and its significance.	**14**
5	**Post Fertilization Evets and Structures** **Embryogenesis**: Structure and development of zygote, Development of Embryo in Dicot (Capsella bursa-pastoris) and Monocot (Najas) plants. **Endosperm**: Development of Endosperm, Types and its biological importance. Free nuclear (*Cocos nucifera*) Cellular (*Cucumis*), Helobial type, Ruminate endosperm.	**10**

	Apomixis: a brief account; Polyembryony types- causes, induction of polyembryology, significance. **Seed**: Structure of and Development of Monocot and Dicot seeds, Seed Dormancy and its types, Methods of breaking seed dormancy.	

Text Books for Reference:

1. Bhojwani and Bhatnagar, Introduction to Embryology of Angiosperms –Oxford & IBH, Delhi
2. Bhojwani Sant Saran, 2014.Current Trends in the Embryology of Angiosperms**,** Woong-Young Soh, Springer Netherlands,
3. Coutler E. G. , 1969. Plant Anatomy – Part I Cells and Tissues – Edward Arnold, London.
4. Dickison, W.C. (2000). Integrative Plant Anatomy, Harcourt Academic Press, USA
5. Eames A. J. - Morphology of Angiosperms - Mc Graw Hill, New York.
6. Esau, K. 1990. Plant Anatomy, Wiley Eastern Pvt Ltd New Delhi
7. Evert, R.F. (2006) Esau's Plant Anatomy: Meristem, Cells, and Tissues of the Plant Body: Their Structure, Function and Development. John Wiley and Sons, Inc
8. Fahn, A.1992. Plant Anatomy, Pergamon Press, USA
9. Johri, B.M. l., 1984.Embryology of Angiosperms, Springer-Verlag, Netherlands.
10. Karp G., 1985. Cell Biology; Mc.Graw Hill Company
11. Maheshwari,P1950. An introduction to the embryology of angiosperms. New York: McGraw-Hill
12. Mauseth, J.D. (1988). Plant Anatomy, the Benjammin/Cummings Publisher, USA.
13. Nair P .K .K - Pollen Morphology of Angiosperms - Scholar Publishing House, Lucknow
14. Pandey S.N. 1997, Plant Anatomy and Embryology .A. Chadha, Vikas Publication House Pvt Ltd;
15. Pandey, B. P., 1997. Plant Anatomy, S.Chand and Co. New Delhi
16. Raghavan, V., 2000. Developmental Biology of Flowering plants, Springer, Netherlands.
17. Saxena M. R. – Palynology – A treatise - Oxford & I. B .H., New Delhi.
18. Shivanna, K.R., 2003. Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt.Ltd. Delhi.
19. Vashishta .P.C .,1984. Plant Anatomy – Pradeep Publications – Jalandhar
20. Vashishta, P.C. 1997. Plant Anatomy, Pradeep Publications

*****

Course Title: Plant Histology, Anatomy and Reproductive Biology	**Course Code:** 24MJBOT2P
Total Contact Hours: 56 hrs	**No. of Credits:** 02
L:T:P - 0:0:4	
Internal Assessment Marks: 10	**Duration of SEE:** 3 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Handle the microbiology instruments
2. Identify the different group of microbes based on their morphology or infection caused by them to the host plants
3. Understand the practical importance of microorganisms in nature.

…

List of Experiments / Programs (For a Lab Course)

Sl.No	Experiment / Program
1	(a) Study of meristem (Permanent slides/ Photographs). (b) Study of Simple Tissues (Parenchyma, Collenchyma and Sclerenchyma) and Complex Tissues (xylem and phloem).
2	(a) Study of primary structure of dicot root, stem and leaf (Sunflower/Tridax/any other available plant in local area) (b) monocot root, stem and leaf (Maize/Jawor/ any other available plant in local area))
3	(a) Study of Normal secondary growth structure in dicot stem and root (Sunflower) (b) Anomalous secondary growth: *Bougainvillea, Boerhaavia* (dicot stem) *Dracaena* (monocot stem)
4	(a) Study of trichomes with the help of locally available plant materials (b) Study of stomatawith the help of locally available plant materials
5	(a) Permanent slides of Microsporogenesis and male gametophyte (b) Mounting of Pollen grains of *Vinca rosa*ea, Hibiscus and Pollinia of Calotropis
6	Pollen germination (hanging drop method)/Pollen viability test.
7	(a) Permanent slides of types of ovules, Megasporogenesis &embryo sac development (b) Sectioning of ovary, for the studied types of placentation (Axile, Marginal and Parietal types)
8	Mounting of embryo: Chilli/Mustard, Mounting of endosperm: Cucumis/Croton
9	Study of histochemical localization of proteins/ carbohydrates
10	(a) Study of seed dormancy breaking methods (b) Seed viability test
10	**Mini project work in groups of 3-5 students, from the following list** (a) Study of pollen morphology of different flowers with respect to shape, colour,

	aperture etc. (b) Pollen germination of different pollen grains and calculates percentage of germination. (c) Calculating percentage of germination of one particular type of pollen grain collected from different localities/ under different conditions. (d) Study of placentation of different flowers. (e) Any other relevant study related to Anatomy / Embryology.

*****

B. Sc. Botany First Semester

THEORY EXAMINATION- MODEL QUESTION PAPER

Title of the Paper: Plant Histology, Anatomy andReproductive Biology

Time: 3.00 hours **Max Marks: 80**

Instructions:

a) Question paper comprises of four sections A, B, C, and D. All the sections are compulsory.

b) Draw the diagrams wherever necessary.

c) Drawings without label do not attract any marks.

SECTION- A

I. Answer all the following questions. Each question carries ONE mark. 01x10=10

Questions number (1) to (10) Two questions from Each Unit

SECTION-B

II. Answer all the following questions. Each question carries TWO marks. 02x10= 20

Questions number (11) to (20) Two questions from Each Unit

SECTION-C

III. Answer any Four questions from the following. Each question carries FIVE marks. 04x05= 20

Questions number (21) to (25) one questions from Each Unit and 26th Question can be formed from unit III or IV

SECTION-D

IV. Answer any Three questions from the following. Each question carries TEN marks. 10x03= 30

Questions number (21) to (25) one questions from Each Unit

****

B. Sc. III Semester Practical Model question Paper
Title of the Paper: Plant Histology, Anatomy and Reproductive Biology

Time: 3 Hours **Max. Marks: 40**

I.	Identify the specimen 'A' from given material	- 05
II.	Mount and sketch of endosperm/embryo 'B' from given material	- 06
III.	Preparation of temporary stained material 'C'.	- 06
IV.	Identify the slides D,E, F, G, H & I	- 18
V.	Record submission	- 05
	Total	- 40

B. Sc. III Semester Practical Scheme of Evaluation
Title of the Paper: Plant Histology, Anatomy and Reproductive Biology

Time: 3 Hours **Max. Marks: 40**

I.	Mount, identify, Sketch label the specimen 'A' a. Pollen Mounting – 02 b. Identification - 01 c. Sketch / Label - 02	05
II.	Mount and sketch the Endosperm / embryo – 'B' a. Mounting – 03 b. Identification - 01 c. Sketch / Label - 02	06
III.	Preparation of temporary stained slide 'C' Sketch label and identify with reason a. Preparation - 03 b. Sketch / Label - 01 c. Identification - 01 d. Reason – 01	06
IV.	Identify the slide D,E , F G, H & I with sketch label with reasons a. Identification - 01 b. Sketch – Label - 01 c. Reason - 01 (Two from Histology/two from anatomy/ two from embryology)	18
V.	Record and Mini Project submission	05

****

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Semester – III: Skill Course B1: Phytochemistry and Pharmacognostic studies

Course Title:: Phytochemistry and Pharmacognostic studies	**Course Code:24MJBOTC3S**
Total Contact Hours: 30	**No. of Credits:**02
L:T:P = 1:0:2	
Internal Assessment Marks: 10	**Duration of SEE:** 1 Hrs 30 min
Semester End Exam Marks: 40	

Course Outcomes (COs):

On completion of this course, the students will be able to:

- to know the techniques in the cultivation and production of crude drugs
- to know the crude drugs, their uses and chemical nature
- know the evaluation techniques for the herbal drugs
- to carry out the microscopic and morphological evaluation of crude drugs…

Unit	Description	Hours
1	**Introduction to Pharmacognosy** (a) Definition, history, scope and development of Pharmacognosy (b) Sources of Drugs – Plants, Animals, Marine & Tissue culture (c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins). **Classification of drugs**: Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs **Quality control of Drugs of Natural Origin**: Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.	10
2	**Cultivation, Collection, Processing and storage of drugs of natural origin**: Cultivation and Collection of drugs of natural origin Factors influencing cultivation of medicinal plants. Plant hormones and their applications. Polyploidy, mutation and hybridization with reference to medicinal plants. Conservation of Medicinal plants **Pharmacognosy in various systems of medicine**: Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine.	09
5	**Primary metabolites**: General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following	

	Primary metabolites: **Carbohydrates**: Acacia, Agar, Tragacanth, Honey **Proteins and Enzymes**: Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin). **Lipids(Waxes, fats, fixed oils)** : Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax **Introduction to secondary metabolites**: Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins Analysis of crude drugs by chemical tests: (i)Tragaccanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil Determination of stomatal number and index Determination of vein islet number, vein islet termination and paliside ratio. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer Determination of Fiber length and width Determination of number of starch grains by Lycopodium spore method Determination of Ash value Determination of Extractive values of crude drugs Determination of moisture content of crude drugs Determination of swelling index and foaming	11

Text Books for Reference:

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis
4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5. Textbook of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
6. Herbal drug industry by R.D. Choudhary (1996), IstEdn, Eastern Publisher, New Delhi.
7. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
8. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae 9. Anatomy of Crude Drugs by M.A. Iyengar

*****

Examination pattern:40 Multiple Choice Questions for 40 Marks (OMR Based)

*****

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Semester – IV: Ecology and Conservation Biology

Course Title:: Ecology and Conservation Biology	**Course Code:24MJBOT4L**
Total Contact Hours: 56 Hrs	**No. of Credits:**04
L:T:P – 4:0:0	
Internal Assessment Marks: 20	**Duration of SEE:** 3 Hrs
Semester End Exam Marks: 80	

Course Outcomes (COs):

On completion of this course, the students will be able to:

1. Understanding the fundamental concepts in ecology, Environmental Science and Phytogeography.
2. Concept development in conservation, Global ecological crisis, sustainable development, Pros, and Consequences of human intervention.
3. Induction of the enthusiasm on internal comparative study of different plants adapted to various environmental conditions of locally available plants.
4. Understanding various methods of conservation of natural resources with an outlook in the relationship between the biotic and abiotic components of the ecology.
5. Enable the student to appreciate bio-diversity and the importance of various conservation strategies, laws and regulatory authorities and global issues related to climate change and sustainable development.

…

Unit	Description	Hours
1	**Ecology:** **Introduction to Ecology**: Definitions and concept of Ecology, Principles of Ecology, Brief History, Scope and importance. Ecological levels of organisation. **Ecological factors:** **(a) Climatic factors**: light, temperature, precipitation and humidity. **(b) Edaphic factors**: Soil and its types, soil texture, soil profile, soil formation; physico-chemical properties of soil - mineral particle, soil pH, soil aeration, organic matter, soil humus and soil microorganisms. Soil Erosion and its control measures. **(c) Topographic Factors**: Altitude, Directions, Slope. **Ecological groups of plants and their adaptations**:Morphological and anatomical adaptations of hydrophytes, xerophytes, epiphytes and halophytes.	12
2	**Ecosystem Ecology**: Introduction, Ecosystem Definitions; Functions and Properties of Ecosystem, types of ecosystems with examples -terrestrial and aquatic, natural and artificial. **Structure of ecosystem**: Biotic and Abiotic components, detailed structure of a Pond, Forest and Dessert ecosystem. **Ecosystem Dynamics**: Energy flow in ecosystem; Models for Energy flow; Trophic levels; Food chain, its types and significance, Food web; Ecological	12

	productivity; Ecological pyramids (Energy, Number and Mass); Bio-magnification. **Ecological succession**: Definition, Types and Process of Succession with reference to Hydrosere and xerosere; Climax Community and Range of Tolerance. **Bio-geo-chemical cycles**: Definition and types of Biogeochemical cycles; Gaseous cycles -carbon and nitrogen, Sedimentary cycle- Phosphorus.	
3	**Community and Population Ecology:** **Community and its characteristics**: Frequency, Density, Abundance, Cover and basal area, phenology, stratifications, life forms. Concept of Ecotone, Ecotypes and Ecological Dominance; Intra-specific and Inter-specific interactions with examples. **Ecological methods and techniques:** Methods of sampling plant communities– transects and quadrates. Remote sensing as a tool for vegetation analysis, land use – land cover mapping. **Population Ecology**:Population and its characteristics- Population density, natality, mortality, age distribution, population growth curves and dispersal.	10
4	**Phytogeography and Environmental issues:** **Phytogeographical regions**:Concept, Phytogeographical regions of India. **Vegetation types of Karnataka**:Composition and distribution of evergreen, semi-evergreen, deciduous, scrub, mangroves, shoal forests and grasslands. An account of the vegetation of the Western Ghats. **Pollution**: Definition, Pollutants and classification a) **Water pollution**: Causes, effect, types; water quality indicators, water quality standards in India, control of water pollution; Wastewater treatment and its management. Salient features of Water (Prevention and Control of Pollution) Act, 1974. b) **Air pollution**: Causes, effect, air quality standards, acid rain, control measures of Air pollution. Salient features of Air (Prevention and Control of Pollution) Act, 1981. c) **Soil pollution**: Causes, effect, solid waste management, control measures of soil pollution. d) **Noise Pollution**: Causes, effect, and control measures.	**12**
5	**Biodiversity and its conservation:** **Biodiversity**: Definition, types of biodiversity; Global and Indian species diversity. **Values of Biodiversity**: Economic and aesthetic value, Medicinal and timber yielding plants; Non-timber forest products (NTFPs). **Threats to biodiversity:** Habitat loss; Extinction; Overexploitation; Entry of Invasive species; Over grazing, Fragmentation and Pouching of animals. Concept of Biodiversity Hotspots, Biodiversity hot spots of India. Concepts and examples of Endemic Species; Keystone Species; Indicator Species and Invasive Species. ICUN plant categories with special reference to Karnataka/ Western Ghats. **Biodiversity Conservation Acts**: Brief account on Biological Diversity Act, 2002; Indian Forest Act, 1927 and Forest (conservation) Act, 1980; Wild life Protection Act, 1972; Convention on Biological Diversity; Convention on International Trade in Endangered species of Wild fauna and Flora (CITES);Wetland (Conservation and Management) Rules 2010.	**10**

	Conservation methods: In-situ and ex-situ methods (a) In-situ methods: Biosphere reserves, National parks, Sanctuaries, Sacred grooves. (b) Ex-situ methods-Botanical gardens, Seed bank, Gene banks, Pollen banks, Culture collections, Cryopreservation.	

Text Books for Reference:

a. Sharma, P.D. 2018. Fundamentals of Ecology. Rastogi Publications.
b. Odum E.P. (1975): Ecology By Holt, Rinert& Winston.
c. Oosting, H.G. (1978): Plants and Ecosystem Wadworth Belmont.
d. Kochhar, P.L. (1975): Plant Ecology. (9th Edn.,) New Delhi, Bombay, Calcutta-226pp.,
e. Kumar, H.D. (1992): Modern Concepts of Ecology (7th Edn.,) Vikas Publishing Co., New Delhi.
f. Kumar H.D. (2000): Biodiversity & Sustainable Conservation. Oxford & IBH Publishing Co Ltd. New Delhi.
g. Newman, E.I. (2000): Applied Ecology, Blackwell Scientific Publisher, U.K.
h. Chapman, J.L&M.J. Reiss (1992): Ecology (Principles & Applications). Cambridge University Press, U.K.
i. Malcolm L. Hunter Jr., James P. Gibbs, Viorel D. Popescu, 2020. Fundamentals of Conservation Biology, 4th Edition. Wiley-Blackwel.
j. Saha T. K., 2017. Ecology and Environmental Biology. Books and Allied Publishers.

*****

Course Title:Ecology and Conservation Biology	Course Code:24MJBOT4P
Total Contact Hours: 56 hrs	**No. of Credits:**02
L:T:P – 0:0:4	
Internal Assessment Marks: 10	**Duration of SEE:** 3 Hours
Semester End Exam Marks: 40	

…

List of Experiments / Programs (For a Lab Course)

Practical No.	Experiments
1	Determination of pH of different types of Soils, Estimation of salinity of soil/water samples.
2	Study of Ecological instruments – Wet and Dry thermometer, Altimeter, Hygrometer, Soil thermometer, Rain Gauge, Barometer, Anemometer, etc.
3	Hydrophytes: Morphological adaptations in *Pistia, Eichhornia, Hydrilla, Nymphaea.* Anatomical adaptations in *Hydrilla*(stem) and *Nymphaea* (petiole).
4	Xerophytes: Morphological adaptations in *Asparagus, Casuarina, Acacia, Aloevera, Euphorbiatirucalli.* Anatomical adaptations in phylloclade of *Casuarina.*
5	Epiphytes: Morphological adaptations in *Drynaria*.Anatomical adaptations in epiphytic root of *Vanda.* Halophytes: Morphology and anatomy of Pneumatophores.
6	Study of a pond/forest ecosystem and recording the different biotic and abiotic components
7	Demonstration of different types of vegetation sampling methods – transects and quadrats. Determination of Density and frequency.
8	Field visits to study different types of local vegetations/ecosystems and the report to be written in practical record book.
9	Determination of water holding capacity of soil samples
10	Determination of soil texture of different soil samples.
11	Estimate the amount dust (particulate matter) deposition on the leaves of roadside plants
12	Study of Phyto-geographical regions of India and Karnataka with the help of India and Karnataka Map

*****

B. Sc. Botany Fourth Semester

THEORY EXAMINATION- MODEL QUESTION PAPER

Title of the Paper: Ecology and ConservationBiology

Time: 3.00 hours **Max Marks: 80**

Instructions:

d) Question paper comprises of four sections A, B, C, and D. All the sections are compulsory.

e) Draw the diagrams wherever necessary.

f) Drawings without label do not attract any marks.

SECTION- A

V. Answer all the following questions. Each question carries ONE mark. 01x10=10

Questions number (1) to (10) Two questions from Each Unit

SECTION-B

VI. Answer all the following questions. Each question carries TWO marks. 02x10= 20

Questions number (11) to (20) Two questions from Each Unit

SECTION-C

VII. Answer any Four questions from the following. Each question carries FIVE marks. 04x05= 20

Questions number (21) to (25) one questions from Each Unit and 26th Question can be formed from unit III or IV

SECTION-D

VIII. Answer any Three questions from the following. Each question carries TEN marks. 10x03= 30

Questions number (21) to (25) one questions from Each Unit

****

B. Sc. IV Semester Practical Model question Paper

Title of the Paper: Ecology and ConservationBiology

Time: 3 Hours **Max. Marks: 40**

1. Prepare temporary stained material A and B. Sketch, label, identify and leave the preparation for observation (Hydrophyte, Xerophyte, and Epiphyte) 10
2. Comment on the given materials C and D (Epiphyte, Halophyte, and Parasites) 08
3. Comment on ecological instrument E 04
4. Determination of water holding capacity of soil samples/ Soil textures of different soil samples/estimate the amount dust (particulate matter) deposition on the leaves of roadside plants. 08
5. Mark and label given Vegetation types of Karnataka/India in the supplied map 05
6. Record submission 05

****

B. Sc. IV Semester Practical Scheme of Evaluation

Title of the Paper: Ecology and ConservationBiology

Time: 3 Hours **Max. Marks: 40**

1. Identification of Hydrophytes, Xerophytes, Epiphytes (Any Two -5+5) 10
    a. Preparation : 03 Marks
    b. Identification : 01 Marks
    c. Sketch & Label : 01 Marks
2. Comment on the given materials C and D 08
    a. Identification : 01 Mark
    b. Comments : 03 Marks (Hydrophytes, Xerophytes, Epiphytes, Halophytes)
3. Comment on ecological Instrument 'E' 04
    a. Identification : 01 Mark
    b. Comments : 02 Marks
    c. Uses : 01
4. Determination of Water holding capacity of Soil/ Soil texture types/estimate the amount of dust deposited on leaves of roadside. 08
    a. Procedure : 06
    b. Results : 02
5. Mapping the vegetation / phyto-geographical types of Karnataka/India Marking and labeling 05
6. Record and Submission 05

****

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Semester – IV: Skill Course B2: Methods in plant sciences

Course Title:: Methods in plant sciences	**Course Code:24MJBOTC4S**
Total Contact Hours: 30 hrs	**No. of Credits:**02
L:T:P - 1:0:2	**Duration of SEE:**1 Hrs 30 min
Internal Assessment Marks: 10	**Semester End Exam Marks: 40**

Course Outcomes (COs):

On completion of this course, the students will be able to:

CO1. To learn principals and operations of microscopes and application in biology

CO2. To learn the techniques of separation of biological samples.

CO3. To understand the techniques of characterization of biomolecules.

CO4. To learn the techniques and principals of chromatography, spectrophotometry, blotting and molecular biology techniques and their advance versions.

…

Unit	Description	Hours
1	Microtomy and slide preparation: Fixatives and staining technique. Preparation of whole mounts. Bright-field stains and fluorochromes. Metachromatic staining reaction. Histochemical dyes for the localization of starch, proteins, nucleic acid and lipids. Spectroscopictechniques-Colorimetry,UV-VisibleAbsorptionSpectrophotometry,Infra-Red Spectrophotometry, Mass Spectrophotometry, NMR Spectrophotometry and GCMS,LCMS	10
2	Chromatographic techniques – Principle, Paper chromatography, Thin Layer Chromatography (TLC), Column chromatography and Gas Chromatography. Gas Liquid Chromatography (GLC), High Performance Thin Layer Chromatography (HPTLC), High Performance Liquid Chromatography (HPLC), Ion-Exchange Chromatography, Affinity Chromatography, Autoradiography. Characterization and isolation of proteins, nucleic acids and phytochemicals: Centrifugation, Mass spectrometry; X-ray diffraction; X-ray crystallography; Characterization of proteins and nucleic acids; FTIR.Molecular techniques: Southern, Northern, Western & Slot blots. PCR, DNA sequencing. Electrophoresis: AGE, PAGE, SDS-PAGE	10
3	Practicals 1. Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs. 2. Demonstration of ELISA 3. To separate nitrogenous bases by paper chromatography. 4. Isolation of chloroplasts by differential centrifugation. 5. To separate chloroplast pigments by column chromatography.	10

	6. To estimate protein concentration through Lowry's methods. 7. To separate proteins using PAGE. 8. To separate DNA (marker) using AGE. 9. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, differential staining, fluorescence and FISH). Preparation of permanent slides (double staining)	

Text Books for Reference:

k. Alan peacock H.1966 Elementary Microtechnique Edward Arnold (Pub) Ltd
l. Reid P.D. and R.F. Pont-Lezica (Eds.). 1992. Tissue Printing: tools for the study of anatomy, histochemistry, and gene expression. Academic Press. New York.
m. Conn H.J. 1991. Biological stains. Ninth Edition. Sigma Chemical Company, St. Louis. USA.
n. Prasad & Prasad 2000 Emkay Replications, Delhi. 8. Puru's M.J.et al 1966 Laboratory Techniques in Botany Butter Worths
o. Patki L.R.1992 An Introduction to MicrotechniqueS.Chand& Company, New Delhi.
p. Johnson D.A. 1940 Plant Microtechnique. Mac - Graw Hill, New Delhi.
q. Prasad & Prasad 2000 Emkay Replications, Delhi. 8. Puru's M.J.et al 1966 Laboratory Techniques in Botany Butter Worths
r. Krishnamrthy K.V. 1988. Methods in Plant Histochemistry. S. Viswanathan (Printers & Publishers) Pvt. Ltd. Madras.

*****

Examination pattern:40 Multiple Choice Questions for 40 Marks (OMR Based)

****

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Semester – V: Plant Morphology and Taxonomy

Course Title:: Plant Morphology and Taxonomy	Course Code:24MJBOT5L
Total Contact Hours: 56 hours	No. of Credits:04
L:T:P – 4:0:0	
Internal Assessment Marks: 20	Duration of SEE: 3 Hrs
Semester End Exam Marks: 80	

Course Outcomes (COs): After the successful completion of the course, the student will be able to CO1. Understanding the main features in Angiosperm evolution

CO2. Ability to identify, classify and describe a plant in scientific terms, thereby, Identification of plants using dichotomous keys. Skill development in identification and classification of flowering plants.

CO3. Interpret the rules of ICN in botanical nomenclature.

CO4. Classify Plant Systematic and recognize the importance of herbarium and Virtual Herbarium, Evaluate the Important herbaria and botanical gardens.

CO5. Recognition of locally available angiosperm families, plants, and economically important plants. Appreciation of human activities in conservation of useful plants from the past to the present….

Unit	Description	Hours
1	**Morphology: Vegetative Morphology** **Root**: General introduction including classification, Modifications for storage (fusiform, conical, napiform &fasciulated), support (epiphytic / aerial) & respiration (pneumatophores) floating and haustoria. **Stem**: General introduction, branching types, Modifications: Rhizome, stem tuber, bulb, corm, stolon, sucker, offset, phylloclade, thorn & tendril. **Leaf**: General introduction, types (Simple & Compound), Phyllotaxy (Alternate, opposite & whorled) and stipule and its types. Modifications: Phyllode, spines, tendrils, hooks. Insectivorous plant, pitcher plant, sundew plant & bladderwort. **Inflorescence**: General account of racemes & cymose including special cymes. **Floral Morphology of Flower**: Complete account of flower including Aestivation and placentation. **Fruit**: General account including classification & Types of fruits **Seed**: Structure of monocot & Dicot seed.	12
2	**Taxonomy of Angiosperms** **Introduction**: History, Objectives, Scope and Relevance of Taxonomy. **Systems of classification:** Artificial, Natural and phylogenetic; a brief account of Linnaeus, Bentham & Hooker, Engler &Prantl system, AGP IV(2006) and their merits and demerits.	10

	Taxonomic Literature: Floras and Manuals; Monographs and Revisions, Journals. **Herbaria and Botanical gardens: Herbarium:** Technique of Herbarium Preparation, importance of Herbarium, Important herbaria of world and India. Botanical Gardens and their importance, Important Botanical Gardens of the world and India. **Virtual herbarium:**E-flora; Documentation.	
3	**Concepts of Taxonomic Hierarchy**: Concept of Taxa (Family, Genus, Species); Categories and Taxonomic hierarchy; species concept (Biological, Morphological and Evolutionary). Modes of speciation. Problems with species concepts. **Botanical Nomenclature:** Principles and rules (ICN); Latest code: Madrid Code (2025)–brief account, Brief account of Ranks of taxa, Type concept (Typification), Rule of priority, Author citation., valid publication, rejection of names, principle of priority and its limitations; Names of hybrids/cultivated species.	10
4	**Plant Identification, Description and diagnostic features of angiosperm families** **Plant identification**: Taxonomic dichotomous keys; intended (yolked) and bracketed keys. (Brief account only). **Plant descriptions**: Common Terminologies used for description of vegetative and reproductive parts of the families. **Study of the diagnostic features of Angiosperm families and their economic importance (with suitable examples):** Annonaceae, Brassicaceae, Malvaceae, Rutaceae, Anacardiaceae, Ceasalipinaceae, Fabaceae, Mimosae, Myrtaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Acanthaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Liliaceae, Arecaceae and Poaceae. **Plant Taxonomic Evidences:** from palynology, embryology, cytology, Paleobotany, phytochemistry (Chemotaxonomy) and molecular data.	**14**
5	**Biometrics, Numerical Taxonomy; Phenetics and Cladistics:** Characters; Variations; Operational taxonomic Units (OTUs), character weighting and coding; Cluster analysis; Phenograms, cladograms (definitions and differences). **Phylogenetic Systematics:** Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, Paraphyly, polyphyly, clades, synapomorphy, symplesiomorphy, apomorphy, lineage sorting, serial homology etc). **Originandevolutionofangiosperms;**Co-evolutionofangiospermsandanimals;Methods of illustrating evolutionary relationship (phylogenetic tree,cladogram). **Molecular taxonomy:** Respect to DNA sequences of chloroplast genes (atpB, rbcL, ITS, trnL etc) and nuclear gene (nuclear ribosomal 18s DNA).	**10**

Text Books for Reference

Baker. H.G. 1970. Plant and Civilization, Wadsworth Publishing Company.

Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons –Chichester

Cotton, C.M. 1996. Ethnobotany – Principles and Applications. Wiley and Sons

Datta S C, *Systematic Botany*, 4th Ed, Wiley Estern Ltd., New Delhi, 1988.

Eames A. J. - *Morphology of Angiosperms* - Mc Graw Hill, New York.

Hall, B.G. (2011). *Phylogenetic Trees Made Easy: A How-To Manual*. Sinauer Associates, Inc. USA

Heywood - *Plant taxonomy* - Edward Arnold London.

Jeffrey C .J. and A. Churchil - *An introduction to taxonomy* – London.
Jeffrey,C.(1982).AnIntroductionto*PlantTaxonomy.*CambridgeUniversityPress,Cambridge
Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F., Donogue, M.J., 2002. *Plant Systematics: A Phylogenetic approach*, 2nd edition. Sinauer Associates, Inc., USA.
Lawrence - *Taxonomy of Vascular Plants* - Oxford & I B H, New Delhi.
Manilal, K.S. and M.S. Muktesh Kumar 1998. *A Handbook on Taxonomy Training*. DST, New Delhi.
Manilal, K.S. and A.K. Pandey, 1996. *Taxonomy and Plant Conservation*. C.B.S. Publishers & Distributors, New Delhi.
Manilal, K.S. 2003. *Van Rheede'sHortusMalabaricus. English Edition*, with Annotations andModern Botanical Nomenclature. (12 Vols.) University of Kerala, Trivandrum.
Naik V.N., *Taxonomy of Angiosperms*, 1991. Tata Mcgraw-Hill Pub. Co. Ltd., New Delhi.
Pandey, S. N, and S.P. Misra (2008)-*Taxonomy of Angiosperms*- Ane Books India, New Delhi.
RadfordAB,WCDickison,JMMassey&CRBell,*VascularPlantSystematics*,1974,Harper & Row Publishers, NewYork.
Singh G.2012. *Plant systematics: Theory and Practice*. Oxford and IBH, Pvt. Ltd., New Delhi.
Singh V. & Jain - *Taxonomy of Angiosperms* - Rastogi Publications, Meerut.
Sivarajan V. V - *Introduction to Principles of taxonomy* - Oxford &I B H New Delhi.
Any local/state/regional flora published by BSI or any other agency.

*****

Semester – V: Plant Morphology and Taxonomy

Course Title:Plant Morphology and Taxonomy	Course Code:24MJBOT5P
Total Contact Hours: 56 hours	**No. of Credits:**02
L:T:P – 0:0:4	
Internal Assessment Marks: 10	**Duration of SEE: 3 Hours**
Semester End Exam Marks: 40	

…

List of Experiments / Programs (For a Lab Course)

Practical No.	Experiments
1	Study of root and its modifications
2	Study of stem and its modifications; stipules and its types
3	Study of leaf structure and modifications
4	Study of inflorescence types. Study of flower and its parts, Study of fruits. Floral diagram and floral formula
5	Study of Dicot families mentioned in theory with at least two examples for each family and makes suitable diagrams, describe them in technical terms (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification) and identify up to species using the flora.
6	Study of monocot families mentioned in theory with at least two examples for each family and makes suitable diagrams, describe them in technical terms (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification) and identify up to species using the flora.
7	Identify plants/plant products of economic importance belonging to the families mentioned in the syllabus; with binomial, family and morphology of useful parts. Cotton, Mango, Red gram, Green gram, Horsegram, Blackgram, Bengalgram, Brinjal, Tomato,Chilly,Tamarind, Bittergourd, Luffa, Asfoetida, Cumin, Coriander, Coffee, Rubber, Ricinus, Ginger, Turmeric, Coir, Arecanut, Rice, Wheat, Ragi, Sugarcane, Annona muricata, Catharanthus roses, Rauvolfia serpentaina, Justicia adhatoda, Vitex negundo and Leucas aspera
8	Field visit: Local or outside area/ Botanical garden/ tribal settlements minimum 3 to 5days.
9	Submission: Record book, Tour report and Herbarium (Preparation of 10 properly identified herbarium specimens; mounting of a properly dried and pressed specimen of any common plants from your locality with herbarium label).

*****

THEORY EXAMINATION- MODEL QUESTION PAPER

Title of the Paper: Plant Morphology and Taxonomy

Time: 3.00 hours **Max Marks: 80**

Instructions:

g) Question paper comprises of four sections A, B, C, and D. All the sections are compulsory.

h) Draw the diagrams wherever necessary.

i) Drawings without label do not attract any marks.

SECTION- A

IX. Answer all the following questions. Each question carries ONE mark. 01x10=10

Questions number (1) to (10) Two questions from Each Unit

SECTION-B

X. Answer all the following questions. Each question carries TWO marks. 02x10= 20

Questions number (11) to (20) Two questions from Each Unit

SECTION-C

XI. Answer any Four questions from the following. Each question carries FIVE marks. 04x05= 20

Questions number (21) to (25) one questions from Each Unit and 26th Question can be formed from unit III or IV

SECTION-D

XII. Answer any Three questions from the following. Each question carries TEN marks. 10x03= 30

Questions number (21) to (25) one questions from Each Unit

****

B. Sc. V Semester Practical Model question Paper

Title of the Paper: Plant Morphology and Taxonomy

Time: 3 Hours **Max. Marks: 40**

7. Identify the families A, B, C, and D with reasons.	12
8. Describe 'E' with technical terms &Draw floral diagram with floral formula	06
9. Write the morphological & Biological importance of F, G & H and I	08
10. Write the economic importance of J and K	04
11. Record submission	05
12. Herbarium submission	05

****

B. Sc. V Semester Practical Scheme of Evaluation

Title of the Paper: Plant Morphology and Taxonomy

Time: 3 Hours **Max. Marks: 40**

1. Polypetalae (A), Gamopetalae (B), Monochlamydae (C), &Monocot (D)	12
a. Identification : 01 Mark	
b. Salient characters : 02 Marks	
7. Describe 'E' with technical terms &Draw floral diagram with floral formula	06
a. Technical Description : 03 Marks	
b. Flora formula and Floral diagrams : 03 Marks	
8. Write the morphological and Biological importance of	08
a. F- Root / Stem / Leaf Modifications : 02 Marks	
b. G-Inflorescence : 02 Marks	
c. H- Fruit : 02 Marks	
d. I- Seed : 02 Marks	
9. Write the economic importance of J (Dicot) & K (Monocot)	04
a. Family and Botanical Name : 02Marks	
b. Parts used and Uses : 02 Marks	
10. Record submission	05
11. Herbarium Submission (Ten plants from cultivated lands or college campus)	05

****

Semester – V (Elective Course) B1: Plants for Human Welfare

Course Title:: Plants for Human Welfare	Course Code: 24MJBOT5E
Total Contact Hours: 30	**No. of Credits:**02
L:T:P = 2:0:0	
Internal Assessment Marks: 10	**Duration of SEE:** 1 Hrs 30 min
Semester End Exam Marks: 40	

Course Outcomes (COs): After the successful completion of the course, the student will be able to

CO1: Identify edible and no-edible plants and evaluate the value and uses of biodiversity: Ethical and aesthetic value

CO2: Understand and asses importance of cereals, millets, legumes and nuts and nutrient contents

CO3: Apply skill to manage plant diversity

CO4: Familiar with names of common fruits, food value and health benefits of fruits of India subcontinent.

CO5: Analyze the composition of edible portion of common vegetables

CO6: Identify and classify common spices, condiments and flavouring

CO7: Understand the importance of and decide which are the best natural sugars, starches and cellulose products; beverages and fiber plants for good health.

CO8: Assess utility of forest and forest products.

Unit	Description	Hours
1	**Introduction**: Overview of economically important plants and their role in human welfare. **Plants as sources of food**:Plants as sources of protein (Pulses), carbohydrate and dietary fibres. Important cereals and pulses. Important spices and condiments; Non-alcoholic beverages derived from plants: Tea, Coffee, Cocoa. Brief history of origin, cultivation and domestication of rice and Wheat. **Oil yielding plants**: Classification of oils, processing and purification of different edible oil from Sunflower, Groundnut, Safflower and non-edible oil from *Sesamum indica*, Linseed oil, Eucalyptus oil, citrus oil.	08

2	**Plant based medicinal systems:** Ayurveda, sidda, unani and folk medicine. Diversity of medicinal plants of India. Plants in beauty care. Contribution of medicinal plants to modern medicine: Important plant derived modern medicines and their uses. History of development of *Rauwolfia serpentina, Taxus baccata, Cinchonaofficinalis* and *Catharanthus roseus* based drugs. **Plants in industry, culture and climate regulation**: Industrially and commercially important plants and their products- paper, rubber, timber, Fibre yielding, cane, and sugar. Wood types and its resources. Development of Bt-cotton as a source of fibre through genetic engineering.	12
3	Garden and ornamental plants. Religious and cultural use of plants. Role of plants and forests in climate and environment regulation- carbon sequestration and control of global warming, flood control, pollution control, regulation of water cycle and water purification. **Plant based Biofuels**: Impotence of Biofuels, Plants used for extraction of Biofuels: Jatropa, Pongamia, Maize, Madhuca etc. Economic viability of biofuels, Application as alternate source of diesel.	10

Reference Books:

Hill A.F. 1952. Economic Botany. Tata-McGraw Hill, New Dlhi.

Kochhar S.L. 1998. Economic Botany of Tropics. MacMillan India Publishers, New Delhi.

Pandey, B.P. 2000. Economic Botany. S.Chand and Company, New Delhi.

Pandey S.N. and Chandha A. 1999. Economic Botany. Vikas Publishing House Pvt. Ltd. New Delhi.

*****

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Semester – V: SEC-3: Elementary Research Methodology

Course Title: Elementary Research Methodology	**Course Code:24RMBS5S**
Total Contact Hours: 30 hrs	**No. of Credits:**02
L: T:P: 2:0:0	**Duration of SEE:**1 Hrs 30 min
Internal Assessment Marks: 10	**Semester End Exam Marks: 40**

Course Outcomes (COs): On completion of this course, the students will be able to:

CO1: To learn Types of research and literature review methods.
CO2: To learn the techniques of preparations of reagents, solutions.
CO3: To understand the common calculations for molarity, molality.
CO4:to learn the scientific writing techniques.
CO5: To learn different methods and techniques of plant materials preparations for the basic research work to conducted at the laboratory.

...

Unit	**Description**	**Hours**
1	**Basic concepts of research:** Research-definition and types of research (Descriptive vs analytical; applied vs fundamental; quantitative vs qualitative; conceptual vs emperical). Research methods vs methodology. Literature-review and its consolidation; Library research; field research; laboratory research. **General laboratory practices:** Common calculations in botany laboratories. Understanding the details on the label ofreagent bottles. Molarity and normality of common acids and bases. Preparation of solutions. Dilutions. Percentage solutions. Molar, molal and normal solutions. Technique of handling micropipettes; Knowledge about common toxic chemicals and safety measures in their handling.	12
2	**Data collection and documentation of observations:** Maintaining a laboratory record; Tabulation and generation of graphs. Imaging of tissue specimens and application of scale bars. The art of field photography. **The art of scientific writing and its presentation** Numbers, units, abbreviations and nomenclature used in scientific writing. Writingreferences. PowerPoint presentation. Poster presentation. Scientific writing and ethics,Introduction to copyright-academic misconduct/plagiarism.	08
3	**Methods to study plant cell/tissue structure:** Whole mounts, peel mounts, squash preparations, clearing, maceration and sectioning; Tissue preparation: living vs fixed, physical vs chemical fixation, coagulating fixatives, noncoagulant fixatives; tissue dehydration using graded solvent series; Paraffin and plastic infiltration; Preparation of thin and ultrathin sections.Staining procedures, classification and chemistry of stains. Staining equipment. Reactive dyes and fluorochromes (including genetically engineered protein labelling with GFP and other tags). Cytogenetic techniques with squashed plant materials.	10

Text Books for Reference:

1. Dawson, C. (2002). Practical research methods. UBS Publishers, New Delhi.
2. Stapleton, P., Yondeowei, A., Mukanyange, J., Houten, H. (1995). Scientific writing for agricultural research scientists – a training reference manual. West Africa Rice Development Association, Hong Kong.
3. Ruzin, S.E. (1999). Plant microtechnique and microscopy. Oxford University Press, New York, U.S.A

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Semester – VI: Plant Physiology and Plant Biochemistry

Course Title:Plant Physiology and Plant Biochemistry	**Course Code:24MJBOT6L**
Total Contact Hours: 56 Hours	**No. of Credits:**04
L:T:P – 4:0:0	
Internal Assessment Marks: 20	**Duration of SEE:** 3 Hrs
Semester End Exam Marks: 80	

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1.Importance of water and the mechanism oftransport.

CO2. To understand biosynthesis and breakdown ofbiomolecules.

CO3. Role of plant hormones in plant development and about secondary metabolites.

CO4. Preliminary understanding of the basic functions and metabolism in a plant body.

CO5. To understand the importance of nutrients in plant metabolism and crop yield.

Unit	Description	Hours
1	**Plant water relations**: Importance of Water as a solvent, Diffusion, osmosis, imbibition, osmotic pressure, osmotic potential, turgor pressure, wall pressure, water potential and its components. Mechanism of water absorption, Factors affecting water absorption. **Transpiration.**Typesandprocess.Mechanismofguardcellmovement.K+ionmechanism. Antitranspirants. **Mechanism of ascent of sap:** Vital and physical force theories. **Phloem Transport:** Transport of organic solutes. Path of transport, vein loading and unloading. Transcellular hypothesis, mass flow hypothesis. **Mineral nutrition:** A brief account on Micro and macronutrients**.**	12
2	**Photosynthesis**: Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Photophosphorylation (cyccli and Non-cyclic) Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation;Photorespiration. **Respiration**: Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway. **Nitrogen metabolism:** Biological nitrogen fixation; Nitrate and ammonia assimilation.	10
3	**Plant growth regulators**: Definition and classification of plant growth regulators- Hormones. Site of synthesis, biosynthesis pathway and metabolism	

	and influence on plant growth development of individual group of hormone- Auxins, Gibberlins, cytokinins, ABA, ethylene . Synthetic growth regulators- classification, their effect on plant growth and development. Practical utility in agriculture andhorticulture**.**	10
4	**Sensory Photobiology**: Biological clocks, photoperiodism, function & structure of phytochromes, phototropin& cryptochromes. Senescence, Aging & Cell Death (PCD and autophagosis). Plant Movements: Introduction, Classification, tropic movements (Hydro, Geo, Phototropic) and Sismonastic.	**12**
5	**Plant Biochemistry** **Carbohydrate:** Classification and structure of carbohydrates, and carbohydrate metabolism **Enzymes**: Nomenclature, Structure, Classification and Mode of enzyme action **Proteins and amino acids**: Amino acids and classification, Protein structure - primary, secondary, tertiary and quaternary. **Vitamins** - classification, distribution, structure, production, function. **Lipids and fats:** classification, structure, function and biosynthesis of fatty acids. **Secondary plant products**: structure, biosynthesis and distribution of terpenes, phenolics and nitrogen containing compounds.	**12**

Text Books for Reference

1. Wilson, K. and Walker, J. 1994 Fundamentals of Biochemistry 2nd Ed, John Wiley and Sons Inc.

2 .JainV K, 2008. Fundamentals of Plant Physiology.S Chand andCo.

3. Kochhar P L, Krishnamoorthy H N. Plant Physiology. Atmaram and sons,Delhi.

4. Kumar and Purohit. Plant Physiology: Fundementals and Applications.AgrobotanicalPublishers.

5. Malik CP, 2002. Plant Physiology. Kalyanipublishers.

6. Mukherjii S, Ghosh AK, 2005. Plant Physiology. New Central Book Agency,Culcutta.

7. Noggle GR, Fritz GJ, Introductory Plant Physiology.Prentice Hall ofIndia.

8. Pandey SN, Sinha BK, 2006. Plant physiology.Vikas Publishing House,NewDelhi.

9. Salisbury F B, Ross C W, 1992. Plant Physiology. CBS publishers and Distributers,NewDelhi.

10. Sinha A K, 2004. Modern Plant Physilogy. Narosa publishing House,NewDelhi.

11. Srivastava H S, 2004. Plant physiology and Biochemistry. Rasthogipublications.

12. Verma V, 2007.Text Book of Plant Physiology. Ane Books Pvt.Ltd.

*****

Semester – VI: Plant Physiology and Plant Biochemistry

Course Title: Plant Physiology and Plant Biochemistry	Course Code:24MJBOT6P
Total Contact Hours: 56 hours	**No. of Credits:**02
L:T:P – 0:0:4	
Internal Assessment Marks: 10	**Duration of SEE:** 3 Hours
Semester End Exam Marks: 40	

…

List of Experiments / Programs (For a Lab Course)

Practical No.	Experiments
1	Experiment to demonstrate the phenomenon of diffusion
2	Experiment to demonstrate the phenomenon of osmosis using parchment paper/egg membrane and potato boat experiment
3	Experiment to determine the osmotic pressure of the cell sap by plasmolyticmethod.
4	Experiment tocomparetherateoftranspirationfromthetwosurfacesofleafbycobaltchloridepapermethod.
5	Experiment to demonstrate that oxygen is liberated in the process ofphotosynthesis.
6	Experiment to demonstrate effect of carbon di oxide concentration on the rate of photosynthesis
7	Experiment to demonstrate the effect of different wave length of light on photosynthesis
8	Experiment to demonstrate root pressure / transpiration pull inplants.
	Experiment to measurement of Transpiration Rate
9	Experiment to demonstrate unequal transpiration
10	Experiment to demonstrate transpiration by Bell jar experiment
11	Experiment to Compare the rate of transpiration from both the surfaces of leaf by Garreau's Potometer
12	Experiment to measure the rate of transpiration by using simple potometer or Darwin's potometer
13	Experiment to demonstrate the suction and to measure suction force due to transpiration
14	Experiment to measure the rate of transpiration by using Farmer's Potometer and Ganong's potometer
15	Experiment to demonstration of Transpiration by Four-Leaf Experiment
16	Experiments to demonstration of aerobic and anaerobic respiration
17	Separation of photosynthetic pigments by paper chromatography and measure their Rfvalues.
18	Experiment to isolate and identify the amino acids from a mixture using paperchromatography.
19	Experiment to Study ofplant movements
20	Experiment to demonstrate plant growth by arc auxanometer
21	Biochemical test for Cellulose, Lignin, Starch, Protein, Cystoliths and Raphides

B. Sc. Botany Sixth Semester

THEORY EXAMINATION- MODEL QUESTION PAPER

Title of the Paper: Plant Physiology and Plant Biochemistry

Time: 3.00 hours **Max Marks: 80**

Instructions:

j) Question paper comprises of four sections A, B, C, and D. All the sections are compulsory.

k) Draw the diagrams wherever necessary.

l) Drawings without label do not attract any marks.

SECTION- A

XIII. Answer all the following questions. Each question carries ONE mark. 01x10=10

Questions number (1) to (10) Two questions from Each Unit

SECTION-B

XIV. Answer all the following questions. Each question carries TWO marks. 02x10= 20

Questions number (11) to (20) Two questions from Each Unit

SECTION-C

XV. Answer any Four questions from the following. Each question carries FIVE marks. 04x05= 20

Questions number (21) to (25) one questions from Each Unit and 26th Question can be formed from unit III or IV

SECTION-D

XVI. Answer any Three questions from the following. Each question carries TEN marks. 10x03= 30

Questions number (21) to (25) one questions from Each Unit

****

B. Sc. VI Semester Practical Model question Paper

Title of the Paper: Plant Physiology and Plant Biochemistry

Time: 3 Hours **Max. Marks: 40**

13. Perform the Physiology expt. 'A' and show to examiner (Major Expt.).	10
14. Perform the physiology expt. 'B' and show to examiner (Minor Expt).	07
15. Conduct a micro chemical test in specimen 'C' and identify the cell Inclusions	03
16. Identify and comment on the physiological expt. D , E , F, G & H	15
17. Record submission	05
18.	

****

B. Sc. VI Semester Practical Scheme of Evaluation

Title of the Paper: Plant Physiology and Plant Biochemistry

Time: 3 Hours **Max. Marks: 40**

1. Physiology experiment 'A'		10
a. Principle and Procedure	: 05 Marks	
b. Setting up experiment	: 05 Marks	
12. Physiology experiment B		07
a. Principle and Procedure	: 04 Marks	
b. Setting up experiment	: 03 Marks	
13. Conduct a micro chemical test in specimen 'C'		03
a. Experiment	: 02 Marks	
b. Result and interference	: 01 Mark	
14. Identify and comment on the physiological expt. D , E , F, G & H		15
a. Identification of the experiment	: 01 Mark	
b. Aim of the experiment	: 02Marks	
c. Principle of the experiment	: 02 Marks	
15. Record submission		05

****

VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Semester – VI (Elective Course) B2: Floriculture

Course Title:: Floriculture	**Course Code:A24MJBOT6E**
Total Contact Hours: 30	**No. of Credits:**02
L:T:P = 2:0:0	
Internal Assessment Marks: 10	**Duration of SEE:** 1 Hrs 30 min
Semester End Exam Marks: 40	

Course Outcomes (COs): After the successful completion of the course, the student will be able to

CO1: Identify and describe the ornamental flowering plants.
CO2: Practice the methods of preparing soil and water, cultivation and propagation methods.
CO3: Design, prepare and apply appropriate combinations of plants and methods of cultivationfor commercial setup.
CO4: Adapt to the job role of Floriculturist (employment/ entrepreneurship)

Unit	Description	Hours
1	Introduction to floriculture, tools and equipment's. Study of diversity in shape, size, and colour of flowers(includingbasicbotany,nomenclature,commonnameandgeneraluses). Identification and preparation of an inventory of herbaceous flowering plants, climbers, shrubs, and trees around the campus. Study the various physico-chemical properties of soil.	12 hrs
2	Methods of preparation of floral beds, soil preparation, green-house design and fumigation methods. Methods of seed sowing and raising flowering plants through seeds, bulbs and through vegetative methods in planters, containers and in and out door environments. Role of light, plant growth regulators and nutrients in blooming and flowering. Bacterial and fungal diseases and pests of ornamental flowers and their management.	09 hrs
3	Interior decoration methods, flower arrangements (Japanese, Western and Indian). Harvesting, methods to increase the shelf life of flowers, post-harvest care and marketing platforms for the floriculture industry. Field visit to nearby nursery/garden to understand basic aspects of Garden design. Five flowering plants that are grown commercially, their share in the global market, methods used for selling the products and importance of the floriculture industry in job creation.	09 hrs

Reference Books:

Randhawa, G.S., Mukhopadhyay, A. (1986). Floriculture in India. New York, NY: Allied Publishers.

Larson, R. A. (Ed.). (2012). Introduction to floriculture. Elsevier

Pal, S. L. (2019). Role of plant growth regulators in floriculture: An overview. J. Pharmacogn. Phytochem, 8, 789-796.

Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.

Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.

Semester – VI: Elementary Research Project

Course	**B.Sc. Botany 6th Semester**
Subject	**Elementary Research Project**
Code	**24MJBOT6R**
L:T:P	**0:0:4**
IA marks	**10 marks**
Suggestive topics	Microbial World, Non-flowering plants, Plant Histology, Anatomy, Developmental Biology, Ecology and conservation Biology, Plant Morphology, Plant Physiology, Medicinal and Aromatic plants, Plants for human welfare, Floriculture, Phytochemistry and Pharmacognostic studies.
Selection topics	Based on current issues and possibilities to perform in-house/ field visit may be finalized in consultation with the respective guide.
Time and duration	The students should complete the research project during vacation soon after 5th semester / weekly 4 hours during weekend and submit the report during the 6th semester. (Max 5 students per group)
Mode of Evaluation in SEE	Final Presentation of completed project report : 10 marks Viva-voce: 10 marks Final Report: 20 marks Total : 40 marks

First IA (Presentation): Finalization of topic; framing the objectives, Review of Literature, methodology, expected outcomes.	05 marks
Second IA (Presentation): Results and discussion and major findings	05 marks
Total marks scored	10 marks