KUVEMPU UNIVERSITY

B.Sc., BOTANY PROGRAMME

Course Curriculum and Scheme of Evaluation

B.Sc., BOTANY
FIRST SEMESTER
Paper I (SSA 790) Q.P. Code - 15130

VIRUSES, BACTERIA, CYANOBACTERIA, ALGAE, FUNGI AND LICHENS

Syllabus

Theory	
Total theory marks	**-50**
I A marks for theory	**– 10**
Total number of teaching hours / sem	**– 60hr**
Total number of teaching hours / week	**– 04hr**
Duration of theory exam	**-03hr**
Practical- Based on theory paper I	
Max. marks	**-40**
Total number practical / week	**-01**
Duration	**-03hr**
Duration of practical exam	**-03hr**

Viruses ; Ultrastructure of TMV and T-4 Bacteriophage, Multiplication of Viruses, Common viral diseases of plants – Tobacco mosaic diseases. Bean mosaic disease and Leaf curl of Tomato.

Mycoplasma ; Structure and grassy shoot disease of sugarcane.

Bacteria; Introduction, Morphological types, flagellation, ultra structure, nutrition, reproduction – cell division, conjugation, transduction and transformation, Economic importance and diseases – Citrus canker, Late blight of paddy, Red stripe of sugarcane and Angular leaf spot of Cotton.

Cyanobacteria; Occurrence, Structure, reproduction and economic importance,(Biofertilizer, food, eutrophication and algal blooms) of cyanobacteria.

Type study–*Nostoc* and *Spirulina*. **-16hr**

Algae – General characters, Classification based on Chapman and Chapman system and economic importance.

Occurrence, structure of thallus, Reproduction and life cycle of the following.

Chlorophyceae- *Volvox, Spirogyra, Oedogonium, Chara*
Xanthophyceae-*Vaucheria*
Phaeophyceae – *Sargassum*
Rhodophyceae – *Batrachospermum* **- 22hr**

Fungi - General characters, Classification based on major classes based on Alexopoulos system and economic importance of fungi.
Structure, nutrition, reproduction, lifecycle, disease symptoms and controlling methods of the following.
Oomyctes- *Phytophthora, Albugo*.
Zygomycetes– *Rhizopus*
Ascomycetes- *Penicillium, Xylaria*
Basidiomycetes – *Puccinia graminis-tritici*
Deuteromycetes – *Cercospora*
Lichens – Occurrence and classification-Crustose, foliose, and fruticose. Structure : external and internal, reproduction and economic importance of Lichens.
- -22hr

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B.Sc. Botany

FIRST SEMESTER

Practical -I model question paper

Duration of practical examination: 3 hrs Max.Marks-40

(VIRUSES, BACTERIA, CYANOBACTERIA, ALGAE, FUNGI AND LICHENS.)

Q-I. Identify the specimens A, B & C sketch, label and give reasons. -09

Q-II. Write critical notes D & E, (Macroscopic) -05

Q-III. Write pathological aspects of F, G & H - 06

Q-IV. Identify the slides I, J, K & L with reasons -10

Record -05

Viva -05

SCHEME OF EVALUATION FOR BOTANY PRACTICAL-I

First semester Practical-I

Time:03 hours Max.Marks-40

(VIRUSES, BACTERIA, CYANOBACTERIA, ALGAE, FUNGI AND LICHENS.)

I. Identify the specimens A, B &C -09
Identification =01
Sketch & label =1 ½ marks
Reasons =1/2 marks
(Algae-01, Fungi-01 and Lichens-01.)

II. Critical notes on D & E (Macroscopic) - 05
Identification =01
Critical notes=1 ½
(Algae-01, Fungi-01)

III. Identify and comments on F,G& H - 06
Hological specimen Bacteria, Virus, Fungi
Identification -01
Symptoms & control aspect =01

IV. Identify the slides I, J, K & L with reasons - 10
Identification =01
Reasons=1 ½ marks
(One from Bacteria, / one from Cyanobacteria/ Lichens, one from Fungi, one from algae)
Record-05
Viva-05

B.Sc BOTANY
SECOND SEMESTER
Paper II (SSB 790) Q.P. Code – 15230.

BRYOPHYTA, PTERIDOPHYTA, PALAEOBOTANY AND GYMNOSPERMS

Syllabus

Theory	
Total theory marks	**-50**
I A marks for theory	**– 10**
Total number of teaching hours / sem	**– 60hr**
Total number of teaching hours / week	**– 04hr**
Duration of theory exam	**-03hr**
Practical- Based on theory paper II	
Max. marks	**-40**
Total number practical / week	**-01**
Duration	**-03hr**
Duration of practical exam	**-03hr**

Bryophyta – Introduction, General characters, alternation of generation, classification.Structure: external and internal and reproduction of the following examples.

Hepaticopsida– Riccia and Porella
Anthocerotopsida – Anthoceros
Bryopsida – Polytrichum
Brief account of evolution of sporophytes and economic importance of Bryophytes. - **15hr**

Pteridophyta– Introduction, classification, occurrence, morphology, anatomy, reproduction and life cycle of the following examples.
Psilopsida – *Psilotum*
Lycopsida– *Lycopodiumcernnum* ,*Selaginella*.
Sphenopsida – *Equisetum*
Pteropsida – *Marselia*
Brief account on stellar evolution, Heterospory and seed habit, economic importance of Pteridophytes. **- 25hr**

Palaeobotany – Introduction, process of fossilization, types of fossils, geological time scale, a brief account of **Rhynia and Lepidodendron stem**. **– 05hr**

Gymnosperms - General characters, affinities of gymnosperms, classification, morphology, anatomy of root, stem and leaf. Reproduction and life cycle of
Cycadopsida -*Cycas,*
Coniferopsida -*Pinus*
Gnetopsida - *Gnetum*.

Economic importance of Gymnosperms – **15hr**

[Developmental aspects need not to bestudied]

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B.Sc. Botany

SECOND SEMESTER

Model question paper

(BROYOPHYTA, PTERIDOPHYTA, PALEOBOTANY AND GYMNOSPERMS)

Time :03hrs Max.Marks-40

Q-I. Identify the specimens A, B&C sketch, label and give reasons. -09

Q-II. Write critical notes D &E, -06

Q-III. Identify the slides F, G, H, I, & J with reasons -10

Q-IV. Prepare temporary staining mount of 'K' Identify, sketch, and label leave it for observation -05

Record- 05

Viva- 05

SCHEME OF EVALUATION FOR BOTANY PRACTICAL-II

(BROYOPHYTA, PTERIDOPHYTA, PALEOBOTANY AND GYMNOSPERMS)

Time:03 hours Max.Marks-40

Q-I . Identify the specimens A, B &C -09

Identification =01
Sketch & label =1
Reasons =1

(One from Broyophyta, One from Pteridophyta, and One from Gymnosperms)

Q-II. Critical notes on D & E (Macroscopic) - 06

Identification =01

Critical notes= 02

(One from Broyophyta, /Gymnosperms & One from Pteridophyta,)

Q-III. Identify the slides, F, G, H, I, & J with reasons -10

Identification =01
Reasons =1

(One from Broyophyta, One from Paleobotany, Two from Pteridophyta, and One from Gymnosperms)

Q-V. Prepare temporary stained mount of 'K' sketch, label and identify leave the preparation for inspection. (Pteridophyte or Gymnosperms) 05

Preparation=02

Identification=01

Sketch label=02

Record -05

Viva-voce -05

B.Sc BOTANY
THIRD SEMESTER
Paper III. (SSC 790) Q.P Code 15330.

HISTOLOGY, ANATOMY, EMBRYOLOGY AND PALYNOLOGY

Theory	
Total theory marks	**-50**
I A marks for theory	**– 10**
Total number of teaching hours / sem	**– 60hr**
Total number of teaching hours / week	**– 04hr**
Duration of theory exam	**-03hr**
Practical- Based on theory paper III	
Max. marks	**-40**
Total number practical / week	**-01**
Duration	**-03hr**
Duration of practical exam	**-03hr**

Histology: Meristems – Structure and function, Classification based on Origen, function and position. Histogen and Tunica corpus theory. Structure and function of parenchyma, Collenchyma, Sclerenchyma, Xylem and Phloem**.** **-07hr**

Tissue system:
Dermal–Structure and function of epidermis, Stomata, hairs and glandular hairs **-02hr**

Ground tissue system - Structure and function of Cortex, Endodermis, Pericycle and Pith **-03hr**

Vascular tissue system – Types of vascular bundles- Radial, Conjoint, Collateral, Bicollateral, and concentric**.** **-02hr**

Anatomy: - Internal structure of

Dicot - Tridax and Cucurbita stem, Cicer root and Tridax leaf.

Monocot –Grass stem, Canna root and Grass leaf.

Normal secondary growth- in Tridax stem. Formation of cambial ring, Storied and non-storied cambium, activity of cambium, secondary xylem, secondary phloem, vascular rays, sap wood, heart wood, growth rings, tyloses and periderm . **-10hr**

Secondary growth in typical dicot root –Cicer.
Anamolous secondary growth in Boerhavia and Dracena stem. **-06hr**

Embryology: Historical account, contribution of Maheshwari and BGL Swamy **-02hr**

Microsporogenisis – Development of Anther, male gametophyte and Pollen embryo sac. **-03hr**

Megasporogenisis – Types of ovules, differentiation of archesporial initial, formation of megaspore, types of tetrads, types of embryosac [Monosporic, Bisporic and Tetrasporic]. Development of monosporic embryosac [Polygonum type only]. Double fertilization, Triple fusion and its significance. **-06hr**

Endosperm: Types- Cellular, Helobial and free nuclear . Detailed study of cellular type of endosperm, endosperm haustorium and vermiform appendage**.** **-04hr**
Embryo: Types – Dicot and Monocot, development of dicot embryo Crucifer type. Suspensor haustorium,[definitionwithexample]**.** **-02hr**

Apomixis - a brief account **-02hr**

Polyembryony – Types, causes of poly embryony. Significance **- 02hr**
Palynology – Definition pollen morphology –Pollen structure, size and shape of pollen grains, spherical, sub-porate, prolate and perprolate, Wall layers and their morphology ,exine, sexine, ecto and endoexine, Nexine- I, II, and II., Pollen kit, Number, position and character of aperture and Exine sculpture. **-06hr**

Pollination: Types – Self and cross pollination, types of cross pollination, piston and lever mechanism, Contrivances of cross pollination. **-03hr**

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B.Sc. Botany

THIRD SEMESTER

Practical Model question paper

(HISTOLOGY, ANATOMY, EMBRYOLOGY, AND PALYNOLOGY)

Time:03 hours Max.Marks-40

I.	Identify the specimen – 'A'	-03
II.	Mount and sketch of Endosperm/Embryo/Pollinia of - 'B'	-05
III.	Calculate of the percentage of viability/Fertility of - 'C'	-04
IV.	Preparation of temporary stained slide of – 'D'	-06
V.	Identify the slides E, F,G & H	- 12
	Record-	-05
	Viva-	-05

SCHEME OF EVALUATION FOR BOTANY PRACTICAL-III

(HISTOLOGY, ANATOMY, EMBRYOLOGY, AND PALYNOLOGY)

I. Mount, identify, sketch, and label the specimen 'A' -03
From palynology
Identification =01
Sketch and label=01
Mounting=01

II. Mount and sketch the Endosperm/Embryo/Pollinia of 'B' -05
Mount=03
Identification =01
Sketch and label=01

III. Calculate the percentage of viability/Fertility of 'C' -04
Preparation=02
Calculation=02

IV. Preparation of temporary stained slide 'D' sketch, label, & identify with reason (Anatomy) -06
Preparation=03
Sketch & Label=01
Identification=01
Reason=01

V. Identify the slides E, F, G, & H with reasons -12
Identification=01
Sketch & label=01
Reason=01

(One from Histology, one from Anatomy, one from Embryology ,and one from Palynology)

B.Sc BOTANY
FOURTH SEMESTER
Paper IV. (SSD 790) Q.P Code 15430.

ECOLOGY, ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY

Theory	
Total theory marks	**-50**
I A marks for theory	**– 10**
Total number of teaching hours / sem	**– 60hr**
Total number of teaching hours / week	**– 04hr**
Duration of theory exam	**-03hr**
Practical- Based on theory paper IV	
Max. marks	**-40**
Total number practical / week	**-01**
Duration	**-03hr**
Duration of practical exam	**-03hr**

Theory:

Ecology: Definition and Scope, Factors affecting plant growth and their distribution, Climatic factors (light, temperature, rainfall, wind & atmospheric humidity), Edaphic factors (Soil formation, soil profile, soil air and soil biota), Biotic factors & Topographic factors.
Response of Plants to stress conditions- Hydrophytes, Mesophytes, Xerophytes, Epiphytes, Halophytes, Psamophytes and Parasites.
- **-15hrs**

Ecosystem: Biosphere, concept and structure of ecosystem. Types of ecosystem (pond, forest and grassland), Ecological pyramids, Ecological niche, Food chain, Food web, Ecotone, tropic level, energy flow, Law of thermodynamics and Biogeochemical cycles (Nitrogen, Hydrologic, Carbon, Sulphur and Phosphorous cycles). **-14hrs**

Ecological Successions: Process of plant succession, Hydrosere and Xerosere, concept of climax vegetation. **- 02 hrs**
Community Ecology: Methods of studying natural vegetation Qualitative and Quantitative techniques (Quadrats, Bisects and Transects). **-02hrs**

Environmental Biology

Natural Resources: Introduction, renewable and non-renewable resources, a study on fuel and soil resources, general account on NTFPs. **-05hrs**

Environmental Pollution: Source of air, water, land and noise pollution, Causes & effects of air, water, land and noise pollution (Global warming, Acid rain, Smog & fog, Eutrophication, Ozone depletion, Green house effect, Acidification, Solid wastes, Nuclear hazarders) and Control/management of pollution. **-06hrs**

Forestry: Deforestations, Reforestations, Afforestations and Social forestry, importance of forestry **-02hrs**

Conservation Ecology: Soil erosions and its types, control of soil erosions, conservation and management of soil erosions. Wet lands, Sacred Grooves, National parks, Wildlife Sanctuaries and Biosphere reserves, Biodiversity Hot spots of India. **-06hrs**

Phytogeography: Phytogeographical regions of India, Types of forest in India and Karnataka, endemism. **04hrs**

Population ecology: Effect of habitat characteristics of populations, population density, mortality, natality, and populations interactions. **02 hrs**

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B. Sc. Botany

FOURTH SEMESTER

PRACTICAL MODEL QUESTION PAPER PRACTICAL-IV

Practical-IV: ECOLOGY, ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY

Practical Model Question paper

Time: 03 hours **Max. Marks 40**

1.	Mount the anatomical section of the material 'A'	06 Marks
2.	Comment on the specimens 'B' and 'C'	06 Marks
3.	Comment on ecological Instrument 'D'	04 Marks
4.	Identify the slides 'E' & 'F' with proper ecological reasons	04 Marks
5.	Determination of Soil P^H **OR** Water holding capacity of soil **OR** Estimation of Chloride in given water samples.	06 Marks
6.	Mapping of vegetation of Karnataka, Marking and labelling and comment -	04 Marks
7.	Viva	05 Marks
8.	Class Records	05 Marks

SCHEME OF EVALUATION FOR BOTANY PRACTICAL-IV

Practical-IV: ECOLOGY, ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY

1. Identification of 'A' Hydrophytes/ Xerophytes/Epiphytes 06 Marks
   Preparation: 03 Marks
   Identification & reason: 02 Marks
   Sketch & Label: 01 Marks
2. Comment on the specimens B and C 06 Marks
   Identification: 01 Marks
   Comments: 02 Marks
   (Hydrophytes/Xerophytes/ Epiphytes/Halophytes/ parasite/Psamophytes)
3. Comment on ecological Instrument 'D' 04 Marks
   Identification: 01 Marks
   Comments: 02 Marks
   Uses: 01
4. Identify the slides E & F with proper ecological reasons 04 Marks
   Identification: 01 Marks
   Comments: 01 Marks
5. Determination of Soil P^H **OR** Water holding capacity of soil **OR** Estimation of Chloride of given water samples. 06 Marks
   Procedure : 02
   Readings: 02
   Results : 02
6. Mapping of vegetation of Karnataka ,Marking ,labeling and comment- 04 Marks (1+1+2)
7. Viva 05 Marks
8. Class Records 05 Marks

B.Sc BOTANY

FIFTH SEMESTER

Paper V. (SSE 790) Q.P Code 15549.

MORPHOLOGY, TAXONOMY, ECONOMIC BOTANY AND ETHNO BOTANY

Theory	
Total theory marks	**-50**
I A marks for theory	**– 10**
Total number of teaching hours / sem	**– 45hr**
Total number of teaching hours / week	**– 03hr**
Duration of theory exam	**-03hr**
Practical- Based on theory paper V	
Max. marks	**-40**
Total number practical / week	**-01**
Duration	**-03hr**
Duration of practical exam	**-03hr**

MORPHOLOGY: Vegetative Morphology

Root: General introduction including classification. Modification for storage (fusiform, conical, napiform and fasciculate), support (epiphytic and aerial) and respiration (respiratory/pneumatophores) floating and sucking (haustoria).

Stem: General introduction including branching type. Modification:-Rhizome, stem tuber, bulb, corm, stolon, sucker, off-set, phylloclade, cladode, thorn and tendril.

Leaf: General introduction, Types (simple and compound), Phyllotaxy (alternate, opposite and whorled) stipules.

Modification: phyllode, spines, tendril, hooks, Insectivorous plant-pitcher plant, sundew plant .

Floral Morphology**:**

Inflorescence- general account of racemose and cymose including special cymes.

Flower: Complete account of floral morphology - Gamosepalous, polysepalous, gamopetalous, polypetalous condition, aestivation, attachment and dehiscence and cohesion of anthers, apocarpous and syncarpous, placentation, style and stigma, floral formula and floral diagram.

Fruit: General account including classification and types of fruits**. -15hr**

TAXONOMY OF ANGIOSPERMS:

Principles of classification, Binomial nomenclature, species concept, system of classification by Bentham and Hooker, Herbarium techniques and importance of herbaria of India.

Study of following families with plants of economic importance (Benthem and Hooker's system to be followed).

Dicots: Annonaceae, Brassicaceae, Cappraidaceae, Malvaceae, Rutaceae, Anacardianceae, Fabaceae(Ceasalpinioideae,Mimosoideae and Papilionoidae), Myrtaceae, Curubitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Asclepoadaceae, Convolvulaceae, Solonaceae, Acanthaceae, Lamiaceae, Verbinaceae, Amaranthaceae and Euphorbiaceae.

Monocots: Orchidaceae, Liliaceae, Arecaceae ,Poaceae, and Cannaceae**. - 22hr**

ECONOMOIC BOTANY:

Food: Cereals, Millets and Pulses: Jowar, Ragi, Wheat, Rice, Black gram and Bengal gram.

Oils and Fats: Groundnut, Coconut, Sunflower.

Beverages: Tea, Coffee and Cocoa.

Textile Fibres: Cotton and Coir.

Spices: Cardomom, Clove, and Cinnamon.

Timner: Teak, Rosewood, and Neem.

Narcotic: Tobacco and Opium.

Medicinal plants:*Rauwolfia serpentaiana, Vincarosea, Tylophoraasthimatica,Cinchona officinalis, Withaniasomnifera,Tinosporacordilofia. Ocimum,* Garlic*, Aloe vera,* Turmeric and Ginger**. -10hr**

ETHONOBOTANY:

A general account of Ethnobotany and its significance**.**

Contributions of Indian ethnobotanists: S K Jain, R. R. Rao, K.S Manilal, and R. K Arora. **- - 03hr**

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B. Sc. Botany

FIFTH SEMESTER

MODEL PRACTICAL QUESTION PAPER PRACTICAL-V

(MORPHOLOGY, TAXONOMY, ECONOMIC BOTANY AND ETHNOBOTANY)

Time– 3 hrs **Marks - 40**

I.	Identify the families , A,B,C,D with reasons	- 12
II.	Describe '**E**' technical terms and draw floral diagram with floral formula **F**	- 06
III.	Write the morphological and Biological importance of **G,H & I**	-06
IV.	Write the economic importance of **J & K**	– 04
V.	Identify and comment on Ethnobotanist **L**	- 02
VI.	Viva	- 05
VII.	Record	- 05

PAPER V- PRACTICAL SYLLABUS
MORPHOLOGY, TAXONOMY , ECONOMIC BOTANY & ETHNOBOTANY

MORPHOLOGY

1. Root modification -

   Tap root - Fusiform , Napiform and Conical root.

2. Stem Modification –

   Underground - Rhizome , Tubers , Bulb, and Corm.

3. Leaf modification -

   Tendril [Gloriosa /Pea] and Stipules [Smilax] and available insectivorous plant specimens.

4. Inflorescence – Types of Racemose (Simple raceme, Spike, Spadix ,Corymb, Head , Globose head and Umbel) , Cymose inflorescence (Simple, Dichacial , Polychacial) and Special type (Cyathium, and Verticelaster)

5. Fruits – Legume, Siliqua, Berry, drupe, Pepo, Hesparadium, Pome, Eterio of berries / Follicle.

TAXONOMY

1. Any six families from Polypetalae, six from gamopetalae and two families from each Monocots and monochlamydae. Inflorescence/ Root/stem/leaf/parts used.
2. **Demonstration of herbarium techniques**.
3. Botanical tour is compulsory
4. **Herbarium submission is deleted from the practical syllabus**
5. **ECONOMIC BOTANY-**As prescribed by the Economic Botany syllabus
6. **ETHNOBOTANY-** as per theory syllabus

SCHEME OF EVALUATION FOR BOTANY PRACTICAL-V

MORPHOLOGY, TAXONOMY, ECONOMIC BOTANY & ETHNOBOTANY

I. Identify the families A,B,C,D with reasons -12
Three from polypetale and gamopetale, one from monochlamydeae/monocot
Identification =01
Salient features=02

II. Describe '**E**' technical terms and draw floral diagram with floral formula **F** -06
E-Technical description = 03 marks
F- Floral diagram and floral formula= 2+1 marks

III. Write the morphological and Biological importance of **G,H & I** -06

G= Root/Stem/Leaf modification
H=Inflorescene
I=Fruit
(Identification-01 marks , comments-01marks)

IV. Write the economic importance of **J & K** -04
J = 02 marks, K= 02 marks
Monocot and Dicot: botanical name, family, parts used and uses

V. Identify and comment on Ethnobotanist **L** -02
Identification=01 comment=01

VI. Viva 05

VII. Record 05

B.Sc BOTANY

FIFTH SEMESTER

Paper VI. (SSE 791) Q.P Code 15550.

CELL BIOLOGY AND CYTOGENETICS

Theory	
Total theory marks	**-50**
I A marks for theory	**– 10**
Total number of teaching hours / sem	**– 45hr**
Total number of teaching hours / week	**– 03hr**
Duration of theory exam	**-03hr**
Practical- Based on theory paper VI	
Max. marks	**-40**
Total number practical / week	**-01**
Duration	**-03hr**
Duration of practical exam	**-03hr**

The Cell: Ultra structure of a plant cell, organization, function and its components- cell wall, membranes (fluid mosaic model) Endoplasmic recticulum, Golgi apparatus, Lysosomes, Peroxisomes, Ribosomes, Mitochondira, Plastids, Cytoplasm, Vacoule, Cell sap, Non-living, inclusions, Nucleus, Nucleoplasm, Nuclear membrane, Pores and Nucleolus.

Chromosomes: Size, number, structure, chromotids, centromere, telomere, satellite, secondary constriction. Nuclear organizer. Types of chromosomes (based on position of centromere), Karyotype, heterochromatin (facultative and constitutive heterochromatin). Euchromatin, Chromosomal Model including nucleosome model; Mitosis and Meiosis in plants Chromosomal aberrations (deletion, duplication, inversion, translocations).

Variation in chromosome number: Polypolidy (Anueploidy, euploidy, autoploidy, allopolyploidy- with reference to Raphanobrassica), Character of Polyploidy and its significance of Polyploidy**.** **-15h**

Nucleic acids: Chemical composition of DNA and RNA.

RNA: Occurrence, types, structure, functions.

DNA: Occurrence, types, structure (double helix model), mechanism of DNAreplication (semi conservative method)

Gene Mutation: Mutation and Mutagens (spontaneous, induced: point mutation).

Concept of Gene: Gene expression and regulation- exons, introns, inducible and repressible genes: the operon concept; lac operon(inducible)and repression operon(tryptophan).

Genetic Code: Code dictionary, properties of genetic code.

Protein synthesis: Central dogma: mechanism of protein synthesis transcription and translation: co-linearity**. – 15h**

Mendelian Genetics : Biography of Mendel in brief: Mendel's experiments: Monohybrid cross-law of dominance, law if segregation, purity of gametes. Homozygous, heterozygous, phenotype, genotype, monohybrid test cross, Dihybride cross – law or independent assortment, dihybrid test cross. Mention of trihybrid crosses, incomplete dominance (*Mirabilis jalapa,* Snapdragon*).*

Modification of Mendelian Ratios: (With reference to plant examples) Interaction of genes – Epistasis(dominant and recessive); supplementary factors, complementary factors: multiple alleles(self-sterility in Nicotiana), Linkage and crossing over(Maize).

Sex determination in plants: Chromosomal mechanisms of sex determination methods-XX-XY, ZZ-ZW and XX-XO (only plant examples)- Melandirum, *Rumex acetosa* (tripartile), *Humulus lupalus* (tetrapartile). **– 15h**

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B.Sc., Botany

FIFTH SEMESTER

PAPER- VI: CELL BIOLOGY AND CYTOGENETICS-PRACTICAL SYLLABUS

1. Preparation of Mitotic slides. Ex: Onion root tips.
2. Preparation of Meiotic slides. Ex :Onion flower buds, Rheo
3. Study of different stages of mitosis and meiosis from permanent slides.
4. Solve the genetic problems from the given list
5. Technique of making permanent slides in mitosis and meiosis

B.Sc., Botany

FIFTH SEMESTER

PAPER- VI: CELL BIOLOGY AND CYTOGENETICS

Model Practical question paper –VI

Duration: 3 hrs Marks - 40

1. Prepare squash of material 'A' Identify, sketch, label the stages with reasons. -08
2. Prepare smear of material 'B' Identify, sketch , label the stages withreasons. -06
3. Identify the slides 'C' and 'D'(one from mitosis and one from meiosis) -06
4. Solve the genetic problem 'E' and 'F -10

   Viva -05

   Record -05

PAPER- VI: CELL BIOLOGY AND CYTOGENETICS

SCHEME OF EVALUATION FOR PAPER-VI

Duration: 3 hrs Marks - 40

1. Prepare squash of material 'A' Identify, sketch, label the stages with reasons. -08
   Preparation=05 marks
   Identification with reasons=01 marks
   Sketch & label=02 marks
2. Prepare smear of material 'B' Identify, sketch, label the stages with reasons. -06
   Onion/Rheo flower bud
   Preparation=03 marks
   Identification =01 marks
   Sketch & label=02 marks
3. Identify the slides 'C' and 'D'(one from mitosis and one from meiosis) -06
   Identification =01 marks, reason=01 marks
   Sketch & label=01 marks
4. Solve the genetic problem 'E' and 'F -10
   Monohybrid/dihybrid/interaction factors/incomplete dominance/crossing over

   Viva -05

   Record -05

B.Sc., Botany

SIXTH SEMESTER

Paper- VII(SSF 790). Q.P. Code 15649.

PLANT PHYSIOLOGY

Theory	
Total theory marks	**-50**
I A marks for theory	**– 10**
Total number of teaching hours / sem	**– 45hr**
Total number of teaching hours / week	**– 03hr**
Duration of theory exam	**-03hr**
Practical- Based on theory paper VII	
Max. marks	**-40**
Total number practical / week	**-01**
Duration	**-03hr**
Duration of practical exam	**-03hr**

Plant Water Relation: Significance of water for plants. Solutions (Molar and Mole), colloidal systems (hydrophilic and hydrophobic). Osmosis (O.P, T.P, D.P.D, and water potential. Plasmolysis, exosmosis, deplasmolysis and endosmosis)

Absorption of water: Mechanism active osmotic and active non osmotic absorption and passive absorption. Ascent of sap-path (only Balsam experiment) mechanism, Root pressure and T.C.T theory.

Absorption of Mineral Salts: Mechanism of absorption passive absorption (diffusion, mass flow, -exchange, Donnan equilibrium), active absorption (Lundergardh and Burstrom) Cytochrome pump theory, Lecithin cycle , carrier concept) .- **10hr**

Mineral Nutrition: Essential and Non-essential elements, Micro and Marco nutrients. Role and deficiency symptoms of N.P.K and Mg, Fe, Cu.

Transpiration: Types of transpiration, mechanism of stomatal transpiration – structure of stomata, mechanism of stomatal movement. Significance of transpiration, Guttation and wilting point.

Translocation of Solutes: Types (upward, radial and downward), path (phloem ringing experiment, protoplasmic streaming theory, and mass flow theory.

Enzymes: Nomenclature, structure, classification and properties. **– 10hr**

Photosynthesis: Structure and function of chloroplast, photosynthesis pigment, Photosystem I and Photosystem II. The Z scheme the light, and dark reaction, C3 and C4 pathway. The law of limiting factor, factors affecting photosynthesis. Photosynthesis in bacteria. CAM photosynthesis.

Respiration: Introduction, types, Biochemical pathways of respiration –glycolysis. TCA cycle, electron transport system and terminal oxidation. An account of photoresiparation and its significance. An account of anaerobic respiration and fermentation. Signification as an industrial process**.** **- 15h**

Carbohydrates: Importance of carbohydrates, definition, classification, common carbohydrates in plant glucose, fructose, sucrose, starch, cellulose, pectose.

Phytohormones: Definition, types of hormones, physiological and practical application of auxins, gibberllins, cytokinins, ethylene, ABA.

Physiology of flowering: Photoperiodism, types, role of phytochrome, vernalisation, seed dormancy.

Plant Movement: Introduction, classification, trophic movement**.** **– 10h**

B.Sc., Botany

SIXTH SEMESTER

PAPER-VII; PRACTICAL SYLLABUS

List of major experiments.

1. Measurement of DPD in plants (Potato) by gravimetric method.

2. Ganong's photometer – Rate of transpiration under different conditions of light and wind.

3. Relation between absorption and transpiration.

4. Suction force due to transpiration.

5. Evolution of oxygen by bubble counting method under different wave length of light using color transparencies – Normal, Red, blue, yellow or green (During examination different condition need not to be asked).

6. Experiment to demonstrate the presence of starch in leaves.

7. Separation of chlorophyll pigments by paper chromatographic method.

8. Ganong's respirometer- demonstrated that CO_2 is liberatedduring respiration.

List of Minor experiments

1. Potato osmoscope to demonstrate endosmosis and ex-osmosis

2. Bell jar experiment

3. Light;s screen experiment

4. Mohl's half leaf experiment.

5. Dewar's flask expt

6. Kuhne's fermentation vessel

7. Phototropism

8. Hydrotropism

9. Geotropism

10. Arc indicator

Paper- VII (SSF 790). PLANT PHYSIOLOGY

Time– 3 hrs **Marks - 40**

Practical VII: Question paper model

1. Conduct major experiment **A.** Write Requirement, Procedure, Record the Results with conclusions **-12**

2. Comment on experiment **B , C** and **D.** **-12**

3. Investigate the chemical nature of **E.** **-06**

4. Viva **- 05**

5. Record **-05**

PLANT PHYSIOLOGY

SCHEME OF EVALUATION FOR PAPER-VII

Time– 3 hrs **Marks - 40**

Practical VII: Question paper model

1. Conduct major experiment **A.** Write Requirement, Procedure, Record the Results with conclusions
   Requirement-02, Procedure-03, Experiment settings-03, Record the Results with conclusions -02. Diagram-02 **-12**

2. Comment on experiment **B , C** and **D.** **-12**

   Comments=04 marks

3. Investigate the chemical nature of **E.** **-06**

   Positive result=03 marks, Negative result=03 marks

4. Viva **- 05**

5. Record **-05**

B.Sc., Botany

SIXTH SEMESTER

Paper- VIII. (SSF 791). Q.P.Code 15650

PLANT BREEDING, BIOTECHNOLOGY, PLANT TISSUE CULTURE AND EVOLUTION

Theory	
Total theory marks	**-50**
I A marks for theory	**– 10**
Total number of teaching hours / sem	**– 45hr**
Total number of teaching hours / week	**– 03hr**
Duration of theory exam	**-03hr**
Practical- Based on theory paper VIII	
Max. marks	**-40**
Total number practical / week	**-01**
Duration	**-03hr**
Duration of practical exam	**-03hr**

Plant breeding: Principles and objectives : Methods of breeding (Mass selection, single plant or pure line selection, clonal selection, progeny selection, recurrent selection). Significance of plant breeding- increase in yield, resistance to disease and insect pests. Plant breeding in producing new and improved varieties of medicinal plants.

Hybridization: Objectives, steps in hybridization, classification- intraspecific, interspecific and intergeneric crosses with suitable examples.

Propagation: Cutting-root and stem, layering- simple, compound and gooty. Grafting,- wedge grafting, approach grafting, Bud grafting.

Evolution: Brief account of theories of evolution – Lamarck, Weismann, Darwin and De-varies, Modern synthetic theories. **- 17hr**

Biotechnology: Introduction: General procedure and scope of genetic engineering (r-DNA technology), PCR technology, production of polyclonal and monoclonal antibodies, general aspects of ELISA technique. Gene mapping.

Application of biotechnology in pharmaceutical, ,agriculture, Industrial, Environmental field and oil spill (Waste management and sewage treatment) .

DNA finger printing and its application

Transgenic plants- Bt cotton, Tomato, Arabidopsis thaliana **-18hr**

Tissue culture: Aim and scope, Totipotency, callus culture, organogenesis through callus culture, somatic embryogenesis, haploid culture (example anther culture), Protoplast fusion. Application of tissue culture in agriculture and human welfare**.** **-10 hr**

Practical syllabus

Paper VIII – Project work

Practical syllabus- ANY TOPIC

Time– 3 hrs **Marks - 40**

Practical VIII: SCHEME OF VALUATION

1. Record – Project work Submission. -20
2. Practical proper - Presentation. -10
3. Viva -10

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