



MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY
(With effect from Academic Year 2020-2021)

B.Sc. (Botany)
SEMESTER - I

SEMESTER PATTERN:

- The Course content has been designed on **Semester pattern**.
- The workload for Theory is allotted on Semester pattern.
- There shall be **one Theory paper of 70 marks** of 2.5 Hours duration.
- There shall be **one Practical paper of 50 marks** of 3 Hours duration.

Type of Course	SUBJECT CODE	Course name	Credit	Class room/lab hrs per week	Marks Ext.	Exam Duration	Marks Internal	Marks
BOTCC 103	22855	Gymnosperm, Taxonomy, Plant Physiology, Economic Botany, Horticulture	4	4	70	2.5	30	100
BOTCC 104	22856	Botany Practical - I	2	4	50	3	--	50

Internal	Marks
Test	15
Assignment / Presentation	10
Seminar / Presence	05
Total	30



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(With effect from Academic Year 2020-2021)

B.Sc. (Botany)
SEMESTER - II

SEMESTER PATTERN :

- The Course content has been designed on **Semester pattern**.
- The workload for Theory is allotted on Semester pattern.
- There shall be **one Theory paper of 70 marks** of 2.5 Hours duration.
- There shall be **one Practical paper of 50 marks** of 3 Hours duration.

Type of Course	SUBJECT CODE	Course name	Credit	Class room/lab hrs per week	Marks Ext.	Exam Duration	Marks Internal	Marks
BOTCC 203	22857	Cryptogamic botany, Cytology, Genetics, Molecular biology, Environmental biology, and Climate change	4	4	70	2.5	30	100
BOTCC 204	22858	Practical - II	2	4	50	3	--	50

Internal	Marks
Test	15
Assignment / Presentation	10
Seminar / Presence	05
Total	30



B.Sc. (Botany)

SEMESTER-I

Paper No: BOTCC 103

Title of the Paper: **Gymnosperm, Taxonomy, Plant Physiology, Economic Botany, Horticulture**

Credits: 04

Hours: 04/week

Marks: 100

Semester End Examination:

70 Marks

Continous Internal Evaluation:

30 Marks

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
1	STUDY OF HIGHER PLANTS Gymnosperms: Outline Classification of Gymnosperms by Chamberlain Cycas -Occurrence, distribution, taxonomic position, morphology, reproduction and life history of the genus. Angiosperms: Sunflower and Maize Occurrence, distribution, taxonomic position, morphology, reproduction and life history of the genus (excluding anatomy).	15	18/17
2	MORPHOLOGY and TAXONOMY Morphology: Phyllotaxy, Types of leaves & Venation, Types of Stipules & their Modifications. Bracts: Scaly, Involucral, Foliaceous, Petaloid and Spathe Inflorescence: Racemose – Raceme Spike, Catkin, Spadix, Umbel, Capitulum; Cymose – Solitary terminal, Solitary axillary, Helicoid, Scorpioid, Biparous, Multiparous cymes. Special Types of Inflorescences: Hypanthodium, Verticillaster, Cyathium. Types of Flowers based on position of ovary, Aestivation & Placentation. Taxonomy: Understand systematic botany of higher plants with the economic importance of plants. Detailed study of the following families: Dicotyledons- Malvaceae Monocotyledons- Amaryllidaceae	15	18/17



3	PLANT PHYSIOLOGY Plant-Water Relations: Water Potential, Diffusion, Imbibition, Osmosis, Plasmolysis Respiration: Mechanism, Aerobic and anaerobic respiration, significance and factors affecting them Photosynthesis: Significance, Mechanism-Light & Dark reactions Physiology of Flowering Role of light and temperature in flowering (Vernalization, Photoperiodism) Transpiration and Guttation: Bell-Jar Experiment, types, significance and factors affecting transpiration, Guttation	15	18/17
4	ECONOMIC BOTANY and HORTICULTURE Economic Botany Botanical name, common name, family, useful part, brief description, important chemical constituents if any, climate and cultivation (only for cereals, Pulses and oil seeds) and uses of the following plants: Cereals- Wheat, Rice, Maize Pulses- Gram, Green gram, Pea. Oil seeds- Ground nut, Sunflower Medicinal plants- Tulsi, Aloe, Tinospora and Ashwagandha Horticulture and Gardening Horticulture: Definition, Scope and Branches Gardening: Introduction, Uses of gardens, Types of gardens (Kitchen garden, water garden, rock garden and terrace garden) Garden Equipments.(Sprinkler, Hoe, Scissors, Hose pipe, Watering can)	15	18/17

Reference books:

- Bhatnagar, S.P. and Moitra, A. 1996. Gymnosperms. New Age International Pvt.Ltd., New Delhi.
- Raghavan, V.1999. Developmental Biology of Flowering plants. Springer Verlag, New York.
- Singh, G. 1999. Plant Systematics - Theory and Practice. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
- Naik, V.N. 1984. Taxonomy of Angiosperms. Tata McGraw - Hill Publishing Co. Ltd. New Delhi.
- Verma B. K. 2011. Introduction to Taxonomy of Angiosperms. PHI Learning Private Ltd. New Delhi
- Botany for degree students- Vol. V, Gymnosperm by P. C. Vasishta (S. Chand, Delhi)
- Gymnosperm by G. L. Chopra (S. Nagin & Co., Jullundhar)



- Gymnosperm by Vasishta (S. Chand, Delhi)
- Plant Systematics, Gurucharan Singh, Oxford & IBH.
- Advanced Plant Taxonomy, A. K. Mondal, New Central Book Agency (P)
- Taxonomy of Angiosperms, B. P. Pandey, S. Chand Publication.
- Raghavan, V.1999. Developmental Biology of Flowering plants. Springer - Verlag, New York.
- Stebbins, G.L. 1974. Flowering Plant - Evolution above Species Level. Edward Arnold Ltd. London.
- Takhtajan, A.L. 1997. Diversity and Classification of Flowering Plants. Columbia University Press, New York.
- Naik, V.N. 1984. Taxonomy of Angiosperms. Tata McGraw - Hill Publishing Co.Ltd. New Delhi.
- Plant Physiology by S Mukherji and A K Ghosh, New Central Book Agency(P)Ltd
- Plant Physiology by S.N.Pandey and B.K. Sinha, Vikas Publishing House.
- Plant Physiology and Biochemistry by S.K. Verma, S. Chand & Co.
- Hopkins, W. G. 1995. Introduction to Plant Physiology. John wiley & Sons, Inc., New York, USA.
- Moore, T. C. 1989. Biochemistry and Physiology of Plant Hormones (2nd edition). Springer - Verlag, New York, USA
- Salisbury, F.B. and Ross, C.W. 1992. Plant Physiology (4 th edition). Wadsworth Publishing Co. california, USA.
- Singhal, G.S., Renger, G., Sopory, S.K., Irrgang, K.D. and Govindjee 1999. Concept in Photobiology: Photosynthesis and Photomorphogenesis. Narosa Publishing House, New Delhi.
- Taiz, L. and Zeiger, E. 1998. Plant Physiology (2nd edition). Sinauer Associates, Inc., Publishers, Massachusetts, USA.
- Weshthoff, P. 1998. Molecular Plant Development: from Gene to Plant. Oxford University Press, Oxford, UK
- Economic Botany by V. Verma
- Economic Botany of the Tropics by S.L.Kochhar
- Economic Botany by A.F. Hill & O.P.Sharma, Tata McGraw Hill, New Delhi.
- Gardening in India – Percy Lancaster, Oxford & IBH Publishing Co. Pvt Ltd.
- Gardens – Laeeq Futehally, National Book Trust, India.
- Economic Botany by A.V.S.S. Samba Murty and N.S. Subramanyam,Wiley Eastern
- A Manual of Ethnobotany, 2nd Edition, by S.K. Jain. Scientific Publishers,Jodhpur.



B.Sc. (Botany)

SEMESTER-I

Paper No: BOT CC 104 (As per theory paper - 103)

Title of the Paper: BOTANY PRACTICAL - I

Credits: 04 Duration: 02 Hours/practical Hours: 04/week Marks: 50

- *All the topics of the practical are being taught by Available fresh / Preserve materials, Models, Charts, Figures and permanent Slides.*
- *Teachers may select plant species available in their locality for study of family.*
- *Students will have to prepare their Practical journals as a part of Laboratory work and they will have to submit certified journals in the University practical exam.*
- *Students shall not be allowed without certified journals in the University practical examination.*

LIST OF PRACTICALS

Sr. No.	Aim of Practical
1	To study Cycus (vegetative parts)
2	To study Cycus (reproductive parts)
3	To study Life history of Sunflower
4	To Study Life history of Maize
5	To study Phyllotaxy
6	To study types of Leaves
7	To study Venation
8	To study Stipules and their modification
9	To study Bracts
10	To study Inflorescence (Cymose)
11	To study Inflorescence (Racemose)
12	To study Inflorescence (Special type)
13	To study Astivation and Placentation
14	To study Family - Malvaceae
15	To study Family - Amarylladaceae
16	To study Diffusion
17	To study Osmosis
18	To study Plasmolysis
19	To study Cereals and Pulses (Wheat, Rice, Maize, Gram, Green gram, Pea)
20	To Medicinal plants (Tulsi, Aloe, Tinospora and Ashwagandha)
21.	To study diferent types of Gardens.
22.	To study garden equipments.



B.Sc. (Botany)
SEMESTER-II

Paper No: BOTCC 203- Cryptogamic botany, Cytology, Genetics, Molecular biology, Environmental biology, and Climate change (THEORY)

Credits: 04

Hours: 04/week

Marks: 100

Semester End Examination

:

70Marks

Continous Internal Evaluation:

30 Marks

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
1	<p>CRYPTOGAMIC BOTANY (Development of sex organ excluded.) Algae: Taxonomic Position (As per F.E. Fritch), structure of thallus, vegetative, asexual and sexual modes of reproduction of the genus, Economic importance of algae. Spirogyra, Spirulina Fungi: Taxonomic Position (As per Ainsworth), structure of thallus, vegetative, asexual and sexual modes of reproduction of the genus, Economic importance of fungi. Mucor, Yeast Bryophytes: General characters of Bryophytes, Taxonomic Position (As per G.M. Smith), Morphology, structure of thallus, vegetative, asexual and sexual modes of reproduction of the genus. Marchantia. Pteridophytes: Taxonomic Position (As per G.M. Smith), Morphology, structure of thallus, vegetative, asexual and sexual modes of reproduction of the genus. Nephrolepis. Economic importance of Pteridophytes</p>	15	18/17
2	<p>CYTOLOGY, GENETICS AND MOLECULAR BIOLOGY Ultra structure of Plant Cell Structure & Function of Mitochondria and Chloroplast DNA Structure ,Watson and Crick's Model & Forms of DNA Structure and Types of RNA DNA Replication Genetic Code & its Properties Protein Synthesis</p>	15	18/17
3	<p>ENVIRONMENTAL BIOLOGY & CLIMATE CHANGE Introduction, Scope and Branches of Ecology Ecosystems: Kinds of Ecosystems: Natural, Artificial Structure and Functions of Ecosystems, Ecological Pyramids, Productivity of an Ecosystem, Energy flow in an Ecosystem Biogeochemical Cycles- Nitrogen, Carbon Components of Freshwater Ecosystem (Pond) Components of Terrestrial Ecosystem (Grassland) Biotic Factors: Symbiosis: Mutualism, Proto-cooperation,</p>	15	18/17



	Commensalism Antagonism: Predation, Parasitism, Antibiosis, Competition, Saprophytism Climate change & Sustainable Biodiversity, IUCN Categories of threat and list of endangered plant species of Gujarat, Importance of Biodiversity, Sources, Effect & Control of Air and Water Pollution.		
4	PLANT BIOTECHNOLOGY Introduction, Brief History, Scope and Types of Plant Biotechnology Plant Tissue Culture – Tools & Technique & Laboratory organization Organ & Pollen Culture Introduction to Synthetic Seeds & Edible Vaccines Protoplast Culture and Somatic Hybridization. Applications of Plant Tissue Culture	15	18/17

Reference books:

- A Textbook of Botany vol. I and II S.N. Pandey, P. S. Trivedi and S. P. Misra., Vikas Publication House Pvt. Ltd.
- Collage Botany Vol. I & II Das, Dutta, Gangulee and Kar., New Central Book Agency
- Algae, Fungi, Bryophyte, Pteridophyte by Vasishta., S. Chand Pub, New Delhi
- Smith, G. M. 1972. Cryptogamic Botany. Vol. 1 & 2. Tata McGraw Hill Publishing Co. Ltd. New Delhi.
- Webster, J. 1985. Introduction to Fungi. Cambridge University Press.
- Sporne, K.K. 1991. The Morphology of Pteridophytes. B.I. Publishing Pvt. Ltd. Bombay.
- The World of Cell by Backer, Kleinsmith and Hardin Pearson Education
- Elements of Cytology by C. B. Powar
- Lewin, B. 2000. Genes VIII. Oxford University Press, New York.
- Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K. and Watson, J.D. 1999.
- Molecular Biology of the Cell. Garland Publishing, Inc. New York.
- Wolfe, S.L. 1993. Molecular and Cellular Biology. Wadsworth Publishing Co. California, USA.
- Kleinsmith, L.J. and Kish, V.M. 1995. Principles of cell and Molecular Biology (2nd Ed.). Harper Collins College Publishers, New York, USA.
- Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology (4th Ed.). W.H. Freeman and Co., New York, USA.
- Cytogenetics by S. Sundara Rajan., First edition, Anmol Publications, New Delhi
- Textbook of Ecology by G. Tailer Miller, Jr. Scott E. Spoolman. Cengage Learning
- Plants and Environment by Daubenmire (Wiley-Eastern Pvt. Ltd., New Delhi)
- Ecology and Environment by P.D. Sharma Rastogee Publication
- Basic Ecology – Eugene P. Odum Fundamentals of Ecology- P. Odum
- Concept in Indian Ecology and Environmental Science – S. V. S. Rana
- Ecology Theories and Application – Peter Stiling



- Ecology & Environment – P. D. Sharma
- Indian Manual of Plant Ecology – R. Misra & G. S. Puri
- Biotechnology by U. Satyanarayana Books and Allied (P) Ltd
- Elements of Biotechnology by P.K.Gupta, Rastogi Publications.
- Plant cell and tissue culture by Narayanswamy, Tata McGraw Hill.
- Bhojwani, S.S. 1990. Plant Tissue Culture: Theory and Practical (a revised edition). Elsevier Science Publishers, New York, USA.
- Basic Biotechnology by S. Ignacimuthu, Tata McGraw Hill.
- Text Book of Biotechnology by R.C. Dubey, S. Chand & Co.
- Vasil, I.K. and Thorpe, T.A. 1994. Plant Cell and Tissue Culture. Kluwer Academic Publishers, the Netherlands .
- Snustad, D.P. and Simmons, M.J.2000. Principals of Genetics. John Wiley & Sons, Inc., USA.
- Stent, G.S. 1986. Molecular Genetics. CBS Publication.
- Brown, T.A. 1999. Genomes. John Wiley & Sons (Asia) Pvt. Ltd., Singapore.



B.Sc. (Botany)

SEMESTER-II

Paper No: BOTCC 204 (As per Theory paper - 203)

Title of the Paper: BOTANY PRACTICAL - II

Credits: 04 Duration: 02 Hours/practical Hours: 04/week Marks: 50

- *All the topics of the practical are being taught by Available fresh / Preserve materials, Models, Charts, Figures and permanent Slides.*
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- *Students will have to prepare their Practical journals as a part of Laboratory work and they will have to submit certified journals in the University practical exam.*
- *Students shall not be allowed without certified journals in the University practical examination.*

LIST OF PRACTICALS

Sr. No.	Aim of Practical
1	To study Spirogyra
2	To study Spirulina
3	To study Mucor
4	To Study Yeast
5	To study Marchantia (Gametophyte)
6	To study Marchantia (Sporophyte)
7	To study Nephrolepis (Sporophyte)
8	To study Nephrolepis (Gametophyte)
9.	To study Ultra stucture of plant cell.
10	To study structure of DNA
11	To study structure of RNA
12	To study types of RNA
13	To study DNA replication
14	To study Genetic code
15	To study Nitrogen cycle
16	To study Carbon cycle
17	To study Fresh water ecosystem
18	To study Symbiosis
19	To study Antagonism
20	To study Nutritionl media composition (MS Media).
21	To study instruments used in tissue culture technique (Weighing balance, pH meter, autoclave, laminar air flow, BOD incubators, culture room)
22	Field study / Excersion Report.