

A.G & S.G. Siddhartha Degree College of Arts & Science

An autonomous college in the jurisdiction of Krishna University

BOTANY	BOT-201C	w.e.f. 2020-21	B. Sc. (BZC)
SEMESTER - II	I B. Sc - BOTANY SYLLABUS		PAPER – II

Basics of Vascular plants and Phytogeography

(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography) -----

Unit – 1: Pteridophytes

12 Hrs.

1. General characteristics of Pteridophyta; classification of Smit (1955) upto divisions.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life History of (a) *Lycopodium* (Lycopsida) and (b) *Marsilea* (Filicopsida).
3. Stelar evolution in Pteridophytes;
4. Heterospory and seed habit.

Unit:-2 Gymnosperms:

14hrs.

1. General characteristics of Gymnosperms; Sporne classification upto classes.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) *Cycas* (Cycadopsida) and (b) *Gnetum* (Gnetopsida).
3. Outlines of geological time scale.
4. A brief account on Cycadeoidea.

Unit – 3: Basic aspects of Taxonomy

13Hrs.

1. Aim and scope of taxonomy; Species concept: Taxonomic hierarchy, species, genus and family.
2. Plant nomenclature: Binomial system, ICBN- rules for nomenclature.
3. Herbarium and its techniques, BSI herbarium and Kew herbarium; concept of digital herbaria.
4. Bentham and Hooker system of classification;
5. Systematic description and economic importance of the following families:
(a) Annonaceae (b) Curcubitaceae

Unit – 4: Systematic Taxonomy

13 Hrs.

1. Systematic description and economic importance of the following families:
(a) Asteraceae (b) Asclepiadaceae (c) Amaranthaceae (d) Euphorbiaceae
(e) Arecaceae and (f) Poaceae
2. Outlines of Angiosperm Phylogeny Group (APG IV).

Unit – 5: Phytogeography

08 Hrs.

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Endemism – types and causes.
3. Phytogeographic regions of India.
4. Vegetation types in Andhra Pradesh.

Unit – 6: Competitive syllabus: (Economic Botany)

1. Edible oils: ground nut, coconut & sesamum.
2. Sugar & Startch: sugar cane, beetroot, potato.
3. Paper & Pulp: Bamboo, & Eucalyptus
4. Medicinal & Aromatic: Ashwagandha, Aloevera, holy basil, amla, mint, Lavender.

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BOTANY	BOT- 201	w.e.f. 2020-21	B. Sc. (BZC)
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I B. Sc – BOTANY Model Question Paper

SEMESTER- II

Paper Code: BOT - 201

PAPER-II: Basics of Vascular plants and Phytogeography

(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)

Time: 3 Hours

Max. Marks: 70

SECTION-A

Answer any **four** of the following questions
(Draw diagrams wherever necessary)

4x5=20Marks

1. Cone of Lycopodium
2. Seed habit
3. Pinus ovuliferous scale
4. T.S of gnetum leaf
5. Herbarium and its techniques
6. Cyathium
7. Discontinuous species
8. Endemism

SECTION-B

Answer any **five** of the following questions.

5x10=50Marks

(Draw diagrams wherever necessary)

9. Describe the structure and reproduction of Lycopodium?
10. Write an essay on stelar evolution in Pteridophyta?
11. Describe the internal structure of the pinus needle and mention its xerophytic characters.
12. Write an essay on geological time scale?
13. Give an account on Bentham and Hooker system of classification?
14. Write an essay on ICBN?
15. Give an account of the family Asclepiadaceae?
16. Describe the principles of phytogeography?

Guide lines for paper setter: (for Paper I – BOT - 101C) w.e.f. 2020-21.

1. In **section A**: **ONE** question each from Unit III, IV and **TWO** questions each from Unit I, II & V.
2. In **section B**: **ONE** question each from Unit IV, V and **TWO** questions each from Unit I, II& III.
3. See the following table and Model paper for marks distribution.
4. Please provide the scheme of valuation for the paper.
5. Question paper should be both in English and Telugu media.

Unit	Section - A		Section - B		Weightage in
	Questions	Marks	Questions	Marks	Marks
Unit – I	2		2		
	10		20		30
Unit - II	2		2		
	10		20		30
Unit – III	1		2		
	5		20		25
Unit – IV	1		1		
	5		10		15
Unit – V	2		1		
	10		10		20
Max. Q & marks	8 (x 5) = 40		8 (x 10) = 80		(Total questions =16) Total marks = 120
Max. Q and marks for Valuation	Questions	Marks	Questions	Marks	Max. marks
	4		5		
	(4 X 5) = 20		(5 X 10) = 50		70

INTERNAL EXAMS – 30 Marks

(20 marks for unit tests, 5marks for attendance, 5marks for Seminars).

Practical syllabus of Botany Core Course – 2/ Semester – II

Basics of Vascular plants and Phytogeography

(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs. /Week)

Course Outcomes:

On successful completion of this course students shall be able to:

1. Demonstrate the techniques of section cutting, preparing slides, identifying of the material and drawing exact figures.
2. Compare and contrast the morphological, anatomical and reproductive features of vascular plants.
3. Identify the local angiosperms of the families prescribed to their genus and species level and prepare herbarium.
4. Exhibit skills of preparing slides, identifying the given twigs in the lab and drawing figures of plant twigs, flowers and floral diagrams as they are.
5. Prepare and preserve specimens of local wild plants using herbarium techniques.

Practical Syllabus:

1. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts
 - a. Pteridophyta : *Lycopodium* and *Marselia*
 - b. Gymnosperms: *Cycas* and *Gnetum*
2. Study of fossil specimens of *Cycadeoidea* and *Pentoxylon* (photographs /diagrams can be shown if specimens are not available).
3. Demonstration of herbarium techniques.
4. Systematic / taxonomic study of locally available plants belonging to the families prescribed in theory syllabus. (Submission of 30 number of Herbarium sheets of wild plants with the standard system is mandatory).
5. Mapping of phytogeographical regions of the globe and India.

Model Question Paper for Practical Examination

Semester – II/ Botany Core Course – 2

Basics of Vascular plants and Phytogeography

(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)

Time:3Hrs.

Max.Marks: 50

1. Take T.S. of the material 'A' (Pteridophyta), make a temporary slide and Justify with with identification characters.....**6 M**
2. Take T.S. of the material 'B' (Gymnosperms), make a temporary slide and justify with identification characters **06 M**
3. Describe the vegetative and floral characters of the material 'C'(Taxonomy of Angiosperms) derive and its systematic position.....**05 M**
4. Identify the specimen 'D' (Fossil Gymnosperm) and give specific reasons.....**04 M**
5. Locate the specified phytogeographical regions (2x2M) in the world / India (**E**) map supplied to you.....**04 M**

Total: 25M

Internals:

- a) Record10M
- b) Herbarium 04M
- c) Field note book03M
- d)Viva-voce..... .03M
- e) Attendance.....05M

Total: 25M

Suggested co-curricular activities for Botany Core Course-2 in Semester-II:

A. Measurable :

a. student seminars:

1. Fossil Pteridophytes.
2. Aquatic ferns and tree ferns
3. Ecological and economic importance of Pteridophytes
4. Evolution of male and female gametophytes in Gymnosperms.
5. Endemic and endangered Gymnosperms.
6. Ecological and economic importance of Gymnosperms.
7. Floras and their importance: Flora of British India and Flora of Madras Presidency.
8. Botanical gardens and their importance: National Botanic garden and Royal Botanic garden.
9. Artificial, Natural and Phylogenetic classification systems.
10. Molecular markers used in APG system of classification.
11. Vessel less angiosperms.
12. Insectivorous plants.
13. Parasitic angiosperms.
14. Continental drift theory and species isolation.

b. Student Study Projects :

1. Collection and identification of Pteridophytes from their native locality/ making an album by collecting photographs of Pteridophytes.
2. Collection and identification of Gymnosperms from their native locality/ making an album by collecting photographs of Gymnosperms.
3. Collection of information on famous herbaria in the world and preparation of a report.
4. Collection of information on famous botanic gardens in the world and preparation of a report.
5. Collection of data on vegetables (leafy and fruity) plants in the market and preparation of a report on their taxonomy.
6. Collection and identification of fresh and dry fruits plants in the market and preparation of a report on their taxonomy.
7. Collection of data on plants of ethnic and ethno botanical importance from their native locality.
8. Preparation of a local flora by enlisting the plants of their native place.

c. Assignments: Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

B. General :

1. Visit to Botanic garden in a Research institute/University to see the live plants.
2. Virtual tour in websites for digital herbaria and botanic gardens.
3. Acquaint with standard floras like – Flora of Madras Presidency, Flora of their respective district in Andhra Pradesh.
4. Looking into vegetation of different phytogeographical regions using web resources.
5. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.

Text books:

- Botany – I (Vrukshasastram-I) : Telugu Akademi, Hyderabad
- Botany – II (Vrukshasastram-II) : Telugu Akademi, Hyderabad
- Acharya, B.C., (2019) *Archchegoniates*, Kalyani Publishers, New Delhi
- Bhattacharya, K., G. Hait & Ghosh, A. K., (2011) *A Text Book of Botany, Volume- II*, New Central Book Agency Pvt. Ltd., Kolkata

Books for Reference:

- Smith, G.M. (1971) *Cryptogamic Botany Vol. II.*, Tata McGraw Hill, New Delhi
- Sharma, O.P. (2012) *Pteridophyta*. Tata McGraw-Hill, New Delhi
- Kramer, K.U. & P. S. Green (1990) *The Families and Genera of Vascular Plants, Volume –I: Pteridophytes and Gymnosperms* (Ed. K. Kubitzki) Springer-Verlag, New York
- Bhatnagar, S.P. & Alok Moitra (1996) *Gymnosperms*. New Age International, New Delhi
- Coulter, J.M. & C.J. Chamberlain (1910) *Morphology of Gymnosperms*, The University of Chicago Press, Chicago, Illinois
- Govil, C.M. (2007) *Gymnosperms : Extinct and Extant*. KRISHNA Prakashan Media (P) Ltd. Meerut & Delhi
- Sporne, K.R. (1971) *The Morphology of Gymnosperms*. Hutchinsons Co. Ltd., London

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BOTANY	BOT-401C	w.e.f. 2020-21	B. Sc. (BZC)
SEMESTER - IV	II B. Sc - BOTANY SYLLABUS		PAPER – IV

Plant Embryology and Plant Metabolism

Hours: 60 @ 4 hrs per week

UNIT – I: EMBRYOLOGY

(12hrs)

1. Introduction: History and Importance of Embryology.
2. Anther structure, Micro sporogenesis and development of male gametophyte.
3. Ovule structure and types; Mega sporogenesis; Monosporic; Bisporic and Tetrasporic types of female gametophyte / embryosac development.
4. Pollination -Types, Fertilization.

UNIT –II: EMBRYOLOGY AND PALYNOLOGY

(12 hrs)

1. Endosperm Development and types.
2. Embryo - development and types.
3. Polyembryony and Apomixis - an outline.
4. Palynology: Principles and applications.

UNIT –III: PLANT METABOLISM- I

(12 hrs)

1. Photosynthesis: Electromagnetic spectrum, absorption and action spectra; Red drop and Emerson enhancement effect, concept of Z scheme in photosystems, Photosynthetic pigments, mechanism of photosynthetic electron transport and evolution of oxygen, photo phosphorylation, carbon assimilation pathways: C₃, C₄ & CAM and Photorespiration.
2. Translocation of organic substances: Mechanism of phloem transport, source-sink relationships.

UNIT –IV: PLANT METABOLISM- II

(12 hrs)

1. Respiration: Aerobic and Anaerobic, Glycolysis, Krebs cycle, electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway.
2. Lipid Metabolism: Structure and functions of lipids, conversion of lipids to carbohydrates, Beta-oxidation.

UNIT –V: GROWTH AND DEVELOPMENT

(12 hrs)

1. Growth and development: Definition, phases and kinetics of growth, Physiological effects of phytohormones - auxins, gibberellins, cytokinins, ABA and ethylene
2. Physiology of flowering and photoperiodism, role of phytochrome in flowering.
3. Stress Physiology: Concept and plant responses to water, salt and temperature stresses.

UNIT –VI: Competitive syllabus:

1. Biofertilizers: Components of biofertilizers- bio compost tricho –card, azotobacter, phosphours, vermin compst, importance of biofertilizers, applications of biofertilizers.

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BOTANY	BOT- 401	w.e.f. 2020-21	B. Sc. (BZC)
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II B. Sc – BOTANY Model Question Paper

SEMESTER- IV

Paper Code: BOT - 401

PAPER-IV: Plant Embryology and Plant Metabolism

Time: 3 Hours

Max. Marks: 70

SECTION-A

Answer any **four** of the following questions
(Draw diagrams wherever necessary)

4x5=20Marks

9. Microsporogenesis.
10. Allogamy.
11. Helobial endosperm.
12. Emerson enhancement effect.
13. Anaerobic respiration.
14. Ethylene.
15. Photoperiodism.
16. Phytochrome.

SECTION-B

Answer any **five** of the following questions.
(Draw diagrams wherever necessary)

5x10=50Marks

9. What is an Embryosac? Describe any five of the tetrasporic type of Embryosac developments.
10. Give an account of Polyembryony.
11. Write an essay on the Principles and applications of Palynology.
12. Describe the carbon assimilation pathway in C4 plants.
13. Write an essay on the Translocation of organic substances in higher plants.
14. Describe various reactions of Krebs cycle.
15. Write an essay on various types of Lipids.
16. Give an account of Auxins and Gibberellins.

Guide lines for paper setter: (for Paper IV – BOT- 401) w.e.f. 2020-21

1. In **section A:** Unit II, III & IV must carry **one** question from each Unit, Unit I must carry **two** questions and Unit V must carry **three** questions.

2. In **section- B:** Set minimum **two** questions from Unit II, III & IV.

One question each from Unit I and Unit V.

3. See the following table and Model paper for marks distribution.

4. Please provide the scheme of valuation for the paper.

5. Question paper should be both in English and Telugu media.

Unit	Section - A		Section - B		Weightage in
	Questions	Marks	Questions	Marks	Marks
Unit – I	2		1		
	10		10		20
Unit - II	1		2		
	05		20		25
Unit – III	1		2		
	05		20		25
Unit – IV	1		2		
	05		20		25
Unit – V	3		1		
	15		10		25
Max. Q & marks	8 (x 5) = 40		8 (x 10) = 80		(Total questions =16) marks = 120
Max. Q and marks for Valuation	Questions	Marks	Questions	Marks	Max. marks
	4		5		
	(4 X 5) = 20		(5 X 10) = 50		70

[INTERNAL EXAMS - 30Marks

(20marks for unit tests, 5 marks for seminar and remaining 5 marks for attendance).

II B. Sc – BOTANY SEMESTER- IV.

PRACTICAL SYLLABUS

PAPER- IV - **Plant Embryology and Plant Metabolism** (BOT – 401)

Total hours of laboratory Exercises 45 hrs @ 3 per week . w.e.f. 2019-20

Suggested Laboratory Exercises:

1. Structure of pollen grains using whole mounts (Catharanthus, Hibiscus, Acacia, Grass).
2. Demonstration of Pollen viability test using in- vitro germination (Catharanthus).
3. Study of ovule types and developmental stages of embryo sac using permanent slides / Photographs.
4. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot Embryos using permanent slides / Photographs.
5. Isolation and mounting of embryo (using Symopsis / Senna / Crotalaria).

Major experiments:

6. Separation of chloroplast pigments using paper chromatography technique.
7. Rate of photosynthesis under varying CO₂ concentration.
8. Effect of kind of light intensity on oxygen evolution during photosynthesis using Wilmontt' bubbler.
9. Titratable acidity estimation of Lemon or Tamarind leaves.

Minor experiments:

10. Release of CO₂ in Aerobic respiration.
11. Demonstration of the process of fermentation using Kuhne's fermentation vessel.
12. Demonstration of Phototropism.
13. Measuring the Plant growth using Arc Auxanometer.

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II BSc Botany Practical Exam (w.e.f. 2020-21)

IV Semester Practical – IV (BOT-401P)

Plant Embryology and Plant Metabolism Model Paper

Time: 3 Hrs.

Max.Marks:50

1. Conduct experiment ‘A’, write down the procedure and conclusions.

Tabulate the results if any.....11M

2. Write the salient features of experiment ‘B’ with the help of neat labelled diagram. 05M

3. Identify and write notes on ‘C, D & E’ (3X3M)09M

Total25M

Scheme of valuation

1. ‘A’ –Physiology –major experiment

Setting and conducting of the experiment 6M, Procedure 3M, Conclusion1M,
tabulation1M. =11M

2. ‘B’- Physiology –minor experiment Salient features 3M, Diagram2M.....= 05M

3. Identify C, D and E (3X3)
(Identification - 1 + Diagram-1 + Notes- 1 =Total = 3marks for each)..... = 09M

‘C’ from Anther T.S / Pollen grains.

‘D’ - Slide from types of Ovules.

‘E’– Slide from Embryosacs / Embryos.

(Total.....25M)

Internal:

a) Record..... 10M

b) Attendance.....05M

c) Internal Practical Exam.....04M

d) Self study project report.....06M

Total.....25M

Grand Total50M

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BOTANY	BOT-601 (GE)	2020-2021	B.Sc. (BZC)
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PAPER – VII

ELECTIVE-C

SEMESTER- VI

Plant tissue culture and its Biotechnological applications

Total hours of teaching 45hrs @ 3hrs per week

Credits: 3

Unit I: PLANT TISSUE CULTURE – 1

(12hrs)

1. History of plant tissue culture research - basic principles of plant tissue callus culture, meristems culture, organ culture, Totipotency of cells.
2. Sterilization procedures, culture medium composition and preparations of explants. Murashige and Skoog's (MS medium), Cell and protoplast culture.
3. Somatic Hybrids and Cybrids (out lines), Artificial Seeds, Somaclonal variations. Applications of Tissue culture (Brief account).

UNIT-II: Plant Tissue culture -2

(12hrs)

1. Endosperm culture – Embryo culture -culture requirements – applications, embryo rescue technique.
2. Cryopreservation; Germ plasm conservation.

Unit III: Recombinant DNA technology

(12hrs)

1. r-DNA technology: Steps in r-DNA technology and tools
2. Cloning Vectors: Prokaryotic (pBR322, Ti plasmid and Lambda phage, Eukaryotic Vectors (YAC and briefly PAC).
3. Gene cloning (Bacterial Transformation and selection of recombinant clones, PCR Mediated gene cloning)

Unit IV: Methods of gene transfer

(12hrs)

1. Methods of gene transfer- Agro bacterium-mediated, direct gene transfer By Electroporation, Microinjection, Micro projectile bombardment.
2. Selection of transgenics – selectable marker and reporter genes (Luciferase, GUS, GFP).

Unit V: Applications of Biotechnology

(12 hrs)

1. Applications of Plant Genetic Engineering – crop improvement, herbicide resistance, insect resistance, virus resistance.
2. Genetic modification – transgenic plants for pest resistant (Bt-cotton); herbicide resistance (Round Up Ready soybean); improved agronomic traits flavrSavr tomato, Golden rice.

III B. Sc – BOTANY Model paper (2019-2020)

Plant tissue culture and its Biotechnological applications

SEMESTER- VI

ELECTIVE-C PAPER – VII

Time: 3 Hours

Paper code: BOT-VII C

Max. Marks: 70

SECTION-A

Answer any FOUR of the following question

4x5=20M.

(Draw diagrams wherever necessary)

1. Organ culture.
2. Somatic hybrids.
3. Cryopreservation.
4. Plasmids
5. Colony Hybridization.
6. Electroporation.
7. GUS.
8. Bt-Cotton.

SECTION-B

Answer any Five of the following questions.

5 x 10= 50M.

(Draw diagrams wherever necessary)

9. Describe the composition and preparation of MS culture media.
10. Give an account on applications of tissue culture?
11. Write about Germplasm conservation?
12. Write notes on endosperm culture and their applications.
13. Explain the PCR mediated gene cloning.
14. Explain the various types of cloning vectors.
15. Write about methods of gene transfer techniques.
16. Give an account on transgenic plants?

Guide lines for paper setter: (for Paper VII -BOT-601) W.e.f. 2020-21.

1. In Section A: Unit I,III,IV must carry Two question from each unit. Unit II, V must carry one question.
2. In section-B: Set minimum two questions from Unit I, II, III and Set One Question from IV, V.
3. See the following table and Model paper.
4. Please provide the scheme of valuation for the paper.
5. Question paper should be both in English and Telugu media.

Unit	Section – A		Section - B		Weightage in Marks
	Questions	Marks	Questions	Marks	
Unit – I	2		2		
	10			20	30
Unit – II	1		2		
		5		20	25
Unit – III	2		2		
		10		20	30
Unit-IV	2		1		
		10		10	20
Unit-V	1		1		
		5		10	15
Max. Q & marks	8	(x 5) = 40	8	(x 10) = 80	(Total questions = 16) Marks 120
Max. Q and marks for Valuation	Questions	Marks	Questions	Marks	Max. marks
	4		5		
		(4 x 5) = 20		(5 x 10) = 50	70

INTERNAL EXAMS - 30Marks

(20 mark for unit tests, 5 marks for assignments and remaining 5 marks for seminar etc.)

Practical Paper VII-C

Plant Tissue Culture & Plant Biotechnology

SEMESTER- VI

Total hours of teaching 30hrs @ 2hrs per week

BOT – 601P

Credits:2

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1. (a) Preparation of MS medium.

(b) Demonstration of in vitro sterilization methods and inoculation methods using leaf and nodal explants of Tobacco/ Datura/ Brassica etc.
 2. Study of embryo and culture, micro propagation of Banana, somatic embryogenesis, artificial seeds through photographs.
 3. Construction of restriction map of circular and linear DNA from the data provided.
 4. Study of methods of gene transfer through photographs: Agrobacterium- mediated, direct gene transfer by electroporation, microinjection, and micro projectile bombardment.
 5. Different steps involved in genetic engineering for production of Bt. cotton, Golden rice, Flavr Savr tomato through photographs.
 6. Isolation of plasmid DNA.
 7. Restriction digestion and gel electrophoresis of plasmid DNA (optional)
 8. Field visit to a lab involved in tissue culture
 9. Study project under supervision of lecturer – tissue culture/ genetic engineering

Expected domain skills to be achieved: Ability to prepare artificial nutrient media, preparing independently, applying various sterilization procedures for media, glassware and biological materials, invitro propagation of Banana callus, morphogenesis--s, clonal propagation methods, isolation of plasmid DNA individually and as a group.

Practical Paper VII-C
Plant Tissue Culture & Plant Biotechnology

SEMESTER- VI

BOT – 601(GE) P

Total hours of teaching 30hrs @ 2hrs per week

Credits: 2

Q1. Project report (A) -	10M
Viva-voce on study project.....	02M
Q2. Identify and write notes on B, C and D (3x2).....	06 M
B- Tool/instrument/container used in sterilization	
C- Tool/instrument/container used in gene transfer	
D- GM crops (Photographs)	
Q3. Construct restriction map of circular and/ or linear DNA from the data Provided.....	04M
Q4. Field report.....	03M

Total.....25 Marks

Internal Assessment

a. Record -	05M
b. Attendance.....	05M
e. Internal practical exam.....	05M
d. preparing album for P.T & B.T. Applications.....	10M

Total... 25Marks

Total ----- 50M

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III-BZC(B. Sc)	BOTANY-VIII	BOT-602 (CE)	2020-21
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Paper – VIII-A-1: PLANT DIVERSITY AND HUMAN WELFARE Credits: 3
Total hours of teaching 60hrs @ 6hrs per week

Unit- I: Plant diversity and its scope: (12hrs)

1. Genetic diversity, Species diversity, Plant diversity at the ecosystem level,
2. Agro biodiversity and Vavilov Crop centers.
3. Values and uses of biodiversity: Ethical and aesthetic values, Uses of plants.

Unit -II: Loss of biodiversity: (12hrs)

1. Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro biodiversity, projected scenario for biodiversity loss.
2. 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-III: Contemporary practices in resource management: (12hrs)

1. Environmental Impact Assessment (EIA), Geographical Information System GIS,
2. Solid and liquid waste management.

Unit -IV: Conservation of biodiversity (12hrs)

1. Conservation of genetic diversity, species diversity.
2. Social approaches to conservation, Biodiversity awareness Programmes, Sustainable development.

Unit- V: Role of plants in relation to Human Welfare (12hrs)

- 1 Importance of forestry, their utilization and commercial aspects-
 - a) Avenue trees, b) ornamental plants of India.
- 2 Fruits and nuts: Important fruit crops their commercial importance. Wood, fiber and their uses.

III B. Sc – BOTANY Model paper (2019-2020)
SEMESTER- VI Paper – VIII-A-1 PAPER – VIII
PLANT DIVERSITY AND HUMAN WELFARE

Time: 3 Hours

Max. Marks 70

SECTION-A

Answer any FOUR of the following question

4 x 5=20M.

1. Species Diversity.
2. Wild Taxa.
3. NBPGR.
4. Biodiversity and its Conservation.
5. EIA.
6. Geographical information system (GIS).
7. Sustainable Development.
8. Fiber and their uses.

SECTION-B

Answer any Five of the following questions.

5 x 10 = 50M.

9. Give a note on Plant Diversity and its Scope.
10. Write about Values and Uses of Biodiversity.
11. What is Biodiversity? Discuss about the Loss of Biodiversity?
12. Explain the Various Types Organizations in Biodiversity?
13. Write an essay on EIA?
14. Write essay on Liquid Waste Management?
15. What is Conservation? Explain the In-situ conservation?
16. What are Fruit crops? Explain their Commercial importance?

Guide lines for paper setter: (for Paper VIII -BOT-602) W.e.f. 2020-21

1. In Section A: Unit I, II, III, must carry Two question from each unit. Unit IV, V must carry one question.
2. In section-B: Set minimum two questions from Unit I, II & III and Set One Question from IV, V.
3. See the following table and Model paper.
4. Please provide the scheme of valuation for the paper.
5. Question paper should be both in English and Telugu media.

Unit	Section - A		Section - B		Weightage in
	Questions	Marks	Questions	Marks	Marks
Unit – I	2		2		30
	10		20		
Unit – II	2		2		30
	10		20		
Unit – III	1		2		25
	05		20		
Unit-IV	1		1		15
	5		10		
Unit-V	2		1		20
	10		10		
Max. Q & marks	8 (x 5) = 40		8 (x 10) = 80		(Total questions = 16) Marks 120
Max. Q and marks for Valuation	Questions	Marks	Questions	Marks	Max. marks
	4		5		70
	(4 x 5) = 20		(5 x 10) = 50		

(20 mark for unit tests, 5 marks for assignments and remaining 5 marks for seminar etc)

Paper – VIII-A-1: Practicals:
PLANT DIVERSITY AND HUMAN WELFARE

SEMESTER- VI
Time: 3hrs

BOT-602-A-1(CL) P
Max. Marks: 50

- 1) Study of plant diversity (flowering plants).
- 2) Study of exotic species- Identification and morphological characteristics.
- 3) Identification of forest trees through bark, wood, flowers leaves and fruits.
- 4) Maceration, Study of wood (Tracheary elements, fibres).
- 5) Methods of preservation and canning of fruits.
- 6) Visit to the local ecosystem to study the plants.
- 7) Study of Solid and Liquid waste management systems in rural/urban areas.

SCHEME OF PRACTICAL EXAMINATION

- I. Assign the plants **A, B and C** to their respective families, giving reasons, family name and classification-1marks, important diagrams- 2 marks.....**09 marks**
- II. Give the protocol of **D****04marks**
- III. Comment on specimens **E, F and G****3x2 = 06 marks**
- IV. Report on Field visit..... **4 marks**
To study sources of firewood (10 plants), timber-yielding trees (10trees) and bamboos.
- V. Viva-Voce**02marks**
- Total..... **25 Marks**

Internals

- a. Record -05M
- b. Attendance.....05M
- c. Internal practical exam.....5M
- d. project work on Cultivated Plant, Wild Plant, Exotic plant....10M
- Total..... **25 Marks**

Total -----50M

KEY

A-Cultivated Plant

B- Wild Plant

C –Exotic plant

D- Preservation and canning of fruits, solid and liquid waste management systems in rural/urban areas

E. Bark/wood/fruit yielding plant

F. Nuts/ Alcoholic beverage plant

G. wood /Fibre yielding plant

Paper – VIII-A-1: Practical's:

PLANT DIVERSITY AND HUMAN WELFARE

SEMESTER- VI

BOT-602-A-(CL) P

SCHEME OF PRACTICAL EXAMINATION

Time: 3hrs

Max. Marks: 50

-
- I. Assign the plants **A, B and C** to their respective families, giving reasons, family name and classification-1marks, important diagrams- 2 marks.....**09 marks**
- II. Give the protocol of **D**.....**04marks**
- III. Comment on specimens **E, F and G****3x2= 06 marks**
- IV. Report on Field visit..... **4 marks**
To study sources of firewood (10 plants), timber-yielding trees (10trees) and bamboos.
- V. Viva-Voce.....**2marks**

Total ---- 25marks

Internals:

- a. Record05M
- b. Attendance.....05M
- c. Internal practical exam.....05M
- d. project work on Cultivated Plant, Wild Plant, Exotic plant....10M

Total ---- 25marks

Total -----50M

KEY

A-Cultivated Plant

B- Wild Plant

C –Exotic plant

D- Preservation and canning of fruits, solid and liquid waste management systems in rural/urban areas

E. Bark/wood/fruit yielding plant

F. Nuts/ Alcoholic beverage plant

G. wood /Fibre yielding plant

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III. BZC (B. Sc)	BOTANY-VIII	BOT- 603 (CE)	2020-21
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Paper – VIII-A-2

Credits: 3

ETHNOBOTANY AND MEDICINAL BOTANY

Total hours of teaching 60hrs @ 6hrs per week

Unit-I: Ethnobotany

(12h)

1. Introduction, concept, scope and objectives
2. Major and minor ethnic groups or Tribal's of India, and their lifestyles.
3. Plants used by the tribal populations:
 - a) Food plants, b) Intoxicants
 - c) Beverages, d) Resins and oils and miscellaneous uses.

Unit -II: Role of ethnobotany in modern Medicine

(12hrs)

1. Role of Ethnobotany in modern medicine with special example; Rauvolfia serpentina, Artemisia annua, Withaniasomnifera.
2. Significance of the following plants in ethno botanical practices (along with their habitat and morphology)
 - a) Azadirachta indica, b) Vitex negundo, c) Ocimum sanctum, d) Phyllanthus niruri
3. Medico-Ethnobotanical Sources of India.

Unit-III: Ethno botany as a tool to protect interests of ethnic groups

(12hrs)

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

Unit -IV: History, Scope and Importance of Medicinal Plants, Indigenous Medicinal Sciences (12hrs)

1. Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments.
2. Homeopathy: Origin of Homeopathy medicinal systems, Basis of Homeopathy, plants used in Homeopathy medicine.

Unit -V: Conservation of endangered and endemic medicinal plants

(12hrs)

1. Definition: endemic and endangered medicinal plants,
2. Red list criteria
3. In situ conservation: Sacred groves, National Parks
4. Ex situ conservation: Botanical Gardens, Seed Banks.

III B. Sc – BOTANY Model paper (2019-2020)
Title of the Paper: **ETHNOBOTANY AND MEDICINAL BOTANY**

SEMESTER- VI
Time: 3 Hours

PAPER – VIII

Cluster – A

Paper – VIII-A-2
Max. Marks: 70

SECTION-A

Answer any four of the following question

4x5=20M.

1. Intoxicants.
2. Withania somnifera.
3. Phyllanthus niruri
4. Curcuma langa.
5. Biopiracy
6. Saptdhatu and Tridosha.
7. Tumors treatments.
8. Red list criteria.

SECTION-B

Answer any Five of the following questions.

5 x10=50M.

9. Explain the Relevance of Ethno-Botany in the present Context.
10. Discuss about Major and Minor Ethnic groups of India.
11. Write about Botanical name, Family, Active principle and medicinal uses of Rauwolfia serpentine, Artemisia annua.
12. Write about the Medico-Ethnobotanical Sources of India.
13. Write about the Intellectual property rights and Traditional knowledge.
14. Write an Essay on Basic concepts of Ayurveda.
15. What is Homeopathy system of Medicine ? Explain their Basic Concepts ?
16. Give an account of Endemic and Endangered Medicinal plants ?

Guide lines for paper setter: (for Paper VIII-BOT-603(CE)) W.e.f. 2020-21

1. In Section A: Unit I, IV, must carry two questions from each unit. Unit II must carry Two Question. Unit III, V must carry one question.
2. In section-B: Set minimum Two questions from Unit I, II & IV and Set One Question from III , V.
3. See the following table and Model paper.
4. Please provide the scheme of valuation for the paper.
5. Question paper should be both in English and Telugu media.

Unit	Section - A		Section - B		Weightage in
	Questions	Marks	Questions	Marks	Marks
Unit – I	2		2		
	10		20		30
Unit – II	2		2		
	10		20		30
Unit – III	1		1		
	05		10		15
Unit-IV	2		2		
	10		20		30
Unit-V	1		1		
	5		10		15
Max. Q & marks	8 (x 5) = 40		8 (x 10) = 80		(Total questions = 16) Marks 120
Max. Q and marks for Valuation	Questions	Marks	Questions	Marks	Max. marks
	4		5		
	(4 x 5) = 20		(5 x 10) = 50		70

(20 mark for unit tests, 5 marks for assignments and remaining 5 marks for seminar etc.).

III B. Sc – Practical Paper
ETHNOBOTANY AND MEDICINAL BOTANY
SEMESTER- VI BOT- VIII- 603- A- 2 (CL) P
Time: 3 Hours **Max. Marks- 50**

1. Ethno botanical specimens as prescribed in theory syllabus
2. Detailed morphological and anatomical study of medicinally important part(s) of locally available plants (Minimum 8 plants) used in traditional medicine.
3. Field visits to identify and collect ethno medicinal plants used by local tribes/folklore.

Practical Question Paper

- I. Identify the specimen A- Give reasons (morphological and anatomical) and draw Labeled sketches10marks
- II. Identify and write about the medicinal uses of B and C.....2x2 = 04 marks
- III. Comment on D and E.....2 x 2= 04 marks
- IV. Report on Field visit:.....04 marks
List to be prepared mentioning special features of plants used by tribal Populations as Medicinal Plants & Spices. Write their botanical and common names, Parts used and diseases/disorders for which they are prescribed.
- V. Viva-voce..... 03 marks
- Total.....**25 Marks**

Internals Assessment

- a. Record -05M
- b. Attendance.....05M
- c. Internal practical exam.....05M
- d. Major and minor ethnic groups or Tribal's of India, and their lifestyles miniproject.....10M
- Total.....**25 Marks**

Total-----50Marks

KEY

- A-Plants given in unit II (i)
B-Plants used in Ayurvedic preparations (Amla in Chyavanprash, Senna in Laxatives)
C - - Do -
D. Photographs of National parks, Biosphere reserves and Botanical gardens.
E. Photograph of famous personalities in Ayurveda/Siddha medicine.

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III-BZC B.Sc	BOTANY-VIII	BOT-604- (CE)	2020-21
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SEM-VI: **Pharmacognosy and Phytochemistry** Credits: 3
Total hours of teaching 60hrs @ 6hrs per week

Unit-I: Pharmacognosy: (12hrs)

1. Definition, Importance
2. Classification of drugs - Chemical and Pharmacological
3. Drug evaluation methods

Unit –II: Organoleptic and microscopic studies: (12hrs)

1. Organoleptic and microscopic studies with reference to nature of active principles and common adulterants of
2. a) Adhatoda vasica(leaf) b) Strychnosnuxvomica (seed),
c) Rauwolfia serpentina(root) d) Zinziberofficinalis e) Catharanthusroseus.

Unit-III: Secondary Metabolites: (12hrs)

1. Definition of primary and secondary metabolites and their differences, Major types - terpenes, Phenolics, alkaloids, terpenoids, steroids.
2. A brief idea about extraction of alkaloids. Origin of secondary metabolites–detailed account of Mevalonate pathway, Shikimate pathway.

UNIT-IV: Phytochemistry: (12hrs)

Biosynthesis and sources of drugs:

1. Structural type biosynthesis importance of simple Phenolic compounds, coumarins, Flavonoids.
2. Steroids, sterols: Biosynthesis, commercial importance.
3. Alkaloids: Different groups, biosynthesis, bioactivity.

It is resolved to implement skill development course – plant nursery for I Year students B.Sc (B.Z.C E.M , T.M & AQUA)

4. Volatile oils, aromatherapy.

UNIT-V: Enzymes, proteins and amino acids as drugs: (12hrs)

1. Vaccines, toxins and toxoids, immune globulins, antiserums,
2. Vitamins, Antibiotics – chemical nature, mode of action.
3. Pharmacological action of plant drugs – tumor inhibitors, PAF antagonists, antioxidants, phytoestrogens and others.

III B. Sc – BOTANY Model paper (2020-2021)

SEMESTER- VI

Paper – VIII-A-3

PAPER – VIII Cluster – A

Title of the Paper: **Pharmacognosy and Photochemistry**

Time: 3 Hours

Max. Marks: 70

SECTION-A

Answer any **Four** of the following question

4x5=20M.

1. Classification of Drugs.
2. Catharanthus roseus.
3. Difference between Primary and Secondary Metabolites.
4. Trpenoids.
5. Flavonoids.
6. Aromatherapy
7. Vaccines.
8. Vitamins.

SECTION-B

Answer any **Five** of the following questions.

5 x10=50M.

9. Give an account on Pharmacognosy?
10. Write an essay on Drug Evolution methods?
11. Write about nature and Active principles of Adhathoda vasica, Rauwolfia serpentine?
12. Write about common Adulteration of Zinziber officinalis, Strychnos nuxvomica?
13. Give an Brief note on Extraction of Alkaloids?
14. Give an account of mevalonate pathway?
15. Write about Bio-Synthesis and Commercial importance of Steroids, Sterols?
16. Explain the role of Different Enzyme inhibitors?

Guide lines for paper setter: (for Paper VI-BOT-604) W.e.f. 2020-21.

1. In Section A: Unit III, IV, V must carry two questions from each unit. Unit I, II, must carry One question.
2. In section-B: Set minimum two questions from Unit I, II & III and Set One Question from IV, V.
3. See the following table and Model paper.
4. Please provide the scheme of valuation for the paper.
5. Question paper should be both in English and Telugu media.

Unit	Section - A		Section - B		Weightage in
	Questions	Marks	Questions	Marks	Marks
Unit – I	1		2		
	5		20		25
Unit – II	1		2		
	5		20		25
Unit – III	2		2		
	10		20		30
Unit-IV	2		1		
	10		10		20
Unit-V	2		1		
	10		10		20
Max. Q & marks	8 (x 5) = 40		8 (x 10) = 80		(Total questions = 16) Marks 120
Max. Q and marks for Valuation	Questions	Marks	Questions	Marks	Max. marks
	4		5		
	(5 x 5) = 25		(5 x 10) = 50		70

INTERNAL EXAMS - 30Mark
(20 mark for unit tests, 5 marks for assignments and remaining 5 marks for seminar etc.)

Pharmacognosy and Phytochemistry

SEMESTER- VI

Time: 3 Hours

BOT-VIII-604-A- 3 (CL)P

Max. Marks- 50

1. Physical and chemical tests for evaluation of unorganized drugs-

Asaphoetida, Honey, Castor oil. Acacia

2. Identification of bark drugs – cinchona, cinnamom
3. Identification of fruit drugs – Cardamom, Coriander
4. Identification of root and rhizome drugs- Ginger, Garlic, Turmeric
5. Identification of whole plant – Aloe, Vinca, Punarnava
6. Herbarium of medicinal plants (minimum of 20 platns)
7. Collection of locally available crude drugs from local venders (minimum of 20)

Practical Question Paper

- I. Identify the given crude drugs **A & B** by Anatomical study and Morphological Study.....**2X5 = 10marks**
- II. Perform suitable chemical test and identify the given phytochemical **C**.....**.05marks**
- III. Comment on **D** and **E****2x2= 04 marks**
- IV. Herbarium and submission of drugs -..... **.04 marks**
- IV. Viva-Voce**.02 marks**
- Total..... **25 Marks**

Internals:

- a. Record -05M
- b. Attendance.....05M
- c. Internal practical exam.....05M
- d. Miniproject on medicinal.....10 M

Total.....20Marks

Total -----50M

KEY

A-Flower/fruit drugs

B-Rhizome/whole plant drugs

C- Tannins/ phenolics/steroids/ isoprenoids /Asaphoetida/ Honey/ Castor oil/ Acacia

D. Column Chromatography/ Gas Chromatogram/HPLC (photograph/ instrument used for chemical analysis of drugs.

Elective paper

Books for Reference:

1. Pullaiah. T. and M.V.Subba Rao. 2009. Plant Tissue culture. Scientific Publishers, New Delhi.
2. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
4. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms. Vikas Publication House Pvt. Ltd., New Delhi. 5th edition.

CLUSTER PAPER I

Suggested Readings:

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.
3. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

CLUSTER PAPER II

Suggested Readings:

- 1) S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
- 2) Glimpses of Indian. Ethnobotany, Oxford and I B H, New Delhi – 1981.
- 3) S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.
- 4) S.K. Jain, 1990. Contributions of Indian ethnobotany. Scientific publishers, Jodhpur.
- 5) Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons Chichester.

CLUSTER PAPER III

BOOKS FOR REFERENCE:

1. Wallis, T. E. 1946. Text book of Pharmacognosy, J & A Churchill Ltd. 2.
Roseline, A. 2011. Pharmacognosy. MJP Publishers, Chennai.
2. Gurdeep Chatwal, 1980. Organic chemistry of natural productis.
Vol.I.Himalaya Publishing house.
3. Kalsi, P. S. and Jagtap, S., 2012. Pharmaceutical medicinal and natural
Product chemistry N.K. Mehra . Narosa Publishing House Pvt. Ltd. New
Delhi.
4. Agarwal, O. P. 2002. Organic chemistry–Chemistry of organic natural
products. Vol. II. Goel publishing house , Meerut.

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BOTANY	PNT - 501	w.e.f. 2020-21	B. Sc. (BZC),Aqua
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SEMESTER - I

SKILL DEVELOPMENT COURSE

Credits: 02

Paper title: PLANT NURSERY

Total 30 hrs (02h/wk)

Max Marks: 50

Learning Outcomes:

On successful completion of this course students will be able to;

- 1. Understand the importance of a plant nursery and basic infrastructure to establish it.**
- 2. Explain the basic material, tools and techniques required for nursery.**
- 3. Demonstrate expertise related to various practices in a nursery.**
- 4. Comprehend knowledge and skills to get an employment or to become an entrepreneur in plant nursery sector.**

Syllabus:

Unit-1: Introduction to plant nursery

06 Hrs.

1. Plant nursery: Definition, importance.
2. Different types of nurseries –on the basis of duration, plants produced, structure used.
3. Basic facilities for a nursery; layout and components of a good nursery.
4. Plant propagation structures in brief.
5. Bureau of Indian Standards (BIS-2008) related to nursery.

Unit- 2: Necessities for nursery

09 Hrs.

1. Nursery beds – types and precautions to be taken during preparation.
2. Growing media, nursery tools and implements, and containers for plant nursery, in brief.
3. Seeds and other vegetative material used to raise nursery. In brief.
4. Outlines of vegetative propagation techniques to produce planting material.
5. Sowing methods of seeds and planting material.

Unit-3: Management of nursery

09 Hrs.

1. Seasonal activities and routine operations in a nursery.
2. Nursery management – watering, weeding and nutrients; pests and diseases.
3. Common possible errors in nursery activities.
4. Economics of nursery development, pricing and record maintenance.
5. Online nursery information and sales systems.

Guide lines for paper setter: (PNT - 501C) w.e.f. 2020-21.

1. In **section A**: Unit I & Unit II must carry **THREE** questions and Unit III must carry **TWO** questions.
2. In **section B**: **TWO** question each from Unit I, II & III
3. See the following table and Model paper for marks distribution.
4. Please provide the scheme of valuation for the paper.
5. Question paper should be both in English and Telugu media.

Unit	Section - A		Section - B		Weightage in
	Questions	Marks	Questions	Marks	Marks
Unit – I	3		2		
	15		20		35
Unit - II	3		2		
	15		20		35
Unit – III	2		2		
	10		20		30
Max. Q & marks	8 (x 5) = 40		6 (x 10) = 50		(Total questions =14) Total marks =100
Max. Q and marks for Valuation	Questions	Marks	Questions	Marks	Max. marks
	4		3		
	(4 X 5) = 20		(3 X 10) = 30		50

MODEL QUESTION PAPER

PLANT NURSERY

Time: 2 hrs

Max. Marks: 50

SECTION- A

4x5 =20 M

Answer any four questions. Each answer carries 5 marks

1. Importance of nursery
2. Components of a good nursery
3. Growing medium
4. Micro-propagation
5. Grafting
6. Nursery pests
7. Greenhouse
8. Record Management

SECTION B

3x10 = 30 M

Answer any three questions. Each answer carries 10 marks

1. Describe different types of nursery?
2. Plant propagation structures in brief.
3. Describe the precautions to be taken during the preparation of a nursery bed?
4. Sowing methods of seeds and planting material.
5. Common possible errors in nursery activities?
6. Pricing and record maintenance of nursery management?

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CERTIFICATE COURSE

SEMESTER - III

Total hours of teaching 30 hrs @ 4 hrs per week

MUSHROOM CULTIVATION

Max.Marks:50

UNIT-1

(8 hrs)

1. Mushroom Cultivation- Introduction, Uses, Types of mushrooms.
2. Preparation of Mother Spawn in Saline bottle, sterilization.
3. Cultivation of milky mushrooms.

UNIT-2

(8 hrs)

4. Soil PH, Water, Soil sterilization, dark room, light room.
5. Controlled room temperature, culture caring.
6. Diseases and their controlling methods.

UNIT-3

(8 hrs)

7. Storage and nutritional value.
8. Industrial edible mushrooms, poisonous mushrooms.
9. Importance and Medicinal value of mushrooms.

UNIT-4

(6 hrs)

10. Types of food prepared from mushrooms -
11. Marketing in India. Export value.

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CERTIFICATE COURSE

SEMESTER - III

MUSHROOM CULTIVATION

Max.Marks:50

Model paper

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SECTION-A

Answer any 5 of the following question

5x4=20M

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer any 3 of the following question

3x10 =30M

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.

