

Sri Kaliswari College (Autonomous), Sivakasi

(Affiliated to Madurai Kamaraj University)

Re-Accredited with 'A' grade (CGPA 3.30) by NAAC



Programme Scheme, Scheme of Examination and Syllabi

(For those who join from June 2018 and afterwards)

Department of Botany

PG Programme – M.Sc. Botany

Curriculum Design and Development Cell

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

M.Sc. Botany (Semester) - (2018-2020)

Objectives, Outcomes, Regulation

Programme Objectives:

- To teach the fundamentals of Botany.
- To impart various field of Botany.
- To prepare the students to identify the flower.
- To mould them to become Botanist.

Programme Outcomes:

Knowledge

PO 1 : Acquisition of advanced knowledge for higher studies and research.

PO 2: Synthesis of knowledge and critical thinking

Skills

PO 1 : Life Skills and Skills for contribution to nation building.

PO 2: Acquisition of specialized skills for entrepreneurship/employability.

Attitude

PO 1: Acquisition of professional ethics and human values.

PO 2 : National Integration and Social Commitment to Society.

Programmes Specific Outcomes:

- **Knowledge:** Core Course of botany improve their knowledge and understanding of the subject.
- **Skill Development:** Practical training in all the aspects of botany.
- **Higher level ability:** Technical skills like Dissection of plants, Field study of flora, Plant pigment separation, Genetics, Biochemical tests and Isolation of microorganisms develop higher level ability.
- **Progression to higher studies:** Indepth knowledge on Plant world, Algae&Bryophytes, Herbal botany, Plant breeding, Pteridophytes, Gymnosperms&Paleobotany equip the students to go for higher studies.
- **Entrepreneurship and Employment:** Knowledge on Mushroom cultivation, Horticulture have ample employment opportunities.

Regulation:

Duration of the programme : Two years (Equivalent to four semesters)

Eligibility:

Candidates who have completed B.Sc., degree in Botany, Zoology, Biochemistry, Microbiology, Biotechnology or any branch of life sciences, Chemistry, Mathematics and Physics with any subject in life sciences as ancillary subject.

Candidates secured at least 60% of marks in aggregate are eligible to apply.

A relaxation of 10% marks in the aggregate will be given to SC/ST/PH students.

Medium of Instruction : English

Age Limit:

Max age limit : No Age limit

Transitory Permission:

Students joined from 2018 to 2020 may be permitted to write their examinations in this pattern up to April 2023.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
Choice Based Credit System
PG Programme - Botany
2018 - 2020

Scheme of Examination / Question Paper Pattern

Theory Examination

The Internal and External marks should be allotted in the ratio 25:75.

Internal Marks :

i. Test (3 Tests)	: 15 Marks (Average of the best two tests)
ii. Assignment	: 5 Marks (Average of two)
iii. Seminar / Quiz	: 5 Marks
Total	: 25 Marks

External Question Paper Pattern :

The question paper for external exam will have three parts.

Time: 3 Hours

Max.Marks: 75

Part – A

(10 X 1 =10)

Question No.1 to 10 – All are Multiple Choices (2 Questions from Each Unit)

Part – B

(5 X 7 =35)

(Choosing Either (a) or (b) Pattern (One Question from Each Unit)

Question No.	11. (a) or 11. (b)	- From Unit I
	12. (a) or 12. (b)	- From Unit II
	13. (a) or 13. (b)	- From Unit III
	14. (a) or 14. (b)	- From Unit IV
	15. (a) or 15. (b)	- From Unit V

Part – C

(3 X 10 =30)

Answer any Three out of Five Questions (One Question from Each Unit)

Question No. 16 – 20.

16	- From Unit I
17	- From Unit II
18	- From Unit III
19	- From Unit IV
20	- From Unit V

Blue Print for Question Paper Setting

Component Unit	Knowledge			Understanding			Higher objective			Total Marks
	PART A	PART B	PART C	PART A	PART B	PART C	PART A	PART B	PART C	
UNIT I	1 (1) 2 (1)				11a (7)	16 (10)		11b (7)		26
UNIT II	3 (1) 4 (1)	12a (7)				17 (10)		12b (7)		26
UNIT III	6 (1)	13a (7)			13b (7)		5 (1)		18 (10)	26
UNIT IV	8 (1)		19 (10)		14a (7) 14b (7)		7 (1)			26
UNIT V	9 (1) 10 (1)	15a (7)			15b (7)	20 (10)				26
Total	8	21	10		35	30	2	14	10	130

- Knowledge based - 30%
- Understanding - 50%
- Higher Objective - 20%

***Practical Examination (Practical Lab)**

Internal Marks :

- i. Average of two tests : 30 Marks
- ii. Lab Performance : 10 Marks
- Total : 40 Marks**

External Marks:

- i. Dissection/Demonstration : 30 Marks
- ii. Spotters Identification : 20 Marks
- iii. Record Note : 10 Marks
- Total : 60 Marks**

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
Choice Based Credit System- Curriculum Structure
PG Programme-M.Sc Botany
2018-2020

Course	Sem I	Sem II	Sem III	Sem IV	Credits
Core Courses	6(5)	6(5)	6(5)	6(5)	78
	6(5)	6(5)	6(5)	6(5)	
	6(5)	6(5)	6(5)	6(5)	
	6(4)	6(4)	6(4)	12(7)	
Major Elective	6(4)	6(4)	-	-	8
Non - Major Elective	-	-	6(4)	-	4
Total hours (per week)	30	30	30	30	90 120

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
Choice Based Credit System-Curriculum Pattern
PG Programme - M.Sc Botany
2018-2020

Sem ester	Course code	Title	Hours	Credits
I	18PBYC11	Core Course I: Taxonomy of Angiosperms	6	5
	18PBYC12	Core Course II: Developmental Botany	6	5
	18PBYC13	Core Course III: Instrumentation and Bio-techniques	6	5
	18PBYC1P	Core Course IV: Practical I Lab in taxonomy of Angiosperms, Developmental Botany, Instrumentation and Bio-techniques	6	4
		Major Elective Course I:	6	4
	18PBYO11 18PBYO12	1. Herbal Botany 2. Biofertilizer Technology		
		Total	30	23
II	18PBYC21	Core Course V: Plant Diversity (Algae, Fungi and Lichens, Bryophytes, Pteridophytes and Gymnosperms)	6	5
	18PBYC22	Core Course VI: Cell and Molecular Biology	6	5
	18PBYC23	Core Course VII: Bioinformatics and Biostatistics and Plant biotechnology	6	5
	18PBYC2P	Core Course VIII: Practical II : Lab in Plant Diversity, Cell and Molecular biology, Bioinformatics, Biostatistics and Plant Biotechnology	6	4
		Non Major Elective Course I:	6	4
	18PBYN21	Mushroom Cultivation		
		Total	30	23
III	18PBYC31	Core Course IX: Microbiology and Plant pathology	6	5
	18PBYC32	Core Course X: Genetics and Evolution	6	5
	18PBYC33	Core Course XI: Biochemistry	6	5
	18PBYC3P	Core Course XII: Practical III Lab in Microbiology and Plant Pathology, Genetics and Evolution and Biochemistry	6	4
		Major Elective Course II :	6	4
	18PBYO31 18PBYO32	1. Biodiversity and Conservation 2. Palynology and Pollination Biology		
		Total	30	23
IV	18PBYC41	Core Course XIII: Plant Physiology	6	5

	18PBYC42	Core Course XIV: Plant Ecology	6	5
	18PBYC4P	Core Course XV: Practical IV Lab in Plant Physiology and Plant Ecology	6	4
	18PBYJ41	Core Course XVI: Project	12	7
		Total	30	21
Total			120	90

Semester	I	II	III	IV	Total
Credits	23	23	23	21	90

Dean of Science

Dean of Academic Affairs

Principal

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

PG Programme - M.Sc

Semester I

(2018-2020)

Core Course -I: Taxonomy of Angiosperms (18PBYC11)

(For those who join from June 2018 and afterwards)

Credits : 5

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks :100

Course Objectives:

- To understand the principles and methodology of Plant taxonomy.
- To develop skills for identifying plants using morphological traits and dichotomous keys in laboratory and field.
- To develop the ability to recognize major plant families and representative species
- To demonstrate the bases for assessing taxonomic relationships among flowering plants.
- To develop skill to identify the local flora.

Course Outcomes:

1. Understand the morphological features of vegetative, inflorescence, fruits and seed characters.
2. Provide knowledge on botanical nomenclature, classifications, merits and demerits of various systems of classifications.
3. Understand the systematics positions of the selected families of the flowering plants with their economic importance.
4. Provide the knowledge about the identification of plant species.
5. Students to be familiar with local flora and herbarium techniques.

UNIT I

(18 hrs)

Introduction, Scope and importance of Taxonomy; Classification; Systems of classification – Artificial – Linnaean system. Natural – Bentham and Hooker system. Phylogenetic – Engler and Prantl and Hutchinson, Takhtajhan and Cronquist system (Comparative study)-Merits and Demerits.

UNIT II

(18 hrs)

ICN Plant Nomenclature, Principles and effective and valid publication; typification and author citation, retention and rejection of names, publication of names, rules of priority.

UNIT III

(18 hrs)

Modern concept and trends in Plant taxonomy; Elementary treatment of Cytotaxonomy, Chemotaxonomy, Numerical Taxonomy, Molecular Taxonomy, Cladistics, Herbarium techniques.

UNIT IV

(18 hrs)

Study the important character and popular examples of the following natural order of Bentham and Hooker classification – Distingue characters and Floral characters of Annonaceae, Protolocaceae, Fabaceae, Malvaceae, Meliaceae, Tiliaceae, Rubiaceae, Sapotaceae, Solanaceae, Apocynaceae, Acanthaceae and Lamiaceae.

UNIT V**(18 hrs)**

Distingue characters and floral characters of Amaranthaceae, Euphorbiaceae, Loranthaceae, Orchidaceae, Liliaceae, Commelinaceae, Cyperaceae and Arecaceae.

Text Books:

1. Sharma, O.P., "Plant Taxonomy", Tata Mc Graw-Hill Publications, Pvt. Ltd., 2006.
2. Annie Regland, Kumaresan, "Angiosperms", Saras Publications, Nagarcoil, 2014.
3. Panday, B.P., "Text Book of Botany Angiosperms", S.Chand and Company Pvt. Ltd., 2015.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	1	1.1 - 2.5	1-18
II	1	3	3.3-3.6	18-43
		14	14.1-14.6	125-131
III	2	5	1.1-1.6	43-137
IV	3	4	4.1- 31.1	98-350
V	3	33	33.1-38.1	358-395

Reference Books

1. Lawrence, G.H.M., "Taxonomy of vascular plants", Mac Millan, New York, 1959.
2. Sokal, R.R. and Sneath P.H.A., "Principles of numerical taxonomy", Fremen and Co. San Francisco. USA, 1963.
3. Stace, C., "Plant Taxonomy and Biosystematics", Edward Arnold, London, 1985.
4. Subrahmanyam, N.S., "Modern Plant Taxonomy", Vikas Publishing House PVt. Ltd. New Delhi, 1999.
5. Cole, A.J., "Numerical Taxonomy", Academic Press, London, 1969.
6. Takhtajan, A.L., "Diversity and Classification of Flowering Plants", Columbia Univ. Press, New York, 1997.
7. Woodland, D.W., "Contemporary Plant Systematic", Pretice Hall, New Jersey, 1991.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

PG Programme - M.Sc

Semester I

(2018-2020)

Core Course -II: Developmental Botany (18PBYC12)

(For those who join from June 2018 and afterwards)

Credits : 5

Int. Marks : 25

Hours/Week : 6

Ext. Marks : 75

Duration : 90 hrs

Max. Marks :100

Course Objectives:

- To understand the structure and development of male and female reproductive organs of angiosperms
- To analyze the morphogenetic potentials pertaining to its development of various organs

Course Outcomes:

1. Provide information about internal structure of stem, root and leaf.
2. Improve the knowledge about the general aspects of plant reproductive organs and embryo and its development.
3. Studied with a fundamental practices of plant embryology.
4. Provide the knowledge about the various aspects of morphogenesis.
5. Identifying the key aspects of embryology of Angiosperms.
6. Understand the process of formation of male and female sexual representatives.
7. Studied the mechanism of fertilization in angiosperms.
8. Improve the knowledge embryo development and endosperms.

UNIT I

(18 hrs)

Meristems – Characters, Classification and theories – Apical cell theory, Tunica – Corpus theory and Korper – Kappe concept. Vascular cambium – Types, divisions, arrangement and seasonal activity. Origin, Development, function and Structure of xylem and phloem. Anomalous secondary growth in Dicots and Monocots – each two samples.

UNIT II

(18 hrs)

Leaf Origin– Initiation, Apical, Intercalary, Marginal and Development of Vascular Tissues. Transfer Cells – Structure, Development and Functions. Flower - Floral Anatomy and its Role in Classification. Types and Structure Plant Gall. Role of Polarity in Cell Differentiation, Symmetry. Role of Sucrose in Vascular Tissue Differentiation.

UNIT III

(18 hrs)

Embryology

Microsporogenesis ; Anther and Pollen Development; Physiological Relationship of Tapetum and Sporogenous Tissues, Pollen Fertility, Sterility, Pollen Storage and Pollen Germination; Megasporogenesis; Female Gametophyte Development, Structure of Pistil.

UNIT IV**(18 hrs)**

Pollen – Pistil Interaction and Fertilization, Types of Stigma and Style, Events on Stigmatic Surface, Pollen Tube Growth, Guidance and Entry into Ovule and Embryosac, Double Fertilization – Significance; Incompatibility – Interspecific – Homomorphic and Heteromorphic Causes and Methods to Overcome Incompatibility. Classification of Embryo Development In Dicots and Monocots.

UNIT V**(18 hrs)**

Endosperm, Anther, Ovule, Ovary and Embryo Culture and Their Significance. Haploid and Their Significance. Perasexual Hybridization in Crop Improvement.

Text Books:

1. Bhojwani, S.S. and Bhatnagar, S.P., “Embryology of Angiosperms”, S.Chand and Co., NewDelhi, 2016.
2. Tayal, M.S. “Plant Anatomy”, Rastogi publications, Meerut, 2017.

Unit	Text Book No.	Chapter	Section	Page. No.
I	1	5	5.1 - 5.4	46 – 52
II	1	6	6.1 – 8.6	56 – 92
III	1	18	14.1-18.5	132 – 229
IV	2	1	1.1-1.2	12 - 24
		6	2.4 - 2.6	45 – 101
V	2	7	7.1 – 8.6	108 – 145

Reference Books

1. Johri, B.M., “Embryology of Angiosperms”, Springer Verlag, Berlin, 1984.
2. Pandey, A.K., “Introduction to Embryology of Angiosperms”, CBS Publishers and Distributors, New Delhi, 1997.
3. Pandey, S.N. and Chadha, A., Embryology. Vikas Publishing House Pvt. Ltd., New Delhi, 2000.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
PG Programme - M.Sc
Semester I
(2018-2020)

Core Course -III: Instrumentation and Bio-techniques (18PBYC13)
(For those who join from June 2018 and afterwards)

Credits : 5

Int. Marks : 25

Hours/Week : 6

Ext. Marks : 75

Duration : 90 hrs

Max. Marks :100

Course Objectives:

- To understand the theoretical and practical knowledge of instruments in modern biology.
- To understand the working principles and applications of instruments used in the studies related to various disciplines of biological sciences.

Course Outcomes:

1. Learning to different types of microscopes and their uses of biological science laboratories.
2. Describe the pH measurement in soil and water samples
3. Realise the need of centrifuges and their uses in research
4. Understand the principle, Applications and different methods of chromatography.
5. Realise the importance of UV-Visible.
6. Describe the principle of flame photometer and bomb calorimeter

UNIT I

(18 hrs)

Microscopy General principles and their Application-Compound Microscope, SEM and TEM. Microtomy - Principle and application, types – Fixation – Embedding – Sectioning – Staining.

UNIT II

(18 hrs)

pH; basic principles and construction of pH meter- pH electrodes- Principles and application of buffers Mechanism of buffer action and preparation of common buffers- Citrate, acetate, tris and phosphate- Application of buffers- pH measurements of soil and water.

UNIT III

(18 hrs)

Centrifugation- Centrifuges and their uses- Micro centrifuge, high speed refrigerated centrifuges, ultra centrifuges, differential and density gradient centrifugation. Electrophoresis (SDS – PAGE and Agarose), Two dimensional Electrophoresis, Blotting techniques – Southern, Northern and Western Blotting,

UNIT IV**(18 hrs)**

Chromatograph- Paper, thin layer, Ion-exchange, column, affinity - separation of amino acids and sugars- Gas liquid chromatography, HPLC.

UNIT V**(18 hrs)**

Spectroscopic techniques- UV-Visible and FT-IR - Flame photometer and Lyophilizer- Principle and applications.

Text Books:

1. Annie Ragland and Kumaresan, N., “Plant Anatomy and Microtechniques”, Saras Publications, 2018.
2. Arumugam, Gopi, Sundaralingam, Meena and Kumaresan, “Biostatics computer application bioinformatics instrumentation”, Saras publication, Nagarcoil. 2010.
3. Plummer, D.T., “An introduction to practical Biochemistry”, Tata Mcgraw Hill, 1996.
4. Palanivelu, P., “Laboratory manual for analytical biochemistry and separation techniques”, School of Biotechnology, Madurai Kamaraj University. 2000.

Unit	Text Boo No.	Chapter	Section	Page No.
I	1	62	62. 1	297-310
II	1	65	65.1	311-314
III	3	5	-	117-225
IV	2	29	29.1	386-395
		31	31.1	409-421
V	4	6	-	118-229

Reference Books:

1. Johanson, D.A., “Plant Microtechniques”, Macgraw Hill, 1940.
2. Stock,R and Rice, C.B.F., “Chromatographic methods”, Chapman and Hall, 1980.
3. Ruzin, Z.E., “Plant Microtechique and Microscopy”, Oxford university press, New York, 1999.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
PG Programme - M.Sc
Semester I
(2018-2020)

**Core Course -IV: Practical I Lab in Taxonomy of Angiosperms, Developmental Botany,
Instrumentation and Biotechniques (18PBYC1P)**
(For those who join from June 2018 and afterwards)

Credits : 4

Int. Marks : 40

Hours/Week : 6

Ext. Marks : 60

Duration : 90 hrs

Max. Marks :100

Course Objectives:

- To impart the knowledge on identification of plant species.
- To understand the floral and morphological characters of various families.
- To provide the knowledge about the general aspects of Plant reproductive organs and embryo and its development.
- To understand the practical knowledge of instruments in modern biology.
- To understand the working principles of instruments used in the studies related to various disciplines of biological sciences.

Course Outcomes:

1. Understand the floral and morphological characters of various families.
2. Helps to know the permanent herbarium preparation techniques.
3. Improve the knowledge about the plant identification.
4. Learn to the key preparations of families, Genus and species.
5. Improve the knowledge about the general aspects of plant reproductive organs and embryo and its development.
6. Learning to different types of microscopes and their uses of biological science laboratories.
7. Realize the need of centrifuges and their uses in research
8. Understand the principle and different methods of chromatography.

Angiosperms

1. Preparation of dichotomous keys
2. Solving nomenclatural problems
3. Identification of families mentioned in the syllabus with the help of floral characters.
4. Submission of minimum 25 herbarium sheets representing different locations
5. Students must be taken minimum 3 days field trip for herbarium collection.

Developmental Botany

1. Study of wood anatomy (*Bombax, Tectona, Azadirachta, Terminalia, Mangifera, Dalbergia*)
2. Structural anomalies in stems of *Antigonon, Bignonia, Achyranthus, Nyctanthus, Aristolochia* and *Bougainvillea*
3. Preparation of 5 permanent slides using microtome and double staining
4. Observation of pollen types and germination studies
5. Anther dissection (Various types)
6. Endosperm haustoria

Instrumentation and Bio-techniques

1. Measurement of plant cells using micrometry
2. Preparation of buffer
3. Chromatography – separation of pigments and amino acids – TLC, paper and column
4. Separation of protein SDS – PAGE
5. Estimation of biomolecules using spectrophotometer
6. Preparation of specimen and sectioning using microtome.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
PG Programme - M.Sc
Semester I
(2018-2020)

Major Elective Course-I: Herbal Botany (18PBY011)
(For those who join from June 2018 and afterwards)

Credits : 4

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks :100

Course Objectives:

- To provide the information about the importance of medicinal plants.
- To make the students to be more familiar in medicinal plants cultivation.
- To make them to discern the marketing of medicinal plants.

Course Outcomes:

1. Provide the knowledge about the importance of medicinal plants.
2. Studied to be more familiar in medicinal plants cultivation and conservation.
3. Learn to the making and process of medicinal plants.
4. Understand the systematic position, diagnostic feature and medicinal uses of selected plants.
5. Improved knowledge about different systems of medicinal plants (Siddha, Ayurveda and Unani).
6. Studied that the conservation methods of medicinal plants.

UNIT I

(18 hrs)

Brief History-scope of raw drugs of plant origin , Definition , herbals classification and description. Classification of vegetable drugs. Biological sources of drugs.

UNIT II

(18 hrs)

Factors involved in production of drugs - climate cultivated and wild plants collections, drying and storage. Deterioration of drugs- primary factors, mould and bacterial attack control of insects and pests. Methods of preparation of drugs from various plant materials – extraction separation and identification.

UNIT III

(18 hrs)

Pharmacological action of plant drugs- action on the autonomic nervous system, central nervous system, heart muscle, blood vessel respiratory system, gastro intestinal tract and the uterus.

UNIT IV

(18 hrs)

Basic study on the source, structure and medicinal value of the following phytochemicals – glycosides, alkaloids, phenolics, saponins and steroidal saponins. Natural steroid production for pharmaceuticals – Dioscorea, sarasaparilla roots.

UNIT V**(18 hrs)**

Drugs obtained from the roots and underground parts- *Rawolfia*, *Sarasaparilla*, *Aconite*, *Turmeric*, *Ginger* and *Acorus Leaves* – *Eucalyptus*, *Adhatoda*, *Oslanumtrilobatum* *Digitalis* *Andtographis* and *leucasaspera* Fruits- *Ebblica cumin*, *Tamarndus*, *Capsicum*.

Text Books:

1. V. Kumaresan, “Herbal Biotechnology and Pharmacognosy”, Saras publication, Nagercoil, 2015.
2. S.G. Joshi, “Medicinal Plants”, Oxford and IBH Publishing Co. Pvt. Ltd, 2013.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	1	1.1	1-8
II	1	2	2.1	8-16
III	2	9	9.1	52
		14	14.1	65
		51	51.1	240
IV	2	53	53.1	261
		59	59.1	341
		87	87.1	407
		105	105.1	407
V	1	13	13.1	321-350
		14	14.1	351-380
		15	15.1	381-402

Reference Books:

2. V. Kumaresan, “Herbal Biotechnology and Pharmacognosy”, Saras publication, Nagercoil, 2015.
2. S.G. Joshi, “Medicinal Plants”, Oxford and IBH Publishing Co. Pvt. Ltd, 2013.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
PG Programme - M.Sc
Semester II
(2018-2020)

Major Elective Course - I: Biofertilizer Technology (18PBYO12)
(For those who join from June 2018 and afterwards)

Credits : 4

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks :100

Course Objectives:

- Know the characteristics features of Biofertilizer.
- Know the potential organisms to be used as Biofertilizer and Biopesticides.
- Study the application of Biofertilizer.
- Learn about the production of Biofertilizer.
- To understand and know the recycling of waste.

Course Outcomes:

1. Describe the essential features Biofertilizer.
2. Provided a thorough knowledge about Biopesticides
3. Study that the structure of Algal Biofertilizer and their uses.
4. Understand the salient features of Organic Farming.

UNIT I (18 hrs)

Introduction and Types: Bacterial, Algal and Fungal Biofertilizers. Bacterial Biofertilizers- Rhizobium and Phosphobacteria, mass cultivation and field application of Rhizobia.

UNIT II (18 hrs)

Nitrogen Fixation – Symbiotic and nonsymbiotic, Mechanism of N₂ Fixation with reference to Rhizobia and Azotobacter, Nif genes, Nodulation by Rhizobium

UNIT III (18 hrs)

Algal Biofertilizer – Blue green Algae – Nostoc, Anabaena, Mass Cultivation of BGA- Algalization, VAM Fungi – Uses and Mass Cultivation.

UNIT IV (18 hrs)

Organic Farming – Advantages of Organic Farming, Raw materials for Composting, Recycling of wastes through Vermicomposting. Vermicomposting – Pit Method, Heap Method, Window Method and Bin or Tray Method.

UNIT V

(18 hrs)

Vermi Wash preparation and Applications. Pancha Kavya – Production and Uses. Biofertilizer storage, Shelf life, Quality Control and Marketing.

Text Books:

1. Subbarao, N.S., “Biofertilizers in Agriculture and Forestry”, Oxford and IBH, New Delhi, 1988.
2. Subbarao, N.S., “Recent Advances in Biological Nitrogen Fixation”, Oxford and IBH, New Delhi, 2001.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	-	-	11-32
II	1	-	-	55-71
III	2	-	-	40-53
IV	1	-	-	73-98
V	2	-	-	54-78

Reference Books:

1. Tilak, K.V.B.R., “Bacterial Biofertilizers,” Indian Council for Agricultural Research, New Delhi, 1991.
2. Gillings, M. and Holms, A., “Plant Microbiology”, Bios Scientific Publishers, New York, 2005.
3. Smith, S.E. and Read, D.J., “Mycorrhizal Symbiosis”, Second Edition, Academic Press, London, 2002.
4. Subbarao, N.S., “Soil Microorganism and Plant Growth”, Fourth Edition, Oxford and IBH, New Delhi, 1995.
5. Rangaswami, G. and Bagyaraj, D.J., “Agricultural Microbiology”, Second Edition, Prentice-Hall Pvt.Ltd. New Delhi, 2001.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

PG Programme - M.Sc

Semester II

(2018-2020)

Core Course-V: Plant Diversity (Algae, Fungi and Lichens, Bryophytes, Pteridophytes and Gymnosperms) (18PBYC21)

(For those who join from June 2018 and afterwards)

Credits : 5

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks :100

Course Objectives:

- Know the characteristics features and classification of algae.
- Study the classification, structure and reproduction and various fungi.
- Study the structure and reproduction of various forms of bryophytes.
- To know the structure and reproduction of various forms of Pteridophytes.
- To understand the structure, characters and classification of gymnosperms.

Course Outcomes:

1. Describe the essential features diversity of plant kingdom and their salient features.
2. Provided a thorough knowledge about structure and life cycle pattern of algae and bryophytes.
3. Study that the structure, reproduction, culture, classifications, life-cycle of fungi.
4. Understand the salient features of Pteridophytes and Gymnosperms.

UNIT I

(18 hrs)

Algae: systematic position and classification of algae by Fritsch. Range of thallus organization; Reproduction and various life cycles. General characters of Cyanophyta, chlorophyta, Xanthophyta, Bacillariophyta, Phaeophyta, Rhodophyta, Economic importance of algae – as Food, medicine, agriculture and industry.

UNIT II

(18 hrs)

Fungi and Lichens: General characteristics of fungi. Classification of fungi based on C.J Alexopoulos (1962). Study of somatic and reproductive structures of the following classes: Zygomycetes, Ascomycetes, Basidiomycetes&Deuteromycetes. Significance of fungi. General characteristics of Lichens, Morphology, types and reproduction – Ecological indication of

UNIT III

(18 hrs)

Bryophytes: occurrence and distribution; a brief account of bryophyte flora in India; classification, basis and criteria of classification, (Rothmaler classification only) structural variation in the gametophytes and sporophytes; evolution of sporophyte and gametophytes; ecology of bryophytes; an account of fossil bryophytes and their significance.

UNIT IV**(18 hrs)**

Pteridophytes: Principles and outlines of the classification (Sporne). Comparative morphology, structure, ecology and phylogeny of the following groups – Psilopsida, Lycopsida, Sphenopsida and Pteropsida. Structure and evolutionary trends with reference to stele and spore. Telome concept in Pteridophytes; the phenomenon of apospory, apogamy and parthenogenesis.

UNIT V**(18 hrs)**

Gymnosperms: Study of the external features of *Cycas*, *Pinus*, *Araucaria*, *Podocarpus*, *Agathis* and *Gnetum* - C.S., R.L.S. & T.L.S. of stems - Micropreparation of leaves and cone - Observation of fossil slides.

Text Books:

1. Pandey, B.P., "College Botany Vol. I," S.Chand and Co., New Delhi, 8th Edition, 2011.
2. Johri, R.M., Lata, S. and Sharma, S., "A Text Book of Bryophyta," Dominant Publishers and Distributors, New Delhi, 2004.
3. Vashishta, P.C., Sinha, A.K., and Kumar, A., "Pteridophyta", S.Chand and Co., Ltd. New Delhi, Ninth Edition, 2006.
4. Pandey, B.P., "College Botany Vol.II", S.Chand and Co., New Delhi, Eighth Edition, 2011.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	1	1.1	1 - 42
		2	2.3	54 -56
		3	3.2	141 - 146
		6	6.1	198 - 207
		7	7.5	233 - 243
		8	8.2	260 - 266
II	1	1	1.2	1 - 10
		2	2.4	25 - 30
		15	15.3	249 - 255
		6	6.3	74 - 79
		7	7.5	93 - 98
		10	10.2	134 - 137
		12	12.5	200 - 215
		14	14.2	243 -245
		17	17.2	260 - 264
III	2	1	1.1 - 1.5	1 - 4
		2	2.5	11 -18
		3	3.5	35 - 47
		6	6.4	112 - 124
		11	11.2	171 - 181
IV	3	1	1.1 -1.2	1 - 6
		2	2.3	12 - 18
V	4	1	1.2	1-6

		2	2.5	12 - 38
		4	4.5	66 – 79
		6	6.2	143-158

Reference Books:

1. Vashishta, B.R., Sinha,A.K. and Singh,V.P., “Algae”, Nineth Edition S.Chand and Co., New Delhi, 2010.
2. Vashishta, B.R., “Fungi”, S.Chand and Co., New Delhi, Sixth Edition, 2008.
3. Sharma, P.D., “Fungi and Allied Organisms”, Narosa Publishing House, New Delhi, 2005.
4. Pathak, C. “The Latest Portfolio of Theory and Practice of Pteridophyta”, Dominant Publication, New Delhi, 2003.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

PG Programme - M.Sc

Semester II

(2018-2020)

Core Course-VI: Cell and Molecular Biology (18BYC22)

(For those who join from June 2018 and afterwards)

Credits : 5

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks :100

Course Objectives:

- To provide a thorough knowledge about structure and function of Cells, bio molecules and cellular development
- To provide the knowledge on advances in cell biology

Course Outcomes:

1. Studied that about the structure and function of Cells.
2. Provide the knowledge on advances in cell biology.
3. Students to be studied about microscopy, cell organelles of Prokaryotic and Eukaryotic cells.
4. Understand gene regulation and chloroplast and mitochondria genome organization.
5. Helps to study the significance of mitosis and meiosis cell divisions.
6. Understand about the cellular components.
7. Gain knowledge about cell biology to selected examples of changes or losses in cell function.

UNIT I

(18 hrs)

Cell biology; Ultra structure of plant cell: Cell cycle and its regulation; structure and functions of cell organelles; ER, GC, Ribosomes, Chloroplast, mitochondria - Semi-autonomous nature of chloroplast & mitochondria.

UNIT II

(18 hrs)

Molecular biology: structure and organization of Plasma membrane; Glycoconjugates and proteins in membrane systems; ion transport; Na⁺ / K⁺ ATPase; molecular base of signal transduction in plants.

UNIT III

(18 hrs)

The central dogma and structure of DNA & RNA;; chromosome structure in prokaryotes and eukaryotes; levels of DNA packaging; repeat sequences in DNA; Mechanisms and its types - DNA Replication - rolling circle replication

UNIT IV

(18 hrs)

Steps involved in transcription and Translation, Post transcriptional and Post tyranlational Modification.Mutation: spontaneous and induced mutation; molecular basis of mutations; mutation

by radiation, chemicals and transposable elements. DNA damage and repair mechanism; light dependent repair, excision repair and error. Transposans – A Brief Account.

UNIT V

(18 hrs)

Regulation of gene expression in prokaryotes – Operon concept, regulation of Lac, regulation of gene expression in eukaryotes, RUBP carboxylase gene in plants. RNAs in gene regulation – RNAi, SiRNAs & MiRNAs.

Text Books:

1. Verma P.S. and Agarwal V.K., Cell Biology and Molecular Biology (Cytology) S. Chand and Company, New Delhi, 1986.
2. Arumugam, N. “Cell Biology and Molecular Biology”, Saras publication. Nagercoil, 2014.

Unit	Text Book No.	Chapter	Page No.
I	2	1	1-7
II	2	14	263-285
III	1	12-16	179-240
		21	257
IV	1	24	282-294
V	1	25	297-330

Reference Books:

1. De Robertis, E.D.P., and De Robertis, E.M.F., “Cell and Molecular Biology”, Lippincott Williams and Wilkins, Philadelphia. 8th edition, 2006.
2. Cooper, G.M., and Hausman, R.E., “The Cell: A Molecular Approach”, ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA. 5th edition, 2009.
3. Karp, G., “Cell and Molecular Biology Concepts and Experiments”, John Wiley and Sons.Inc.6th Edition, 2010.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
PG Programme - M.Sc
Semester II
(2018-2020)

Core Course-VII: Bioinformatics, Biostatistics and Plant Biotechnology (18PBYC23)
(For those who join from June 2018 and afterwards)

Credits : 5

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks :100

Course Objectives:

- To understand the basic concept of Bioinformatics and Nucleic acid databases.
- To understand the Biostatistics analysis.
- To study the Plant tissue culture techniques.
- To study the Development of Transgenic plants.

Course Outcomes:

1. Improve the knowledge of data collection and Biostatistics methods.
2. Understand various media, sterilization, totipotency, cell induction, organogenesis.
3. Able to apply the techniques to develop a standard protocol for Plant Tissue Culture.
4. Have comprehensive knowledge on GM technology, bio-safety relations and germplasm storage.

UNIT I

(18 hrs)

Introduction To Bioinformatics: Definition, Objectives; Biological Databases-Primary, Secondary And Specialized Databases. Nucleic Acid Databases-NCBI, DDBJ, And EMBL: Protein Databases-PDB, PIR, And SWISSPROT. Structure Elucidation -SCOPE And CATH. Sequence Retrieval Method From Different Databases. Sequence Analysis-Local Vs Global: Multiple Alignment: Dynamic Programming- Smith Waterman/Needle Man Wunschalgorithm, Online Search Tools-BLAST/FASTA.

UNIT II

(18 hrs)

Biostatistics: Populations, Samples, Variables, Parameters, Collection Of Data, Sampling Methods, Organizing The Data Into Summary Tables And Graphing The Data.

UNIT III

(18 hrs)

Measures Of Central Tendency-Arithmetic Mean Mode And Median, Measures Of Dispersion-Mean Deviation And Standard Deviation And Standard Error. ANOVA (One Way And Two Way), Correlation And Regression-Tests Of Significance(T,F)-X2 Test And Its Applications.

UNIT IV

(18 hrs)

Plant Tissue Culture – Definition, History And Scope And Importance; Overview Labarotary Requirements And General Techniques Tissue Culture Media, Somatic Embryogenesis : Micropropagation Organ Culture. Principles In Plant Tissue Culture, Basic Requirements. Culture

Media – Types MS Medium, B5 Medium, Gamborg Medium And Woody Plant Medium. Role Of Hormone In Plant Tissue Culture.

UNIT V

(18 hrs)

Development Of Transgenic Plants- Transformation In Plants *Agrobacterium* Mediated Direct Method Vector In Transformations. Biosafety And Ethical Issues. Gm Crops – Golden Rice And BT Cotton.

Text Books:

1. Arumugam, Gopi, Sundaralingam, Meena and Kumaresan, “Biostatistics computer application bioinformatics instrumentation”, - Saras publication, Nagarcovil. 2010.
2. Gurumani, N., “Research Methodology for Biological Science”,- MJP Publishers, Chennai 2017.
3. H.S. Chawla, “Introduction to Plant Biotechnology”, Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi and Calcutta, 2001.
4. Erica E. Benson, “Plant Conservation Biotechnology”, Taylor and Francis group, London, 2003.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	10	15.1	297-339
II	2	12	12.2, 12.6	284-296, 310-316
III	1	2	2.1-2.9	6-16
		6	6.1-6.4	75-97
		8	8.1-8.3	116-118
		12	12.1	196-206
IV	3	1	1-4	1-41
V	4	14	14.1-16.6	211-264

Reference Books:

1. Johanson D.A., “Plant Micro techniques”, Tata McGraw Hill, 1940.
2. Sase John E., “Botanical Microtechnique”, oxford 7 Ibh, 1964.
3. Gray P., “Hand Book of Basic Microtechniques”, McGraw Hill, 1964.
4. Kesavachandran, R. and Peter, K.V., “Plant Biotechnology: Methods in Tissue culture and gene transfer”, University Press Ltd. Hyderabad, 2008.
5. Bhojwani , S.S. and Razdan , M.K., “Plant Tissue Culture : Theory and Practice”, (revised edition) Elsevier Science Publishers, New York, USA, 1996.
6. Jain, S.M.Sopory, S.K. and Veilleux, R.E., “In Vitro Haploid Production in HigherPlants, Vols. 1-5, Fundamental Aspects and Methods”, Kluwer Academic Publishers,Dordrecht, The Netherlands, 1996.
7. Vasil, I.K. and Thorpe, T.A., “Plant Cell and Tissue Culture”, Kluwer Academic Publishers, The Netherlands, 1994.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

PG Programme - M.Sc

Semester II

(2018-2020)

Core Course-VIII: Practical –II –Lab in Plant Diversity Cell and Molecular Biology,

Bioinformatics, Biostatistics and Plant Biotechnology (18PBYC2P)

(For those who join from June 2018 and afterwards)

Credits : 4

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 40

Ext. Marks : 60

Max. Marks :100

Plant Diversity

1. Critical examination of algal samples of different classes
2. Micropreparation and observation of the following – *Mucor*, *Rhizopus*, *Alternaria*.
3. Micropreparation of lichens
4. Critical examination of Bryophyte and Pteridophytes of different classes.
5. Study of fossils mentioned in the syllabus.
6. Gymnosperm
7. Submission of 5 permanent slides from Pteridophytes and Gymnosperms

Molecular Biology

1. Cell Biology: Root tip squash for mitosis,
2. Acetocarmine preparation of *Rheo*
3. anthers for meiosis
4. Viewing cystolith & raphides.
5. Isolation of auxotrophs by UV mutagenesis

BIOINFORMATICS AND BIOSTATISTICS

1. Estimation of Mean, Median and Mode.
2. Estimation of Standard Deviation and Standard Error.
3. Pearson co-efficient of correlation and Spearman rank correlation
4. X² test problems-a) Test of Goodness of fit b) Test of independence

Plant Biotechnology - Demonstration

1. Database and sequence retrieval
2. Isolation of Bacterial chromosomal DNA
3. Isolation of plant chromosomal DNA
4. Isolation of Bacterial plasmid.
5. Agarose gel electrophoresis
6. And visualization of DNA

7. Demonstration of regeneration from callus culture
8. Demonstration Isolation of Plant protoplast
9. Diagrams of vectors, Southern blot Western blots

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
UG Programme - M.Sc
Semester III
(2018-2021)

Non Major Elective Course: Mushroom Cultivation (18PBYN21)
(For those who join from June 2018 and afterwards)

Credits	: 4	Int. Marks	: 25
Hours/Week	: 6	Ext. Marks	: 75
Duration	: 90 hrs	Max. Marks:	100

Course Objectives:

- To provide the information about mushroom and their uses
- To make the students to be more familiar in mushroom cultivation
- To make the students to be more familiar in mushroom cultivation.
- To understand the effective methodology to cultivate Oyster, button and milky mushrooms.
- To learn the importance and application of Mushrooms and its products.

Course Outcomes

1. Understand the cultivation process of mushrooms.
2. Provide the knowledge about spawn preparation technique.
3. Understand the various types mushroom diseases and control.
4. Provide the Knowledge about processing of mushrooms.
5. To become a entrepreneur through the knowledge of mushroom cultivation.

UNIT I **(18 hrs)**

General characters of Mushroom- Present status of the Mushroom industry in India – Common edible and Non edible mushroom.

UNIT II **(18 hrs)**

Nutritive value of edible mushroom: Protein, Vitamin minerals carbohydrates and fats
Energy value of mushroom.

UNIT III **(18 hrs)**

Methods of spawn production – Factors determining the Spawn production, Storage of spawn.

UNIT IV **(18 hrs)**

Methods of cultivation and harvesting – Paddy straw mushroom, Oyster mushroom, White Button Mushroom and Milky Mushroom.

UNIT V **(18 hrs)**

Diseases and Pests of Mushroom Preservation of Mushroom, Recipes marketing of Mushroom, Products. Role of mushroom in compost preparation.

Text Books:

1. Shu-Ting Chang and Philip G. Miles., "Mushrooms Cultivation, Nutritional Value, Medicinal Effect and Environmental Impact", CRC Press Boca Raton London New York Washington, D.C. 2004.
2. Paul Stamets J.S., and Chilton, "The Mushroom Cultivator A practical guide to growing mushrooms at home", Agariikon Press Olyivipia, Washington, 1983.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	1	I-II	1-06
	1	4	I-VII	53-73
II	2	VII	-	121-231
III	1	9	I-VI	159-179
		10	I-III	189-199
IV	1	11	IV	211-216

Reference Books:

1. Peter Oei, "Mushroom Cultivation", III Edition, Backhuyes Publisher, USA, 2000.
2. Tripathi, DP., "Mushroom Cultivation" Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi, 2005.

Sri Kaliswari College (Autonomous), Sivakasi
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PG Programme - M.Sc
Semester III
(2018-2020)

Core IX: Microbiology and Plant Pathology (18PBYC31)
(For those who join from June 2018 and afterwards)

Credits : 5

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks :100

Course Objectives:

- To enable students to understand the diversity of microbes and importance of classification of microorganisms.
- To help the students to understand the influence of microorganisms and microbiological applications on everyday life.

Course Outcomes:

1. Understand the basics knowledge of microbiology includes types of microbes, classification and characterization.
2. Studied the history of microbiology and its applications.
3. Describe the classification of bacteria.
4. Explain the different types of viruses and plant diseases.
5. Provide the sufficient knowledge about the types of symptoms and their causative agents of diseases.
6. Understand the diversity of microbes and importance of classification of microorganisms.

UNIT I

(18 hrs)

Early development of microbiology – contributions of Anton Van Leeuwenhoek, Louis Pasteur, Joseph Lister, Robert Koch and his postulates. General characteristics of bacteria - morphological, cultural characteristics. Ultra structure of Bacterial cell, capsule, flagella, pili, cell membrane, nucleoid, mesosome, ribosomes, plasmids. Endospore- structure, sporulation and its significance

UNIT II

(18 hrs)

Classification of Bacteria according to Bergeys Manual of systematic Bacteriology, Growth of bacteria, generation time, measurement of bacterial growth, Nutritional types of bacteria.

UNIT III

(18 hrs)

General characteristics of fungi. Classification of fungi based on C.J Alexopoulos (1962). Study of somatic and reproductive structures of the following classes: Zygomycetes, Ascomycetes, Basidiomycetes&Deuteromycetes. Significance of fungi.

UNIT IV**(18 hrs)**

Classification and symptoms of plant diseases. Mechanism of infection. Defence mechanism through structural changes. Plant diseases: Downy mildew of Grapes, Banana leaf spot, Black rust of wheat, Citrus canker, Tomato spotted wilt, Root knot by Meloidogyne.

UNIT V**(18 hrs)**

Plant viruses – Classification based on the morphology. Structure of Cauliflower mosaic virus (CaMV) and Tobacco Mosaic Virus (TMV). Transmission & control measures of plant viruses. Bacteriophages – Structure, Lytic and Lysogenic cycles. Viroids and Prions.

Text Books:

1. P. D. Sharma, “Microbiology and Plant Pathology”, Rastogi Publication, Meerut. 3rd edition, 2016.
2. S. Rajan and Selvi Christy, “Experimental procedures in Life Sciences”, Anjanaa Book house, Chennai, 2012.
3. A. Mani, A.M., Selvaraj, L.M., Narayanan and N. Arumugam, “Microbiology”, Saras Publication, 2017.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	1-2	-	1-14 and 47-82
II	2	1	1 - 18	1-74
II	3	23	-	519-552
III	1	12	-	289-317
IV	1	Part II - 1	-	3-21
V	1	Part II - 2	-	22-43

Reference Books:

1. Prescott L.M., J.P. Harley and D.A. Klein, “Microbiology”, McGraw Hill, Boston. Sixth edition, 2005.
2. Pelzer M.J., E.C.S. Chan and N.R. Kreig, “Microbiology”, McGraw Hill Inc., New York, 1993.
3. Ananthanarayanan and J.Panicker, “Text book of Microbiology”, Orient Long Publishers, Eighth edition, 2005.
4. Alef, Kassem, and Paolo Nannipieri, “Methods in applied soil microbiology and biochemistry”, Academic press, 1995.
5. Michael T. Madigan John M. Martin and Jack Parker, “Biology of Microorganisms”, Prentice Hall International, Inc., London. 1984.
6. Gerard J. Tortora, Berdell R. Funke, Christine and L. Case, “An Introduction of Microbiology”, Benjamin Cummings, U.S.A. 2001.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
PG Programme - M.Sc
Semester III
(2018-2020)

Core Course– X: Genetics and Evolution (18PBYC32)
(For those who join from June 2018 and afterwards)

Credits : 5

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks :100

Course Objectives:

- To study the principles of Mendelian genetics.
- To gain knowledge about mutation and population genetics.

Course Outcomes:

1. Study the principles and concept of Mendelian law.
2. Gain knowledge about mutation and population genetics.
3. Understand basic structure and function of DNA and chromosomes.
4. Provide sufficient knowledge of hybridization and concepts of genetics.
5. Understand the concept of genetic recombination's at molecular level.
6. Studied the origins of the human species.

UNIT I

(18 hrs)

Mendelism : Mono hybrid Dihybrid ; multiple alleles ; Gene interaction; dominant epistasis (12:3:1) recessive epistasis (9: 3: 4), duplicate dominant gene (15: 1) and Duplicate recessive gene (9:7), Inheritance of quantitative characters.

UNIT II

(18 hrs)

Recombination genetics: methods of genetic recombination conjugation transformation and transduction in prokaryotic cell; crossing over, linkage maps, conventional and molecular theories of crossing over; cytological basis of crossing over in corn; position effect and gene conversion, self sterility; male sterility.

UNIT III

(18 hrs)

Cytogenetics: cytogenetics of polyploids and aneuploids, haploid plastids, cytogenetic value, sex chromosome, sex determination and sex linked inheritance, chromosomal aberration. Cytoplasmic inheritance.

UNIT IV

(18 hrs)

Population genetics : frequency of genes in population; Hardy- Weinberg law; basic mechanics of genetic engineering and its applicability for plant improvement.

UNIT V

(18 hrs)

Evolution: Evolution of biosphere cytogenetic basis of variation; natural selection of speciation and further progress in evolution: modern synthetic theories on evolution.

Text Books:

1. Verma P.S and V.K Agarwal, "Genetics", S.Chand and Co, New Delhi, 1991.
2. Alice Marcus, "Genetics", MJP Publishers, Chennai, 2009.

Unit	Text Boo No.	Chapter	Page No.
I	2	1	1-11
		3	25-35
II	2	6	75-95
III	2	9	115-135
IV	1	30	417-433
V	1	36	475-494

Reference Books:

1. Glick, B.R., Pasternak, J.J., "Molecular Biotechnology - Principles and Applications of recombinant DNA", ASM Press, Washington, 2003.
2. Pevsner, J., "Bioinformatics and Functional Genomics", John Wiley and Sons. II Edition, 2009.
3. Gupta, P.K., "Genetics", Rastogi Publication Meerut, 2000.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

PG Programme - M.Sc

Semester III

(2018-2020)

Core Course- XI: Biochemistry (18PBYC33)

(For those who join from June 2018 and afterwards)

Credits : 5

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks :100

Course Objectives:

- To develop a sufficient background for those students who wish to study more advanced biochemistry.
- To motivate the students familiar with basic biochemistry techniques
- To improve the ability of thinking in biochemistry fields.

Course Outcomes:

1. Discuss different metabolic pathways.
2. Relate the characteristics and role of enzymes.
3. Comprehend the lipid metabolism.
4. Understand Hormones, Vitamins and Alkaloids

UNIT I

(18 hrs)

Enzymes : classification and nomenclature of enzymes, concept of active site, mechanism of enzyme action; Michaelis-Menton equation and KM value , Enzyme modifiers- activators, inhibitors, allosteric and regulation. Isozyme.

UNIT II

(18 hrs)

Amino acid and proteins: biosynthesis of amino acid; properties and chemical reaction concerned with amino acid, proteins; primary, secondary, tertiary and quaternary protein folding, physiochemical properties of proteins.

UNIT III

(18 hrs)

Metabolism of carbohydrates: chemical reaction & derivatives of monosaccharide; Glycolysis, T.C.A. Cycle, E.T. Chain – ATP synthesis; H.M.P Pathway. Glyconeogenesis.

UNIT IV

(18 hrs)

Metabolism of lipids: Oxidation of any one fatty acid and its bioenergetics; Biosynthesis of any one fatty acid; palmitic acid unsaturation; biosynthesis of cholesterol; Importance of cholesterol and plant lipids.

UNIT V

(18 hrs)

Chemistry of vitamins, hormones and alkaloids: vitamins as co-enzymes; chemistry and biosynthesis of hormone- thyroxine, catecholamines, steroidal hormones. Biologically important alkaloids (Vincristine, Ajmalicine, Nicotine).

Text Books:

1. Satyanarayana, U. Biochemistry. Books and Allied (p) Ltd. Calcutta. 1999.
2. Jain, J.I. Fundamentals of Biochemistry S. Chand & Co. New Delhi. 2000.

Unit	Text Book No.	Chapter	Page No.
I	1	1-8	1-111
II	1	11	190-265
III	2	9	132-203
		14	269-279
IV	2	17-18	349-404
V	1	17-20	374-490

Reference Books:

1. Campbell, M.K. Biochemistry, saunders college Publishing, New York. 1999.
2. David T. Dennis and David H. Trupin (Eds.) Plant physiology, Biochemistry and Molecular Biology. Longmann Scientific and Technical, Singapore. 1993.
3. Goodwin and mercer Introduction to plant Biochemistry. CBS Publishers and Distributors, New Delhi. 1996.
4. Plummer, D.T. An Introduction to practical Biochemistry. McGraw Hill. 1996.

3.

Sri Kaliswari College (Autonomous), Sivakasi
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Semester III
(2018-2021)

**Core Course- XII: Practical- III: Lab in Microbiology, Plant Pathology, Genetics, Evolution
and Biochemistry (18PBYC3P)**

(For those who join from June 2018 and afterwards)

Credits : 4

Int. Marks : 25

Hours/Week : 6

Ext. Marks : 75

Duration : 90 hrs

Max. Marks :100

Course Objectives:

- To enable students to understand the diversity of microbes and importance of classification of microorganisms.
- To help the students to understand the influence of microorganisms and microbiological applications on everyday life.
- To gain knowledge about mutation and population genetics.
- To create a knowledge on different biochemical pathways, physiology and developmental aspects of plants.

Course Outcomes:

1. Understand the basics knowledge of microbiology includes types of microbes, classification and characterization.
 2. Provide the sufficient knowledge about the types of symptoms and their causative agents of diseases.
 3. Study the principles and concept of Mendelian law.
 4. Understand basic structure and function of DNA and chromosomes.
 5. Comprehend the lipid metabolism.
-

Lab in Microbiology and Plant Pathology

1. Sterilization method.
2. Preparation of culture Media - Nutrient Agar (NA) and Potato Dextrose Agar (PDA)
3. Isolation of microbes from soil and water using serial dilution technique.
4. Staining of Bacteria - simple and gram staining.
5. Hanging drop technique.
6. Micro preparation and observation of the following fungi:
Mucor, Rhizopus, Aspergillus, Puccinia, Polyporus,
7. Observation of infected plant specimens mentioned in the syllabus.

Genetics

1. Solving problem related to Monohybrid,
2. Solving problem related to Dihybrid crosses,
3. Solving problem related to test cross,
4. Solving problem related to gene interaction mentioned in the syllabus.
5. Problem in Hardy Weinberg equilibrium.

Biochemistry

1. Estimation of glucose starch, Protein glucose in the and Lipids in Plant tissue
2. Qualitative test for carbohydrates, Lipids, Proteins and Amino acids.
Determination of enzyme activities- Amylase Nitrate reductase and Peroxidase

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PG Programme - M.Sc
Semester III
(2018-2020)

Major Elective Course-II: Biodiversity and Conservation (18PBY031)
(For those who join from June 2018 and afterwards)

Credits	: 4	Int. Marks	: 25
Hours/Week	: 6	Ext. Marks	: 75
Duration	: 90 hrs	Max. Marks	:100

Course Objectives:

- To study the concept of Biodiversity
- To study the role of Biodiversity in Ecosystem
- To understand the Bio prospecting, Indigenous knowledge, Biopiracy
- To study the Cause and consequences of loss of biodiversity
- To study the *in situ* conservation and *ex situ* conservation

Course Outcomes:

1. Understand vegetation and their relationship with the ecosystem.
2. Provide a thorough knowledge about environmental biology and ecosystem.
3. Acquire knowledge on ecosystem organization, biogeochemical cycle and ecosystem stability.
4. Comprehend the information on biodiversity, threats and conservations.

UNIT I **(18 hrs)**

Biodiversity; definition, levels of biodiversity; genetic, species and ecosystem diversity, Hotspot concept and hot spot in India. values of biodiversity: Endemic diversity.

UNIT II **(18 hrs)**

Biological Diversity, Concept and levels , role of Biodiversity in Ecosystem, function and Stability, speciation and extinction, IUCN categories of threat, terrestrial Biodiversity hot spot.

UNIT III **(18 hrs)**

Bioprospecting. Indigenous knowledge, Biopiracy, Intellectual property rights and its impact on biodiversity; Impact of new technologies: biotechnology and genetic engineering.

UNIT IV **(18 hrs)**

Cause and consequences of loss of biodiversity, Impact of exotic species on local biodiversity; deforestation; cause for the extinction of species; Red data book and its importance; key stone species and their significance in an ecosystem function.

UNIT V **(18 hrs)**

Conservation – need for conservation – *in situ* conservation: sanctuaries, national parks, biosphere reserves – *ex situ* conservation: gene banks and cryopreservation- Role of indigenous people in conservation- human- animal conflicts. Role of national and international institutions in conservation of biodiversity.

Text Books:

1. V. Kumaresan and N. Arumugam, "Plant Ecology and phytogeography", Saras Publication, Nagercoil, 2015.
2. Erica E. Benson, "Plant Conservation Biotechnology", Taylor and Francis group, London, 2003.

Unit	Text Book No.	Chapter	Page No.
I	1	1	1-54
II	1	7	67-99
III	2	9	132-203
		14	269-279
IV	1	18	220-231
V	1	18	233-241

Reference Books:

1. Odum, E.P., "Fundamentals of Ecology", Saunders, Philadelphia, 1971.
2. Muller Dombosis. Dand Ellenberg, H., "Aims and methods of vegetation Ecology", Wiley, New York, 1974.
3. Odum, E.P., "Basic Ecology", Saunders, Philadelphia, 1983.
4. Ludwing, J. and Reynolds, J.F., "Statistical Ecology", John Wiley and Sons, 1988.
5. Begon, M. Harper, J.L. and Townssend, C.R., "Ecology", Backwell Science, Cambridge, USA, 1996.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Botany
PG Programme - M.Sc
Semester III
(2018-2020)

Major Elective Course - II: Palynology and Pollination Biology (18UBY032)
(For those who join from June 2018 and afterwards)

Credits : 4

Int. Marks : 25

Hours/Week : 6

Ext. Marks : 75

Duration : 90 hrs

Max. Marks : 100

Course Objectives:

- To learn about Palynology.
- To provide the knowledge on Pollination in plants.

Course Outcomes:

1. Learning about Palynology.
2. Provide the knowledge on Pollination in plants.
3. Understand the sexual incompatibility in plants.
4. Students to be familiar with embryonic processes.
5. Understand the various pollinations periods.
6. Explain the seeds dispersal mode of plants.

UNIT I

(18 hrs)

Palynology - Form of Pollen Grains, Pollen Wall Structure, Palynogram, NPC System, Types of Pollen Grains, Development of Pollen Wall Pattern, Pollen Development, Cell Biology of Pollen Grains, Pollen Kit, Pollen Calendar, Circadian Rhythms of Pollen Emission, Pollen and Allergy and Application of Palynology.

UNIT II

(18 hrs)

Pollination Biology- Sexual Incompatibility- Homomorphic System- Gametophytic Self Incompatibility, Sporophytic Incompatibility- Heteromorphic System- Distyly And Tristyly.

UNIT III

(18 hrs)

Physiology and Biochemistry of Incompatibility- Recognition Reaction, Rejection Reaction, and Stigma Surface Inhibition, Stylar Inhibition. Biological Significance of Incompatibility and Significance of Incompatibility in Plant Breeding.

UNIT IV

(18 hrs)

Various Methods to Overcome the Self Incompatibility- Mixed, Bud, Stub, End-of-Season Pollination, Intra Ovarian and Test Tube Pollination, Polyploidy, Irradiation, Heat and Chemical Treatment and Parasexual Hybridization.

UNIT V

(18 hrs)

Apomixis and its Types- Agamospermy, Diplospory, Apospory, Adventive Embryony. Polyembryony and its Practical Application.

Text Books:

1. Bhojwani,S.S and Bhatnagar, S.P., “The embryology of angiosperms”, Vikas publication house, New delhi, 1974.
2. Maheswari.P., “An introduction to the embryology of angiosperms”, TMH limited New Delhi, 1971.
- 3 .Chopra,G.L., “Angiosperms”, Pradeep publications, Jalandar, 1988.

Unit	Text Book No.	Chapter	Page No.
I	2	1	1-16
II	1	-	265-278
III	2	7	74-184
IV	2	13	321-350
V	3	-	280-292

Reference Books:

1. Shivanna , K.R and Johri ,B.M., “The angiosperm pollen”, Wiley publication, 2006.
2. Kashinath Bhattacharya, “A Text book of Palynology”, New Central Book Agency; 3rd Revised edition, 2011.
3. Yogesh Dabgar, “Pollination Biology”, Neha Publishers and Distributors, 2011.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

UG Programme - M.Sc

Semester IV

(2018-2021)

Core Course - XIII: Plant Physiology (18PBYC41)

(For those who join from June 2018 and afterwards)

Credits : 5

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks: 100

Course Objectives:

- To understand how plant structure relates to function
- To understand how and why water and ions are transported through plants
- To understand plant strategies in the capture of light
- To recognize different methods plants use to sequester nutrients
- To understand different plant strategies in the utilization of nutrients

Course Outcomes:

1. Describe the physiological phenomena of plants in terms of mechanisms.
2. Will know the overview of biorhythms; stress physiology of plants.
3. Understand photoperiodism and physiology of flowering.

UNIT I

(18 hrs)

Water Relation- Physico- Chemical Properties of Water, Theories on Membrane Permeability; Diffusion, Osmosis and Imbibitions; Plasmolysis and Deplasmolysis- Significance; Water Potential – Definition, Water Potential Gradient, Absorption of Water; Types of Soil Water, Mechanism of Water Absorption, Active and Passive Absorption, Significance. Ascent of Sap- Transpiration Pull Theory.

UNIT II

(18 hrs)

Minerals salt absorption; Mechanism of Mineral salt absorption Theory, Passive absorption Theory, Donnan's Equilibrium, Active absorption theory, Protein Lecithin Transpiration: Three Types, Significance, Mechanism of Stomatal Opening and Closing – Theory of Starch, K⁺ Ions. Antitranspirants and Guttation.

UNIT III

(18 hrs)

Photosynthesis- Electromagnetic Spectrum, Ground and Excited State, Photosynthetic Apparatus. PSI and PSII Reaction Centres, Components of Cyclic And Non Cyclic Reaction. "Z" Scheme, Emerson's Enhancement and Red Drop Effect; CO₂ Assimilatory Pathway, C₃, C₄, (Three Types NADP-ME & PCK Types), CAM Pathway.

UNIT IV

(18 hrs)

Respiration-RQ- aerobic, (EMP, TCA, ETP) HMP, Pathway–Significance. Anaerobic respiration. Photo respiration – Dual action of Rubisco – Glycolate (C₂ pathway) Lipid metabolism – α and β oxidation. Glyoxylate metabolism – gluconeogenesis and its importance in seed germination.

UNIT V**(18 hrs)**

Growth Curve, Bioassay, Chemistry and Physiological Application of Phytohormones; Auxin, Gibberellins, Cytokinins, ABA, Ethylene and Brassinosteroids. Role Of Light – Photoperiodism, - Types and Significance; Vernalization, Senescence and Ageing Mechanism (Brief Account). Phytochromes- Properties, Mechanism of Action and Function. Stress Physiology- Drought, Salt. Biological Clock- Circadian Rhythm in Plant (A Brief Account).

Text Books:

1. Hess, D., “Plant Physiology”, Narosa Publishing House, New Delhi, 1975.
2. Lincoln Taiz and Eduardo Zeiger, “Plant Physiology”, The Benjamin/ Cummings Publishing Company, Inc, 1991.

Unit	Text Book No.	Chapter	Page No.
I	1	1	1-98
II	1	8	187-211
III	2	1	1-57
IV	2	2	60-98
V	1	11	250-277

Reference Books:

1. Brett, C.T. and Waldron, K.K., “Physiology and Biochemistry of Plant Cell Walls”, Chapman and Hall London, 1996.
2. Daphne, J.O. and Micheal, B.J., “Cell Separation in Plant Physiology, Biochemistry and Molecular Biology”, Springer –Verlag, Berlin, 1989.
3. David, T.D. and David, H.T. (Eds.), “Plant Physiology, Biochemistry and Molecular Biology”, Longmann Scientific and Technical, Singapore, 1993.
4. Devlin and Witham, “Plant Physiology”, CBS Publishers and Distributors, New Delhi, 1997.
5. Fitter, A.H. and Hay R.K.M.1987. Environmental Physiology of Plants. Academic Press.
6. Hall, D.O. and Rao. K.K., “Photosynthesis”, Cambridge University Press, 1999.
7. Strafford, G.A., Essentials of Plant Physiology, Heinmann Publishing Co, New York, 1979.
8. Wilkins, M.B. (Eds.), “Advanced Plant Physiology” Pitman Publishing Co, New York, 1984.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

UG Programme - M.Sc

Semester IV

(2018-2021)

Core Course-XIV: Plant Ecology (18PBYC42)

(For those who join from June 2018 and afterwards)

Credits : 5

Hours/Week : 6

Duration : 90 hrs

Int. Marks : 25

Ext. Marks : 75

Max. Marks: 100

Course Objectives:

- To understand the significance of ecosystem
- To understand the natural recourses
- To study the environmental pollution
- To recognize Diversity indices, evenness and richness
- To know the ecological concept

Course Outcome:

5. Understand vegetation and their relationship with the ecosystem.
6. Provide a thorough knowledge about environmental biology and ecosystem.
7. Acquire knowledge on ecosystem organization, biogeochemical cycle and ecosystem stability.
8. Comprehend the information on biodiversity, threats and conservations.

UNIT I

(18 hrs)

Introduction - Concept and Significance. Ecosystem - Terrestrial Ecosystem Forest, Desert, Grassland, Aquatic Ecosystem- Freshwater, Marine, Estuarine, Mangrove Food Chain, Food Web; Production Ecology; Biogeochemical Cycles C, N, P, S, and Water.

UNIT II

(18 hrs)

Resource Ecology: Energy Crisis, Renewable and Non- Renewable Energy Source; Conventional and Non Conventional / Alternative; Coal, Solar, Petroleum, Thermal, Nuclear, Biomass, Wind and Wave Energy. Conservation of Natural Resource: Soil, Forest, Water, Wildlife, Post- Desalination, Desertification, Reclamation of Land.

UNIT III

(18 hrs)

Environmental Issues: Pollution - Air, Gaseous & Particulate; Water: Industrial Effluent Entrophication- Natural and Cultural; Land Radiation, Pollution, Noise Pollution; Recycling, Human Ecology: Population Explosion, Causes Effect and Control.

UNIT IV

(18 hrs)

Measure of Plant Biodiversity – Alpha, Beta and Gamma Diversity- Diversity Indices, Evenness and Richness – Methods of Studying Diversity, Quadrature Method and Transect Method.

UNIT V

(18 hrs)

Ecological Concept of Species, Genecology, Ecotypes, Ecophene In Relation To Climatic, Edaphic and Photoperiodic Factors. Biogeography: Principle, Factor of Distribution of Plants and

Animal, Continuous and Discontinuous, Distribution, Continental Drift, Endemism, Age and Area Hypothesis.

Text Books:

1. Kumar, H.D., "General Ecology" Vikas Publishing House Pvt, Ltd, New Delhi, 1997.
2. Ambasht, R.S. and Ambasht, N.K., "A Text Book of Plant Ecology", Students Friends and Co. Varanasi, 1996.

Unit	Text Book No.	Chapter	Page No.
I	1	1	1-54
II	1	7	67-99
III	2	9	132-203
		14	269-279
IV	1	18	220-231
V	1	18	233-241

Reference Books:

1. Arora, "Fundamentals of Environmental Biology", Kalyani Publishers, New Delhi, 1995.
2. Chapman, "Ecology – Principles and Applications", Cambridge University Press, Foundation Books, New Delhi, 1999.
3. Crawford, R.M.M., "Plant Life in Aquatic and Amphibious habitats", Black Well Scientific Publications, Oxford London, 1986.
4. Jeffref, D.W., "Soil Plant Relationship –An Ecological Approach" Croom Helam, 1987.
5. Kershaw, K., and Looney, J.H.H., "Quantitative and dynamic plant ecology", Edward Arnold, 1985.
6. Mackenzie, A., Bell, A.S. and Virdee, S.R., "Instant notes in Ecology", Viva Books Pvt. Ltd., New Delhi, 1999.
7. Trivedi, P.R. and Gurudeep Raj, "Environmental Biology", Akashdeep Publishing House, New Delhi, 1995.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

PG Programme - M.Sc

Semester IV

(2018-2020)

Core Course-XV: Practical IV- Lab in Plant Physiology and Plant Ecology (18PBYC4P)

(For those who join from June 2018 and afterwards)

Credits : 4

Int. Marks : 40

Hours/Week : 6

Ext. Marks : 60

Duration : 90 hrs

Max. Marks: 100

Course Objectives:

- To understand the ecological relationship of plants with environment.
- To develop the skills on quantitative and qualitative analysis of various biochemical components of plants.
- To estimate the various importance to the physiology of plants.
- To understand the various physiological actions of plants.

Course Outcomes:

1. Understand vegetation and their relationship with the ecosystem.
2. Provide a thorough knowledge about environmental biology and ecosystem.
3. Acquire knowledge on physiological response of plants to various factors.
4. Understand the photosynthetic mechanism and related events of plants.

Plant Physiology

1. Determination of Osmotic potential of Rhoeo cell sap by plasmolytic method.
2. Determination of Water Potential of Potato tuber by Gravimetric method.
3. Effect of detergent on membrane permeability.
4. Effect of organic solvent (acetone) on membrane permeability.
5. Effect of temperature on membrane permeability.
6. Determination of Anthocyanin.
7. Determination of Stomatal Frequency and stomatal Index.
8. Effect of Cytokinin on the delay of senescence in terms of chlorophyll content.
9. Determination of proline from normal and water stressed plant.

Plant Ecology

1. Assessment of plant diversity- Field works to list herbs, shrubs and trees in the College campus and mapping them on graph.
2. Morphological and anatomical features of typical Xerophytes –Phylloclade- *Opuntia*, Cladode- *Casuarina*, Succulent – *Bryophyllum* and Hydrophytes- *Hydrilla*.
3. Vegetation study by Quadrant and Line transect.
4. Estimation of dissolved oxygen in water samples by Wrinklers method.
5. Estimation of CO₂ in water samples.
6. Biomonitoring of water pollution by species index method.
7. Visit to forest institution and field interest – Report preparation.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Botany

PG Programme – M.Sc

Semester IV

(2018 - 2020)

Core Course – XV: Project (18PBYJ41)

(For those who join from June 2018 and afterwards)

Credits : 7

Int.Marks : 20

Hours/Week : 12

Ext.Marks : 80

Duration : 180 hrs

Max.Marks:100

Course Objectives:

- To enable students understand the purpose and importance of research in Botany.
- To plan and carry out research work by collecting review, collecting materials, and find the results by various techniques.

Course Outcomes:

1. Inculcate Research interest among students
2. Get familiarized with basic concepts of research.
3. Identify and state the research topic.
4. Design and conduct research study accordance with the identified research need.
5. Develop skill to search online and offline sources to carryout research.
6. Apply academic skills to present the research study findings in a formal academic oral presentations and a written research paper.

Project work:

- Each learner can select for his/her research project in the thrust areas of Botany in consultation with his/her guide and the Head of the Department.
- The project report should be submitted to the Principal through the Head of the Department of Botany one week prior to the commencement of the summative examination. If a candidate fails to submit his/her project report on the date presented above, he/she may be permitted to submit the same 4 days prior to the date of viva-voce examination with a fine as prescribed by the college.
- Each learner shall submit 2 copies of his/her project report for valuation.
- The project report shall contain at least 45 pages excluding bibliography and appendices.
- The project report shall be valued for a total of 80 marks out of which 40 is internal mark and 40 is external mark. Out of the external mark 40, the external examiner and guide share 30 and 10 marks respectively. The sum of marks awarded by both the examiners shall be considered to be the final mark. For the pass in the project report the learner shall secure a minimum of 25 marks. If the learner fails to get the minimum pass mark in the project report he/she shall be permitted to submit his/her project report once again within a period of 6 months after the publication of the result.

- For those candidates who have passed in the evaluation of the project report there will a viva-voce examination of the above. The viva-voce carries a minimum of 20 marks and it will be conducted jointly by the guide and the external examiner. The learner should secure a minimum of 10 marks for a pass in the viva-voce examination failing which he/she would be required to reappear for the same after a month but within a period of 3 months for which he/she will have to pay a fee as prescribed by the college.
- Further for a pass in this paper as a whole, a learner should secure at least 50 marks in project report and viva-voce put together.