SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Theory Syllabus
Effective from June 2018
(Credits: Theory-4, Practicals-2)
Total Lectures: 48
Semester – V (Paper: 301)

Paper – CC 301: [Microbiology, Algae, Fungi &Plant Pathology.]

Unit – 1: Microbiology (14 Marks) [Lectures 12]

Brief outline Nomenclature and Classification of Virus; Multiplication of Virus; Properties of Virus; Morphology and Ultrastructure(Bacteriophase).
Types of Bacteria (on the base of shape and flagella); Ultrastucture of Bacteria;
Cyanobacteria: *Oscillatoria*, *Spirulina*, its significance.
Application of Microbiology in Agriculture, Industries, Medicine and in control of Soil, Water pollution.
Important crop disease caused by Viruses, Bacteria.
Tobacco Mosaic Virus (TMV), *Citrus canker*.

Unit – 2: Algae (14 Marks) [Lectures 12]

General characters and classification (G.M.Smith)
Range of Thallus structure in Chlorophyta.
Life history of *Volvox, Coleochaetae Vaucheria and Chara*.
General accounts of *Diatoms*.

Unit – 3 : Algae (14 Marks) [Lectures 12]

Origin and Evolution in Algae.
Life history of Phaeophyta: *Ectocarpus, Fucus*.
Life history of Rhodophyta: *Polysiphonia, Batrachospermum*.
Range of life cycle pattern in Algae.
Role of Algae in Human Welfare [Industries, Utilization and Pollution indicators]

Unit – 4: Fungi & Plant Pathology (14 Marks) [Lectures 12]

General characters, classification of Fungi [G.C.Ainsworth, 1971]
Life History of Fungi: *Pythium*, *Pezzia, Yeast* and *Agaricus*.
Heterothallism in Fungi.
General account of *Mushroom* cultivation.
Plant disease: Introduction, Definition of disease, general symptoms of disease caused by Fungi.
Classification of plant diseases [According to major causal agents], disease control, prevention and cure.
Plant diseases cycle of the following:

1. *Late blight of Potato.*
2. *Loose Smut of Wheat.*

Suggested Reading

College Botany Vol. 1& 2 Das, Datta, Gangulee and Kar, New Centralbook Agency.
Smith, G.M. 1972. Cryptogamic Botany Vol. 1. Tata McGraw Hill Publishing Co. Ltd. New Delhi.
A Text Book of Botany Vol. 1 & 2. S.N. Pandey, P.S. Trivedi and Mishra., Vikas Publication House Pvt. Ltd.
Botany for degree students, Algae, Botany for degree students Fungi,
Padey, BP, 2009. Plant Pathology, S Chand Publishers., NewDelhi.

Sharma, PD. 2004. Plant Pathology, Rastogi Publication, NewDelhi.

SHRI GOVIND GURU UNIVERSITY
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Semester – V (Paper: 302)

Paper – CC 302: [Bryophyta & Pteridophyta]

Unit- 1: Bryophyta (14 Marks) [Lectures 14]

General characters and classification
Origin and Evolution in Bryophytes
Resemblances of Bryophytes with Algae.
Life History of the following: [Developmental details not to be included]
Marchantia, Pellia, Porella.

Unit – 2: Bryophyta (14 Marks) [Lectures 14]

Vegetative reproduction in Bryophytes.
Progressive sterilization and evolution of sporogenous tissue.
Resemblances of Bryophytes with Pteridophytes.
Life History of the following: [Developmental details not to be included]
Anthoceros, Polytrichum, Sphagnum.

Unit – 3: Pteridophyta (14 Marks) [Lectures 10]

General characters and classification.
Origin and Evolution in Pteridophytes.
Stelar evolution in Pteridophytes.
Life History of the following: [Developmental details not to be included]
Psilotum, Isoetes.

Unit – 4: Pteridophyta (14 Marks) [Lectures 10]

Evolution of Sporophytes in Pteridophytes (Telome Theory ; Merits and demerits)**.**
Abnormalities in the life cycle: Apospory and Apogamy.
Diversity of Pteridophytes in Gujarat.
Life history of the following: [Developmental details not to be included]
Azolla, Marsilea, Equeisetum

Pteridophytes:

Psilophytales: General characters RHYNIA

Lepidodendrales: General characters LEPIDODENDRON, LEPIDOCARPON

Calamitales: General characters CALAMITES

Suggested Reading

Botany for degree students Bryophytes, Botany for degree students Pteridophytes
By Vasishta, B. R., S. Chand Pub., New Delhi.
Smith, G.M. 1972. Cryptogamic Botany Vol. 2. Tata McGraw Hill Publishing Co. Ltd. New Delhi.
College Botany Vol. I & II Das, Dutta, Gangulee & Kar, New Central book Agency

SHRI GOVIND GURU UNIVERSITY
BOTANY
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Semester – V (Paper: 303)

Paper No. – 303: [Gymnosperms& Paleobotany]

Unit – 1: Gymnosperms (14 Marks) [Lectures 12]

General characters and classification.
Resemblances and deference between Gymnosperms and Pteridophytes.
Resemblances and deference between Gymnosperms and Angiosperms.
Life history of *Pinus*. [Developmental details not to be included]

Unit – 2: Gymnosperms (14 Marks) [Lectures 16]

Origine and Development of Heterospory in Gymnosperms.
Gymnosperms of India and their distribution and economic importance.
Life history of *Ginkgo, Gnetum*. [Developmental details not to be included]

Unit – 3: Paleobotany (14 Marks) [Lectures 10]

Nomenclature of fosills.

Geological Timescale.

Fossilization and Types of Fossils.

General characters of Psilophytales – *Horneophyton*

Lepidodendrales –*Lepidocarpon*[Seed]

Sphenophyllales – *Sphenophyllum.*

Unit – 4: Paleobotany (14 Marks) [Lectures 10]

Factors effecting Fossilization.

Some useful techniques for Fossil study.

Study of Gymnosperm Fossils:

Cycadales: General characters *LYGENOPTERIS*.

Bennettitales: General characters *CYCADEOIDEA*.

Cordaitales: General characters *CORDAITES*.

Suggested Reading

Pandey, BP. 2013,Publishers College Botany vol. II, S Chand Publishers, NewDelhi

Sharma,OP. 1980. Gymnosperms, Pragati Prakashan, Meerut(India)

Gangulee, HC, Das KS & Datta C, College botany Vol. I, II, III. Publisher Central Educational Enterprises(P)Ltd., Kolkata

SHRI GOVIND GURU UNIVERSITY
BOTANY
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Total Lectures: 48
Semester – V (Paper: 304)

Paper No. – 304: [Systematic Botany& Angiosperm Taxonomy]

Unit – 1: Systematic Botany (14 Marks) [Lectures 12]

Principles of Taxonomy.
Comparative accounts and merits and demerits of various system of classification,
Bentham & Hooker, Engler and Prantle, Hutchinson, Bessey,
Numerical Taxonomy.
Chemotaxonomy.

Unit – 2: Systematic Botany (14 Marks) [Lectures 10]

Origin and evolution of Angiosperms
Taxonomic evidences in relation to plant angiosperms: Embryology, cytology and
Molecular data (APG IV System).
Herbarium techniques: Plant Collection and Preparation of herbarium.
Some important Herbaria in India.

Unit – 3 & 4: Anigiosperm Taxonomy (28 Marks) [Lectures 26]

Types of Branches (Lateral & Dichotomy) Types of Leaf shape, Types of Leaf incision
Types of Fruit.
Study of following Angiospermic Families:
Polypetalae: Annonaceae, Umbelliferae, Cucurbitaceae, Rhamnaceae, Mimosaceae, Tiliaceae
Gamopetalae: Apocynaceae, Convolvulaceae, Boraginaceae, Acanthaceae, Rubiaceae, Sapotaceae
Apetalae (Monochlamydeae): Chenopodiaceae, Polygonaceae, Moraceae
Monocots: Cannaceae, Commellinaceae

Suggested Reading

Simpson, MG. 2006. Plant Systematics. Elsevier Academic Press, San Diego, CA, USA.

Singh, G. 2012. Plant Systematics: Theory & Practice. Oxford & IBH Pub.Co. Pvt. Ltd. NewDelhi.

Mondal, A.K. Advanced Plant Taxonomy, New Central Book Agency, Kolkatta.

Sharma A.K. and Rajeshwari Sharma, Pragti Prakashan, Meerut.

Saxena N.B. and S. Saxena, Pragti Prakashan, Meerut.

SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Theory Syllabus
Effective from June 2018
(Credits: Theory-2)
Total Lectures: 30
Semester – V (SEC-Paper: 305)
Ethnobotany

Unit: 1. Ethnobotany (14 Marks) [Lectures 06]

Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in thee present context; Major and minor ethnics groups or Tribals of india, and their life styles. Plantes used by tribals:
a) Food Plants b)Intoxicants and beverages c) Resins and oils and miscellaneous used.

Unit: 2. Methodology of Ethnobotanical studies (14 Marks) [Lectures 06]

a) Field work b) Herbarium c) Ancient Literature d) Archaeological e) temples and sacred places.

Unit: 3. Roles of Ethnobotany in modern medicine (14 Marks) [Lectures 10]

Medico-ethnobotanical sources in India; Significance of the following plants in ethnobotanical practices (along with their habitat and morphology) *a) Madhuca indica b) Chlorophytom borivilliansis c) vitex negundo d) Gloriosa superba e) Tribulus terrestris f) Pongamja pinnata g) Cassia fistula h) Diospyres melanoxylon.* Role of ethnobotany in modern medicine with special example *Rauvolfia serpentina , Trichopus zeylanicus Artemisia, Withania., Adhatoda, Achyrenthus aspera.*

Unit: 4. Ethnobotany and legal aspect (14 Marks) [Lectures 08]

Role of ethnic groups in conversation of plant genetic resources. Endangered taxa and forest management(participatory forest management)

Ethnobotany as a tool to protect interest of ethnic groups.

Sharing of wealth concept with few examples from India Biopiracy, Intellectual Property Rights and Traditional Knowledge.

Suggested Readings

1) S.K.Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
2) S.K.Jain(ed) Glimpses of Indian Ethnobotany, Oxford and I B H, New Delhi-1981
3) Lone et al, Palaeoethnobotany
4) S.K.Jain(ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.
5) S.K.jain, 1990. Contribution of Indian ethnobotany. Scientific Publishers, JodhpurC
6) Colton C.M. 1997. Ethnobotany – Principles and application. John Wiley and sons-Chichester
7) Rama Ro, N and A.N.Henry (1996). The Ethnobotany of Eastern Gath in Andhra Pradesh, India. Botanical Survey of India. Howrah.
8) Rajiv K. Sinha- Ethnobotany The Renaissance of Traditional Herbal Medicine-INA-Shree Publisher, Jaipur-1996-99
9) Trivedi, P.C. Ethnobotany., Aavishkar Publishers, Jaipur.
10) Sinha RK, Sinha S, 2001. Ethnobiology, Surabhi Publications, Jaipur
11) Colton CM, 1997. Ethnobotany- Principles and applications. John Wiley and Sons- Chichester

SHRI GOVIND GURU UNIVERSITY
BOTANY
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Semester – V
Practicals (Paper: 306A)
Base on Theory Paper – 301
[Microbiology, Algae, Fungi &Plant Pathology]

Study of types through Fresh/ Preserved material/s and Permanent Slides (P.S.)/Models/ Charts

(1) Study of following Microbiological species.

Identify and Classify following types through Mounting (W.M.)

(a) Study of Cyanobacteria: Oscillatoria,Spirulina

(b) Study of Citrus canker (*Xanthomonas citri*): mounting from infected part and Permanent Slide (P.S.)

(c) Ultrastructure of Bacteriophase virus and types of Bacteria (on the bases of shape & flagella) through Model/ Chart;

(d) Staining of Bacteria through Gram Staining

(2) Identify and Classify following types: Morphology, Internal structure and Reproductive organs through Mounting

Study of Algae

(a) Volvox, Coleochaetae, Vaucheria, Chara

(b) Ectocarpus, Fucus, Polysiphonia, Btrachospermum

Study of Fungi

(a) Pythium, Peziza, Yeast, Agaricus

Study of following Plant disease

(a) Late Blight of Potato (*Phytophthora infestans*)

(b) Loose Smut of Wheat (*Ustilago nuda*)

Students are expected to submit Project / Submission regarding the any one topic/s as mentioned in theory paper.

SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Practical Syllabus
Effective from June 2017
Semester – V
Practicals (Paper: 306B)
Base on Theory Paper – 302
[Bryophyta & Pteridophyta]

Study of types through Fresh/ Preserved material/s and Permanent Slides (P.S.)/Models/ Charts

Identify and Classify Following types

(1) Study of Bryophytic Plants

Marchantia, Pellia, Porella: Thallus morphology, internal (V.T.S.) structure, Sexual reproductive organs & Sporophyte.

(2) Study of Pteridophytic Plants: Morphology & Internal Structure

Psilotum (Rhizome, Aerial Shoot, Synangium T.S.; Study of Prothallus-P.S.)

Isoetes (Leaf T.S., Micro- & Megasporophylls)

Azolla (Root, Stem, Leaf T.S., Structure of Micro & Mega sporocarps).

Marsilea (Rhizome, Petiole T.S., Structure of Sporocarps).

Equeisetum (Rhizome, Aerial Shoot T.S.& Cone)

(3) Study of Fossil Pteridophytes

Rhynia Stem T.S., Lepidodendron Stem T.S., Lepidocarpon Lomaxii Megasporophylls

V.S. Slide & Calamites Impression, Stem T.S. through specimen/s, Slides.

SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Practical Syllabus
Effective from June 2017
Semester – V
Practicals (Paper: 306C)
Base on Theory Paper – 303
[Gymnosperms & Paleobotany]

Study of types through Fresh/ Preserved material/s and Permanent Slides (P.S.)/Models/ Charts

Identify and Classify Following types

(1) Study of Gymnosperm Plants

External and Internal structure of Leaf / Needle, Male & Female cones;

Anatomy of Root & Stem, through P.S of the following:

Pinus: Anatomy of Root & Stem; Male Cone and Female Cone; L.S of Ovule.

Ginkgo: Anatomy of Root & Stem; Male and Female Cone; L.S. of Ovule

Gnetum: Anatomy of Root & Stem; Male and Female Cone; L.S. of Ovule

(2) Study of following Gymnosperm Fossils:

Psilophytales – *HORNEOPHYTON*

Lepidodendrales –*LEPIDOCARPON* [Seed]

Sphenophyllales – *SPHENOPHYLLUM.*

Cycadales: *LYGENOPTERIS Stem T.S.*

Bennettitales: *CYCADEOIDEA Stem T.S., Flower Bud*

Cordaitales: *CORDAITES Root T.S., Stem T.S, Leaf impression/ T.S.*

SHRI GOVIND GURU UNIVERSITY
BOTANY
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Practicals (Paper:306D)
Base on Theory Paper – 304
[Systematic Botany& Anigiosperm Taxonomy]

Types of Branches:

1. Dichotomous
2. Lateral: Racemose/ Monopodial.
   Cymose/ Sympodial-Uniparous cymose(Helicoid, Scorpoid)
   Biparous cymose, Multiparous cymose

Types of Leaf shape:

Acicular, Linear, Lanceolate, Oblong, Elliptical or Oval, Ovate, Cordate, Reniform, Spathulate, Sagittate, Hastate, Orbicular, Lyrate, Oblique, Cuneate

Types of Leaf incision:

1. Pinnate: Pinnatifit, Pinnatipartite, Pinnatisect.
2. Palmate: Palmatifit, Palmatiparite, Palmatisect

Types of Fruit:

a) Simple fruits
1. Dehiscent: Legume, Follicle, Capsule, Siliqua
2. Indehiscent: Caryopsis, Cypsela, Nut, Achene, Samara
3. Schizocarpic: Lomentum, Cremocarp, Dobluesamara, Regma, Carcerule
4. Fleshy Fruit : Drupe, Berry, Pepo, Pome, Hesperidium, Balausta

b) Aggregate fruits
1. Etaerio of follicles 2. Eaterio of Achenes
3. Eaterio of Drupes 4. Eaterio of Berries

c) Multiple or composite fruits:
1. Sorosis 2.Syconus

Study of following Angiospermic Families:

DICOTS: **Polypetalae**: Annonaceae, Umbelliferae, Cucurbitaceae, Rhamnaceae, Mimosaceae, Tiliaceae. **Gamopetalae**: Apocynaceae, Convolvulaceae, Boraginaceae, Acanthaceae, Rubiaceae, Sapotaceae. **Apetalae** (Monochlamydeae): Chenopodiaceae, Polygonaceae, Moraceae.
MONOCOTS: Cannaceae, Commellinaceae.

Students are expected to describe total morphology of given Angiospermic plant/s to perform as an exercise in examination for this paper. Study Tour / Field trips, Its report & preparation of Herbarium sheets are mandatory.

SHRI GOVIND GURU UNIVERSITY, GODHRA

B.Sc., Semester- V, BOTANY PRACTICAL (Paper- 306A)

Practical: I

[Practical Examination Based on Theory Paper - 301]

[Microbiology, Algae, Fungi &Plant Pathology]

Date: Place:

Time: 05 Hours Total Marks: 35

Instruction:

Q1.	Identify, classify and describe giving reasons. Draw the labeled diagram of the peculiarities observed in Specimen A, B and C.	(15)
Q2.	Expose the reproductive structure of specimen D. Make sketch and show your preparation to the Examiner.	(06)
Q3.	Identify and describe briefly the slide/specimens.	(06)
(E)	Microbiology	
(F)	Algae	
(G)	Fungi/ Plant Pathology	
Q4.	Journal.	(03)
Q5.	Submissoins.	(05)

SHRI GOVIND GURU UNIVERSITY, GODHRA

B.Sc., Semester- V, BOTANY PRACTICAL (Paper-306B)

Practical: II

[Practical Examination Based on Theory Paper - 302]

[Bryophyta & Pteridophyta]

Date: Place:

Time: 05 Hours Total Marks: 35

Instruction:

Q1	Identify, Classify and describe giving reasons. Draw the labeled diagram of the peculiarities observed in Specimen A & B.	(10)
Q2	Identify & Expose the reproductive structure from the Specimen C. Make a sketch and show your preparation to the Examiner.	(07)
Q3	Identify and Describe.	(10)
	(D)Bryophyte	
	(E) Bryophyte	
	(F) Pteridophyte	
	(G) Pteridophyte	
	(H) Fossil	
Q4	Journal	(03)
Q5	Submission/ Project	(05)

SHRI GOVIND GURU UNIVERSITY, GODHRA

B.Sc., Semester- V, BOTANY PRACTICAL (Paper-306C)

Practical: III

[Practical Examination Based on Theory Paper - 303]

[Gymnosperms & Paleobotany]

Date: Place:

Time: 05 Hours Total Marks: 35

Instruction:

Q1	Identify, Classify and describe giving reasons. Draw the labeled diagram of the peculiarities observed in Specimen A & B.	(10)
Q2	Identify & Expose the reproductive structure from the Specimen C. Make a sketch and show your preparation to the Examiner.	(07)
Q3	Identify and Describe.	(10)
	(D)Gymnosperm	
	(E) Gymnosperm	
	(F) Paleobotany	
	(G) Paleobotany	
	(H) Paleobotany	
Q4	Journal.	(03)
Q5	Submission/ Project	(05)

SHRI GOVIND GURU UNIVERSITY, GODHRA

B.Sc., Semester- V, BOTANY PRACTICAL (Paper-306D)

Practical: IV

[Practical Examination Based on Theory Paper - 304]

[Systematic Botany& Angiosperm Taxonomy]

Date: Place:

Time: 05 Hours Total Marks: 35

Instruction:

Q1	Identify and classify Specimen A & B to their respective families giving reasons, Draw labeled diagrams including floral formula & floral diagram/s.	(10)
Q2	Describe total morphology of Specimen C, Draw necessary diagrams of all peculiarities .	(06)
Q3	Identify and Describe.	(10)
	(D) Type of branch	
	(E) Leaf shape	
	(F) Type of leaf incision	
	(G) Type of Fruit	
	(H) Type of Fruit	
Q4	Journal.	(03)
Q5	Submission: Herbarium sheets	(06)

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Semester – VI (Paper: 307)

Paper No. – 307: [Anatomy & Embryology]

Unit – 1: Anatomy (14 Marks) **[Lectures 12]**

Epidermal Tissue System
Mechanical Tissue System
Secretary Tissue System
Absorbing Tissue System

Unit- 2: Anatomy (14 Marks) **[Lectures 12]**

Anomalous Secondary growth in following:
Salvadora stem, Bougainvillea stem, *Draceana* stem, *Tinospora* root, *Carrot* root.
Types of Stele.
Periderm [origin, structure, functions; Lenticel]
Leaf fall

Unit – 3: Embryology (14 Marks) **[Lectures 12]**
Palynology:

Pollen wall features, Exine ornamentation, concept of palynogram, Apertures, NPC- system,
Scope of Palynology.
Applications of polynology in Taxonomy, coal, oil exploration & forensic science,
Germination of pollen tube & factors affecting pollen germination

Unit- 4: Embryology (14 Marks) **[Lectures 12]**

Types of Tapetum
Nutrition of Embryo and Embryosac
Sexual Incompatibility: Types of self incompatibility; Genetic basis of Self Incompatibility.
Embryo development of Dicotyledons:
Crucifer type of embryo development
Embryo development of Monocotyledons:
Triticum type of embryo development
Polyembryology.

SuggestedReadings:

Mauseth, JD, 1988. Plant Anatomy. The Benjamin/ Cummings Publishers, USA.

Eames, AJ and Mac Daniels, LH. 1981. An Introduction to Plant Anatomy, Tata McGraw Hill Publishing co. Ltd., NewDelhi.

Bhojwani,SS.& Bhatnagar, SP. 2011. Embryology of Angiosperms, Vikas Publication House Pvt. Ltd. NewDelhi. 5th Edition.

Bhojwani, SS.& Razdan, MK. 2006. Plant Tissue Culture: Theory & Practice, Elsevier India Pvt. Ltd.NewDelhi

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Semester – VI (Paper: 308)

Paper No. – 308: [Biochemistry, Plant Physiology, Plant Breeding]

Unit – 1: Biochemistry (14 Marks) **[Lectures 12]**

Amino acids: classification, structure, protein and non protein amino acids.
Fat metabolism: Distribution of fats, General structure, Hydrolysis of Fat, Oxidation of fatty acids, Conversion of Fat in to Carbohydrates, Synthesis of Fats.
Vitamins: General account of structure and functions of vitamins.
Biochemical Technique: Types of chromatography, Colorimetry, Electrophoresis- PAGE

Unit –2: Plant Physiology (14 Marks) **[Lectures 13]**

Colloidal system, Properties of colloidal system and protoplasm as a colloidal system
Plant movements,
Water as a plant constituent (functions in plans, molecular structure, Physical & chemical properties,Imbibition, osmosis).
Water potential (general account, methods for measurement of water potential).
Growth indices
Mineral nutrition: Importance of micro and macro elements in plants.

Unit – 3: Plant Physiology (14 Marks) **[Lectures 13]**

Seed germination and factor affecting seed germination,
Factor affecting rate of Photosynthesis,
CAM cycle
Pentos phosphate pathway
Photorespiration,
Respiration: RQ & Factors affecting respiration.
Heterotrophic nutrition in plants.
Stress physiology (heat, water, salinity, metal)

Unit –4: Plant Breeding (14 Marks) **[Lectures 10]**

Aims, objectives and impacts of plant breeding.
Procedure of plant introduction, merits and demerits of plant introduction.
Selection methods: Mass selection, Pure line selection, Progeny selection.
Methods andTechniques of Hybridization. Techniques followed for Maize, Cotton.
Special methods involving Hybridization- Breeding for disease resistance,
Back & Test cross methods, Use of hybrid seed.
Vegetatively propagated crops.

Suggested Reading

Kumar, A. & Purohit, SS. 1997-98, Plant Physiology, Agro Botanical Publishers(India), Bikaner.

Noggle RG.& Fritz, GJ, 1989. Introductory Plant Physiology, 2nd ED. Prentice Hall of India Private Ltd. NewDelhi.

Devlin, RM.& Witham, FH, 1997.Plant Physiology,4th Ed., CBS Publishers & Distributers, Delhi.

Taiz, L.& Zeiger, E.2010. Plant Physiology. Sinauer Associate Inc. USA, 5th Edition

Hopkins, WG.& Hunter, NP. 2009. Introduction to Plant Physiology, John Wiley & Sons, USA, 4th Edition.

Plant Biochemistry, Hans- Walter Heldt, 2004, Academic Press.

Nelson, D.L. and Michael, M. Cox, 2008, Lehninger Principles of Biochemistry,5th Ed., WH Freeman and Company, New York, NY.

SHRI GOVIND GURU UNIVERSITY
BOTANY
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Semester – VI (Paper: 309)

Paper No. – 309: [Ecology, Plant Geography, Forestry &Economic Botany]

Unit –1: Ecology (14 Marks) **[Lectures 14]**

Structure of plant communities, Methods of studying plant communities, Analytical and synthetic character,
Raunkiaer's life forms, Biological spectrum, Plant Biodiversity: Concepts and levels, IUCN categories of threat, Red data books,
Hotspots - Brief account and International Biological Program,
Man and Biosphere Program (MAB), Climate change (CO_2, Global Warming, Sea Level Rise),
Green House Effect and Global Warming, Ozone depletion,
Effect of Air, Water & Soil pollution on vegetation.
Environmental Impact Assessment (EIA).
Biogeochemical cycles, Biological clock.

Unit –2: Plant Geography (14 Marks) **[Lectures 12]**

Major plant communities of the World
Phytogeographic region of the World
Soil types of India
Climate and climatic region of India
Age and area hypothesis

Unit –3: Forestry (14 Marks) **[Lectures 10]**

Forest types of India & its conservation
Plant indicators, Carbon footprint.
Ecological and Economic important of forest, Social forestry.
Wood: Physical properties, structural features, wood identification, carbon dating.
Endangered plants.
Endemism

Unit –4: Economic Botany (14 Marks) **[Lectures 12]**

General account, Methods of cultivation, Climate & Uses:
Cereals: Bajara, Wheat; *Pulses*: Soybean, Phaseolus
Plantation crops: Tea, Coffee.; *Commercial crop*: Sesamum .
Botanical name, family, useful part, chemical composition and uses of the following:
Medicinal and *Aromatic plants*: Lemon grass, Cumin.; *Narcotics* : Opium,Cannabis.
Insecticides: Pyrethrum,Rotenone.
Condiments and *spices*: Cardamom, Chillies.

Suggested Reading

Sharma, P.D. Ecology and Environment (7^{th} Ed.)
Eugene P. Odum., Fundamentals of Ecology.
Hill, A.F. and Sharma, O.P. Economic Botany, Tata MacGraw Hill, New Delhi.
Pandey, B.P. Economic Botany, Chand & Co., New Delhi.
Subramanyam N.S. and Samba Murty, A.V.S. Economic Botany, Wiley Eastern Ltd.
Ashokkumar, Botany in forestry & environment, 2001,Published by Kumar media (P) Ltd., Gandhinagar.
Kochhar, SL. 2011. Economic Botany in the Tropics,4^{th} Edition, MacMillan Publishers India Ltd., NewDelhi

SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Theory Syllabus
Effective from June 2018
(Credits: Theory-4, Practicals-2)
Total Lectures: 48
Semester – VI (Paper: 310)
Paper No. – 310: [Cell Biology, Molecular Biology, Genetics & Biostatistics]

Unit –1: Cell Biology (14 Marks) **[Lectures 12]**

Prokaryotic and Eukaryotic cells- structure and ultra structural details
Ultra structure and functions of Plasmamembrane, Models of plasmamembrane
Biogenesis of Chloroplast and Mitochondria
Programmed Cell Death (PCD)
Molecular basis of cell cycle
Cytoskeleton and Microtubules

Unit –2: Molecular Biology (14 Marks) **[Lectures 12]**

General account and techniques of Gene mapping
Restriction Endonucleases
Cloning vectors
Techniques used in recombinant DNA technology
Gene expression in Prokaryotes (Lac operon concept)
DNA sequencing
DNA finger printing and its importance
DNA damage and repair

Unit –3: Genetics (14 Marks) **[Lectures 14]**

Gene mutation: Types of mutation, mutagents
Linkage and crossing over:
Linkage: Coupling and Repulsion hypothesis, Linkage groups
Crossing over: Chromosome mapping, three point test cross, Interference and coincidence introns and their significance
Sex chromosomes and sex linked inheritance
Polyploidy in plants

Unit –4: Biostatistics (14 Marks) **[Lectures 10]**

Biometrics: Aims & objective as applicable to biological Science.
Methods of data collection & graphical representation
Measures of central tendency: Mean, Median & Mode.
Standard deviation & Simple linear regression, correlation
Frequency of distribution (Normal, binomial & Poisson).

Suggested Reading

DeRobertis, EDP and DeRobertis, EMF. 2006. Cell and Molecular Biology, 8th Edition, Lippincott Williams and Wikins, Philadelphia.

Fundamentals of Molecular biology, Veer Bala Rastogi.

Cell and Molecular Biology, Philip Sheeler and Donald EB., Wiley India.

Sundara Rajan, S. 2000. Cytogenetics, Anmol Publications Pvt. Ltd., NewDelhi.

Gupta, P.K. 2003-04. Genetics, Rastogi Publications, Meerut.

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SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Theory Syllabus
Effective from June 2018
(Credits: Theory-2)
Total Lectures: 30
Semester – VI (SEC-Paper: 311)
Plant Diversity & Human Welfare

Unit: 1 Plant diversity and its scope: **[Lectures 08]**

Genetic diversity, Species diversity, Plant diversity at the ecosystem level,
Agrobiodiversity and cultivated plant taxa, wild taxa.
Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle,
Methodologies for valuation, Uses of plants, Uses of microbes.

Unit: 2 Loss of Biodiversity: **[Lectures 06]**

Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity Loss of agrobiodiversity,
Projected scenario for biodiversity loss,
Management of Plant Biodiversity:
Organizations associated with biodiversity management-methodology for
execution-IUCN, UNEP, UNESCO, WWF, NBPGR, Biodiversity legislation and conservations,
Biodiversity information management and communication.

Unit: 3 Conservation of Biodiversity: **[Lectures 08]**

Conservation of genetic diversity, species diversity and ecosystem diversity,
In situ and ex situ conservation, Social approaches to conservation,
Biodiversity awareness programmes, Sustainable development.

Unit: 4 Role of plants in Human Welfare: **[Lectures 08]**

a) Importance of Forestry their utilization and commercial aspect b) Avenue trees,
c) Ornamental plants of india d) Alcoholic beverages through ages.
Fruits and nuts: Important fruit crop their commercial importance, Wood and its uses

Suggested Reading

Krishnamurty, K. V. (2004). An Advanced Text Book of Biodiversity -Principles and Practices.
Oxford and IBH Publication Co. Pvt Ltd. New Delhi.

SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Practical Syllabus
Effective from June 2017
Semester – VI
Practicals (Paper: 312A)
Base on Theory Paper – 307
[Anatomy & Embryology]

Anatomy:

(1) Study of Dermal tissue system through Plant material/permanent Slides:

(a)Types of epidermis - Uniseriate: Cucurbita/ Sunflower stem T.S.;

Multiseriate: Nerium/ Ficus leaf T.S. OR Orchid root T.S.

Root hairs and Piliferous layer.

(b) Epidermal outgrowths: Through P.S.

Stellate hairs: Gossypium/ Abutilon leaf. Peltate hairs: Fern rachis (Ramenta)

Branched hairs: Tectona/ Ashwaghandha leaf. Stinging hairs: Mucuna/ Urtica leaf

(c) Glandular hairs: Cucurbita, Oscimum/ Mentha, Avicinia leaf;

Nactaries; Digestive glands; Hydathodes

(d) Study types of Stomata in Plant material

Anomocytic, Anisocytic, Paracytic, Diacytic and Monocotyledonous.

(e) Study of mechanical tissue system in Pandanus/ Crinum leaf, Monocot stem/ Colocasia petiole.

(f) Study of various Types of Stele.

(2) Study of Anomalous secondary growth using double staining

(Fast green and Safranin only) temporary preparation technique:

(a) Anomalous secondary growth in Stem: Salvadora, Bougainvillea, Draceana.

(b) Abnormal secondary growth in Root: Tinospora, Carrot.

(3) Study of Pollen characters (polarity, symmetry, shape of aperture, distribution of aperture, shape of pollen grain, exine ornamentation & stratification) from Arachis/ Argemone, Cleome/ Lathyrus,Dhatura, Hibiscus/ Mirabilis and Canna pollen grains.

(4) To Dissect out globular/ heart-shaped/ Mature Crucifer type embryo from Mustard seeds

(5) Permanent slides: Microsporangium/ Anther T.S., Crucifer type and Monocot embryo.

Submission: Permanent Slides.

SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Practical Syllabus
Effective from June 2017
Semester – VI
Practicals (Paper: 312B)
Base on Theory Paper – 308
[Biochemistry, Plant Physiology, Plant Breeding]

Plant Physiology and Biochemistry:
The following experiments are performed by the students and results are expected.
Major experiments:
1. Separation of Amino acids from a given mixture by paper chromatography & their identification by comparison with standard Rf – Value.

2. To determine Water potential of given plant tissue (Any tuber)

3. To study the effect of different light intensity and Co_2 conc. on the rate of photosynthesis.

4. Determine the value of R.Q. of the given plant material (respiratory substrate may be Carbohydrates, Fat, Protein, Organic acid).

Minor experiments:

1. To test for the presence of Fats/ oils in the seeds.

2. To test the presence of Nitrate in Plant tissues.

3. To demonstrate Hill activity.

4. Demonstration of the elements (Na, Ca, Mg, Fe, S, P, Cl) present in plant ash.

5. To test the common organic acids- Oxalic acid, Malic acid & Citric acid in plant tissues.
Demonstration experiments: Instrumens- Colorimeter, Electrophoresis Plant Movements expts., Imbibition expt., Plasmolysis expt., Heterotrophic nutrition

Plant Breeding: Charts as per theory syllabus.

SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Practical Syllabus
Effective from June 2017
Semester – VI
Practicals (Paper: 312C)
Base on Theory Paper – 309
[Ecology, Plant Geography, Forestry &Economic Botany]

Ecology:

1. Determination of Frequency, Density and Abundance.
2. Study of Biological Spectrum and prediction of vegetation of a given area by comparing it's Biological spectrum to the normal.
3. Determination of Carbonate and Bicarbonate in a water sample.
4. Determination of Total hardness of water sample.

Plant geography & Forestry:

1. To prepared map of India with respect to Major Climatic Zones, Biogeographical regions of India and to comment on it.

2. To prepared map of Phytogeographic region of the world and to comment on it.

3. Identification and characteristics of the following Wood samples.

(a) Eucalyptus sp.(b) Acacia arabica (c) Tectona grandis (d) Mangifera indica (e) Shorea robusta

Economic Botany:

Specimens and / or their products to be demonstrated as per theory syllabus.

Submissions: Economic botany, Wood sample.

SHRI GOVIND GURU UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Practical Syllabus
Effective from June 2017
Semester – VI
Practicals (Paper:312D)
Base on Theory Paper – 310
[Cell Biology, Molecular Biology, Genetics & Biostatistics]

Cell biology:

1. To study Mitosis in Onion root tip by squash method
2. Histochemical localization of DNA, RNA and Proteins in plant material.
3. Electron Micro photographs of the following Cell & its organelles:

   Prokaryotic & Eukaryotic Cell, Plasma membrane, Chloroplast, Mitochondria, Microtubules.

Molecular Biology:

Charts as per theory syllabus.

Genetics: Solve the Genetical problems- *as per theory syllabus*.

Biostatistics:

Statistical Exercises and Examples for the analysis of following parameters:

Measures of central tendency: Mean, Median & Mode.
Standard Deviation.
Correlation.
Frequency of Distribution (Normal, Binomial & Poisson).

SHRI GOVIND GURU UNIVERSITY, GODHRA

B.Sc., Semester- VI, BOTANY PRACTICAL (Paper-312A)

Practical: I

[Practical Examination Based on Theory Paper - 307]

[Anatomy & Embryology]

Date: Place:

Time: 05 Hours Total Marks: 35

Instruction:

Q1	Make a temporary double stained preparation from given Specimen A. Make a labeled sketch and Show your preparation to the Examiner.	(10)
Q2	Identify and Describe the peculiarities of pollen/s from Specimen B & C. Draw a labeled sketch and comment on structural characteristics.	(06)
Q3	Identify and Describe.	(10)
	(D) Anatomy	
	(E) Anatomy	
	(F) Anatomy	
	(G) Embryology	
	(H) Embryology	
Q4	Journal.	(03)
Q5	Submission & Permanent Slides	(06)

SHRI GOVIND GURU UNIVERSITY, GODHRA

B.Sc., Semester- VI, BOTANY PRACTICAL (Paper-312B)

Practical: II

[Practical Examination Based on Theory Paper - 308]

[Biochemistry, Plant Physiology, Plant Breeding]

Date: Place:

Time: 05 Hours Total Marks: 35

Instruction:

Major experiment:

Q1 Perform the Physiological Experiment_____ (10)

Tabulate your observations with conclusion and show your results to the Examiner.

Minor experiment:

Q2 Perform the Physiological Experiment_____ (06)

Tabulate your observations with conclusion and show your results to the Examiner.

Q3 Identify and Describe. (10)

(D) Plant Physiology

(E) Plant Physiology

(F) Heterotrophic nutrition

(G) Plant Breeding

(H) Plant Breeding

Q4 Journal. (03)

Q5 Submission/ Project (06)

SHRI GOVIND GURU UNIVERSITY, GODHRA

B.Sc., Semester- VI, BOTANY PRACTICAL (Paper- 312C)

Practical: III

[Practical Examination Based on Theory Paper - 309]

[Ecology, Plant Geography, Forestry &Economic Botany]

Date: Place:

Time: 05 Hours Total Marks: 35

Instruction:

Q1 To determine Frequency/Density/ Abundance of any five species occurring in a given area. Tabulate your observations with conclusion and show your results to the Examiner. (10)

Q2 Perform the _____ experiment assign to you (07)
Tabulate your observations with conclusion and show your results to the Examiner.

Q3 Identify and Describe. (10)

(D) Plant Ecology

(E) Plant geography

(F) Forestry

(G) Economic Botany

(H) Economic Botany

Q4 Journal. (03)

Q5 Submission (05)

SHRI GOVIND GURU UNIVERSITY, GODHRA

B.Sc., Semester- VI, BOTANY PRACTICAL (Paper-312D)

Practical: IV

[Practical Examination Based on Theory Paper - 310]

[Cell Biology, Molecular Biology, Genetics & Biostatistics]

Date: Place:

Time: 05 Hours Total Marks: 35

Instruction:

Q1	Prepare a slide using proper stain, showing Cell division from given Specimen A. Draw a labeled sketch and show your results to the Examiner.	(06)
Q2	Perform the _____ _____ experiment assign to you and show your results to the Examiner.	(05)
Q3	(a) Solve the genetical problem	(04)
	(b) Biostatistics calculation as per slip.	(03)
Q4	Identify and Describe. (D) Cell biology (E) Cell biology (F) Molecular Biology (G) Molecular Biology	(08)
Q4	Journal.	(03)
Q5	Submission & Viva	(06)