M.Sc. (Botany) Semester-III
Scheme of Examination
Semester-III

BOT-121121-Paper 3.1	Plant Development and Reproduction
BOT-121122-Paper 3.2	Cytogenetics
BOT-121123-Paper 3.3	Taxonomy of Angiosperms
BOT-121124-Paper 3.4	Lab Course-III (General)
BOT-121125-Paper 3.5	Advanced Plant Pathology-I
BOT- 121126-Paper 3.6	Advanced Plant Ecology-I
BOT-121127-Paper 3.7	(a) Lab Course-III Advanced Plant Pathology (Special paper)
BOT-121127-Paper 3.7	(b) Lab Course-III Advanced Plant Ecology (Special paper)

CHO102 Students are advised to visit website of UOK to choose one paper/course of 50 marks for CBCS.

Objectives

1. To provide the knowledge about the tracheary elements by tissue maceration technique.
2. To impart basic knowledge about the structure of male and female gametophyte.
3. To understand fundamental concept of special chromosome euchromatin heterochromatin and structure of nucleosome.
4. To provide the knowledge of identification of plant and their families. To impart the knowledge about the taxonomical tools and modern evidences.
5. To impart basic understanding technique for isolation, purification, culture and inoculation of pathogens. Study of fungal and other diseases causal organism and symptoms.
6. To determine the plant community characters and estimate IVI of plant species of study area and to understand the different pollutions and their consequence

Paper 3.1 Plant Development and Reproduction

Scheme of Examination **Duration : 3 hours** **Max. Marks : 100**

Duration of Examination : 3 Hours

Maximum Marks : 100 Marks
Semester Assessment : 70 Marks
Continuous (Internal) Assessment : 30 Marks

Note : The syllabus is divided into five independent units and question paper will be divided into two sections.

There will be two sections A and B in the paper. Section A will be comprised of 10 questions having two questions from each unit having no choice. The weightage of each question is 2 marks hence the total weightage of section A is 20 marks.

In Section B, there will be 10 questions. Two questions from each unit having internal choice. Students have to attempt total 5 questions (one question from each unit). The weightage of each question is 10 marks hence the total weightage of the section B is 50 marks.

UNIT-I

Unique features of plant development.

Root development : Organization of root apical meristem (RAM), cell fates and lineages, vascular tissue differentiation, lateral roots, root hairs. Root microbial interactions.

UNIT-II

Shoot development : Organization of the shoot apical meristem (SAM), cytological and molecular analysis of SAM, control of cell division and cell to cell communication, control of tissue differentiation, especially xylem and phloem, secretory ducts and laticifers, wood development in relation to environmental factors.

Leaf growth and differentiation : Determination, phyllotaxy, control of leaf form, differentiation of epidermis (with special reference to stomata and trichomes) and mesophyll.

UNIT-III

Reproduction : Vegetative and sexual reproduction, flower development, genetics of flora organ differentiation, homeotic mutants in *Arabidopsis* and *Antirrhinum*.

Male gametophyte : Structure of anthers, microsporogenesis, role of tapetum, pollen development and gene expression, male sterility, sperm dimorphism and hybrid seed production, pollen germination, pollen tube growth and guidance, pollen storage, pollen embryos.

Female gametophyte : Ovule development, megasporogenesis, organization of the embryo sac, structure of the embryo sac cells.

UNIT-IV

Pollination, Pollen-pistil interaction and fertilization : Floral characteristics, pollination mechanisms and vectors, breeding systems, commercial considerations, structure of the pistil, pollen- stigma interactions, saprophytic and gametophytic self-incompatibility (GSI,SSI) (cytological, biochemical and molecular aspects), double fertilization, in-*vitro* fertilization.

UNIT-V

Seed development and growth : Endosperm development during early maturation and desiccation stages, embryogenesis, ultra structure and nuclear cytology, cell lineages during late embryo development, storage proteins of endosperm and embryo, polyembryony, apomixis, Parthenocarpy, embryo culture, dynamics of fruit growth, biochemistry and molecular biology of fruit maturation.

Suggested Readings :

1. Atwll, B.J. Kriedcrmann, P.E. and Jumbull, C.G.N. (eds). 1999. Plant in Action : Adaption in Nature Performance, in Cultivation, MacMillan Education, Sydney, Australia.
2. Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4^{th} revised and enlarged edition). Vikas Publishing House, New Delhi
3. Burgess, J. 1985. An Introduction to Plant Cell Development. Combridge University Press, Cambridage.
4. Fageri, K. and Van der Pijl, L. 1979. The Principle of Pollination Ecology. Pergamon Press, Oxford.
5. Fahn, A. 1982. Plant Anatomy. (3^{rd} edition). Pergamon Press. Oxford.
6. Fosker, D.E. 1994. Plant Growth and Development. A Molecular Approach. Academic Press, San Dieo.
7. Howell, S.H. 1998. Molecular Genetics of Plant Development. Cambridge University Press, Cambridge.
8. Leins, P., Tucker, S.C. and Endress, P.K. 1998. Aspects of Floral Development. J. Cramer, Germany.
9. Lyndon, R.F. 1990. Plant Development. The Cellular Basis, UnninByman, London.

10. Murphy, T.M. and Thompson, W.E., 1988. Molecular Plant Development. Prenitice Hall, New Jersey.
11. Proctor, M. and Yeo, P. 1973. The Pollination of Flowers. William Collins, London.
12. Raghavan, V. 1997. Molccular Embryology of Flowering Plant. Cambridge University Press, Cambridge.
13. Raghavan, V. 1999. Development Biology of Flowering Plants. Springer-Verlag, NewYork.
14. Raven, P.H., Evrt, R.F. and Eichhorn, S. 19992. Biology of Plant (5th edition). Worth, New York.
15. Steeves, T.A. and Sussex, I.M., 1989. Patternsin Plant Development (2ndedition). Cambridge University Press, Cambridge.
16. Sdgely, M. and Griffin, A.R. 1989. Sexual Reproduction to Tree Crops. Academic Press, London.
17. Waisel, Y., Eshel, A. and Kafkaki, U. (eds.) 1996. Plant Roots : The Hidden Hall (2nd edition), Marcel Dekker, New York.
18. Shivanna, K.R. and Sawhney, VK. (eds.) 1997. Pollen Biotechnology for Crop Production and Improvement. Cambridge University Press, Cambridge.
19. Shivanna, K. R. and Rangaswamy, N.S. 1992. Pollen Biology : A Laboratory Manual. Springer-Verlag. Berlin.
20. Shivanna, K.R. and Johri, B.M. 1995. The Angiosperm Pollen : Structure and Function. Wiley Eastern Ltd. New York.

Hyperlink of e-Books-

https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://dpbck.ac.in/wp-content/uploads/2022/09/Cell-Biology-Verma-and-Agarwal.pdf&ved=2ahUKEwiV07Lw4pKJAxX4oWMGHfGRFNQQFnoECBcQAQ&usg=AOvVaw2-eWAZ864TmxbzbXWRvhUM

Suggested Laboratory/Field Exercises :

1. Effect of gravity, unilateral light and growth regulator son the growth of young seedlings.
2. Study of tracheary elements by elements by maceration technique.
3. L.S. of shoot tip to study the organization of meristem and origin of leaf primordial.
4. Study of living shoot apices by dissections using aquatic plants such as *Ceratophyllum* and *Hydrilla.*
5. Study of cytohistological zonation in the shoot apical meristem (SAM) in sectioned and double-stained permanent slides of a suitable plant such as *Coleus*, *Kalanchoe*, *Tobacco.*

Examination of shoot apices in a monocotyledon in both T.S. and L.S. to show the origin and arrangement of leaf primordial.

6. Study of alternate and distichous, alternate and superposed, opposite and superposed, opposite and decussate leaf arrangement, Examination of rosette plants *(Launaea, Mollugo, Raphanus, Hyoscyamus* etc.) and induction of bolting under natural conditions as well as by GA treatment.
7. Microscopic examination of vertical sections of leaves such as *Cannabis, Tobacco, Nerium*, maize and wheat to understand the internal structure of leaf tissues and trichomes, glands etc. Also study the C_3 and C_4 leaf anatomy of plants.
8. Study of epidermal peels of leaves such as *Coccinia, Gaillardia, Tradescanti* etc. Study the development and final structure of stomata and prepare stomatal index. Demonstration of the effect of ABA on stomatal closure.
9. Study of whole roots in monocots and dicots. Examination of L.S. of root from a permanent preparation to understand the organization of root apical meristem and its derivatives (use maize, aerial roots of banyan, *Pistia, Jussiaea* etc.). Origin of lateral roots. Study of leguminous roots with different types of nodules.
10. Study of microsporogenesis in sections of anthers.
11. Examination of modes of anther dehiscence and collection of pollen grains for microscopic examination (maize, grasses, *Cannabis sativa, Crotolaria, Tradescantia, Brassica, Petunia, Solanum Melongena* etc.
12. Tests for pollen viability using stains and in vitro germination. Pollen germination using hanging drop and sitting drop cultures, suspension culture and surface culture.
13. Estimating percentage and average pollen tube length *invitro*.
14. Role of transcription and translation inhibitors on pollen germination and pollen tube growth.
15. Pollen storage, pollen-pistil interaction, self-incompatibility, *invitro* pollination.
16. Study of ovules in cleared preparations, study of monosporic, bisporic and tetrasporic types of embryo sac development thorough examination of permanent, stained serial sections.
17. Field study of several types of flower with different pollination, mechanisms (Wind pollination, bee/butterfly pollination, bird pollination).
18. Emasculation, bagging and hand pollination to study pollen germination, seed set and fruit development using self compatible and obligate out crossing systems. Study of cleistogamous flowers and their adaptations.

Paper 3.2 Cytogenetics

Scheme of Examination **Duration : 3 hours** **Max. Marks : 100**

Duration of Examination : 3 Hours

Maximum Marks : 100 Marks
Semester Assessment : 70 Marks
Continuous (Internal) Assessment : 30 Marks

Note : The syllabus is divided into five independent units and question paper will be divided into two sections.

There will be two sections A and B in the paper. Section A will be comprised of 10 questions having two questions from each unit having no choice. The weightage of each question is 2 marks hence the total weightage of section A is 20 marks.

In Section B, there will be 10 questions. Two questions from each unit having internal choice. Students have to attempt total 5 questions (one question from each unit). The weightage of each question is 10 marks hence the total weightage of the section B is 50 marks.

UNIT-I

Chromatin organization : Chromosome structure and packaging of DNA, molecular organization of centromere and telomere, nucleolus and ribosomal RNA genes, euchromatin and heterochromatin, karyotypes of chromosomes, polytene, Lampbrush, B-chromosomes and sex chromosome, molecular basis of chromosome pairing.

UNIT-II

Structural and numerical alterations in chromosomes : Origin, meiosis and breeding behavior of duplication, deficiency, inversion and translocation heterozygotes, Origin, occurrence, production and meiosis of haploids, aneuploids and euploids, origin and production of auto polyploids, chromosome and chromatid segregation, allopolyploids, types, genome constitution and analysis, evolution of major crop plants, induction and characterization of trisomics and monosomics.

UNIT-III

Gene Structure and expression : Genetic fine structure, cis-trans test, fine structure analysis of eukaryotes, introns and their significance, RNA splicing, regulation of gene expression in prokaryotes and eukaryotes, Panoply of operon, catabolite repression, attenuation and anti-termination.

Genetic recombination and genetic mapping : Recombination, independent assortment and crossing over, molecular mechanism of recombination, role of RecA and RecBCDenzymes, site- specific recombination, chromosome mapping, linkage groups, genetic markers, construction of molecular maps, correlation of genetic and physical maps.

Mutations : Spontaneous and induced mutations, physical and chemical mutagens, molecular basis of gene mutation.

UNIT-IV

Somatic-cell genetics : An alternative approach to gene mapping. Transposable elements in prokaryotes and eukaryotes, mutation induced by transposons, site-directed mutagenesis, DNA damage and repair mechanisms.

Sex determination, sex linked inheritance, sex limited characters and sex reversal, multiple allele's and blood groups in man.

UNIT-V

Molecular cytogenetics : Nuclear DNA content, C-value paradox, cot curve and its significance, restriction mapping-concept and techniques, multigene families and their evolution, physical mapping of genes of chromosomes, computer assisted chromosome analysis, chromosome microdissection and microcloning, flow cytometry and confocal microscopy in karyotype analysis.

Suggested Readings :

1. Albert B. Bray, D., Lewis, J., Raff, M., Robert, K. and Watson, J.D.1989., Molecular Biology of the Cell (2^{nd} edition), Garland Publishing Inc., New York.
2. Burnham, C. R. 1962. Discussions in Cytogenetics. Burgess Publishing Co. Minnesota.
3. Busch, H. and Rothblum, J.1982. Volume X. The Cell Nucleusr DNA Part. A. Academic Press.
4. Hart l, D.L. and Jones, E.W. 1998. Genetics : Principles and Analysis (4^{th} edition). Jones & Bartlett Publishers, Massachusetts.USA.
5. Khush, G.S. 1973. Cytogenetics of Aneuploids. Academic Press, New York, London.
6. Karp, G.1999. Cell and Molecular Biology : Concepts and Experiments. John Wiley & Sons, Inc., USA.
7. Lewin.B.2000. Gene VII. Oxford University Press, New York, USA.
8. Lewis, R.1997. Human Genetics : Concepts and Applications (2^{nd} edition). WCB Mc Graw Hill, USA.

9. Malacinski, G. M. and Freifeldo, D. 1998 : Essentials of Molecular Biology (3rd edition). Jones and B Art let Publishers Inc. London.
10. Russel, P.J. 1998.Genetics (5th edition). The Benjamin Cummings Publishing Company Ind., USA.
11. Snustad, D.P. and Simmons, M.J. 2000. Principles of Genetic (2nd edition). John Wiley & Sons Inc., USA.

Hyperlink of e-books :

Suggested Laboratory Exercises :

1. Linear differentiation of chromosomes through banding techniques, such as G-banding, C- banding and Q-banding.
2. Silver banding for staining nucleolus-organizing region, where 18S and 28sr DNA are transcribed.
3. Orecein and Feulgen. Staining of the salivary gland chromosomes of Chironomas and Drosophila.
4. Characteristics and behavior of B chromosomes using maize or any the appropriate material.
5. Working out the effect of mono-and tri somyon plant type, fertility and meiotic behaviour.
6. Induction of polyploidy using colchicines, different methods of the application of Colchicines.
7. Effect of induced and spontaneous polyploidy on plant phenotype, meiosis, pollen and seed fertility and fruit set.
8. Effect of translocation heterozygosity on plant phenotype. Chromo some pairing and chromosome disjunction and pollen and seed fertility.
9. Meiosis of complex translocation heterozygotes.
10. Isolation of chlorophyllmutants, following irradiation and treatment with chemical mutagens.
11. Estimation of nuclear DNA content through microdensitomerty and flow cytometry.
12. Fractionation and estimation of repetitive and unique DNA sequences innuclear DNA.

Paper 3.3 Taxonomy of Angiosperms

Scheme of Examination **Duration : 3 hours** **Max. Marks : 100**

Duration of Examination : 3 Hours

Maximum Marks : 100 Marks
Semester Assessment : 70 Marks
Continuous (Internal) Assessment : 30 Marks

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There will be two sections A and B in the paper. Section A will be comprised of 10 questions having two questions from each unit having no choice. The weightage of each question is 2 marks hence the total weightage of section A is 20 marks.

In Section B, there will be 10 questions. Two questions from each unit having internal choice. Students have to attempt total 5 questions (one question from each unit). The weightage of each question is 10 marks hence the total weightage of the section B is 50 marks.

UNIT-I

Angiosperm Taxonomy : Brief history, Aims and fundamental components, taxonomic key, Pheneticversus phylogenetic systems, Salient features of main system of classification and their relative merits and demerits.

UNIT-II

The species concept : Taxonomic hierarchy, species, genus, family and other categories, principles used in assessing relationship, delimitation of taxa and attribution of rank. Salient features of the International Code of Botanical nomenclature.

UNIT-III

Taxonomic tools and evidence : Herbarium, floras, morphology, anatomy, palynology, embryology, cytology, phytochemistry, taximetrics, serological, molecular techniques, computers and GIS, Relevance of taxonomy to conservation.

UNIT-IV

Evolutionary tendencies and range of flower variations in following families-Asteraceae, Cucurbitaceae, Myrtaceae, Sterculiaceae, Combretaceae and Rubiaceae.

UNIT-V

Phylogeny of Angiosperms : Ancestors of Angiosperms, time and place of origin of Angiosperms, Habit of Angiosperm, Primitive families (Ranunculaceae, Magnoliaceae, Nymphaceae, Annonaceae, Winteraceae) and their Important genera.

Suggested Readings :

1. Cole, A.J.1969. Numerical Taxonomy, Academic Press, London.
2. Devis, P.H. and Heywood, V.H. 1973, Principles of Angiosperms Taxonomy, Robert E. Kreiger Publ Co., New York.
3. Grant, V.1971. Plant Speciation. Columbia University Press, NewYork.
4. Grant, W.E. 1984. Plant Biosystematics. Academic Press, London.
5. Harrison, H.J. 1971. New Conceptsin Flowering Plant Taxonomy. Rieman Educational Book Ltd., London.
6. Heslop-Harrison, J. 1967. Plant Taxonomy, English Language Book Soc. & Edward Arnold Pub. Ltd. U.K.
7. Heywood, V.H. and Moore, D.M. 1984. Current Conceptsin Plant Taxonomy. Academic Press, London.
8. Jones, A.D. and Wilbins, A.D. 1971. Variations and Adaptationsin Plant Species. Hiemand & Co. Educational Books Ltd. London.
9. Jones, S.B. Jr. and Luchsinger, A.E. 1986. Plant Systematics (2nd edition). McGraw-Hill Book Co., New York.
10. Nordenstam, B., ElGazaly, G., and Kassas, M.2000. Plant Systematics for 21st Century. Portl and Press Ltd. London.
11. Radford. A.H. 1986, Fundamentals of Plant Systematics. Harper & Row Publications, USA.
12. Solbrig, O.T. 1970. Principals and Methods of Plant Biosystematics. The Macmillan Co-collier-Mac Millan Ltd. London.
13. Solbrig, O.T. and Solbrig, D.J. 1979. Population Biologyand Evolution, Addison-Weslley Publicating Co. Ind. USA.
14. Stebbings, G.L. 1974, Flowering Plant-Evolution Above Species Level. Edward Arnold Ltd. London.
15. Stace, C.A. 1989. Plant Taxonomy and Biosystematics (2nd edition) Edward, Arnold Ltd. London.

16. Takhtajan, A.L. 1997. Diversity and Classification of Flowering Plants. Columbia University Press, New York.
17. Woodland, D.W. 1991, Contemporary Plant Systematics. Prentice Hall. New Jersey.

Hyperlink e-books :

Suggested Laboratory Exercises :

Description of aspecimen from representative, locally available families.

1. List of Locally Available Families:

(1) Ranunculaceae, (2) Capparidaceae, (3) Portulacaceae, (4) Caryophyllaceae, (5) Malvaceae, (6) Tiliaceae, (7) Streculiaceae, (8) Zygophyllaceae, (9) Rhamnaceae, (10) Sapindaceae, (11) Leguminosae, (12) Combretaceae, (13) Myrtaceae, (14) Cucurbitaceae, (15) Apiaceae, (16) Rubiaceae, (17) Asteraceae, (18) Primulaceae, (19) Plumbaginaceae, (20) Asclepiadaceae, (21) Convolvulaceae, (22) Solanaceae,(23) Boraginaceae, (24) Polemoniaceae, (25) Acanthaceae, (26) Pedaliaceae, (27) Martyniaceae, (28) Bignoniaceae, (29) Lamiaceae, (30) Nyctaginaceae, (31) Polygonaceae, (32) Chenopodiaceae, (33) Amaranthaceae, (34) Aizoaceae, (35) Molluginaceae, (36) Euphorbiaceae, (37) Commelinaceae and (38) Cyperaceae.

2. Description of species based on various specimens to study in traspecificvartation : a collective exercise.
3. Description of various species of a genus, location of key characters and preparation of keys at generic level.
4. Location of key characters and use of key at family level.
5. Field trips with in and around the campus, compilation of field notes and preparation of herbarium sheets of such plants, natural or cultivated as are abundant.
6. Training in using floras and herbaria for identification of specimens described in the class.
7. Demonstration of the utility of secondary metabolites in the taxonomy of some appropriate genera.
8. Comparison of different species of a genus and different genera of a family to calculate similarity coefficients and preparation of dendrograms.

University of Kota (Kota)

M.Sc. Semester-III (2024-25) Botany

Skeleton Paper

3.4 Lab. Course–III (General)

Time : 6 Hrs. **Max. Mark : 150**

1. (a) Study the Root apical meristem / Shoot apical meristem. 10
   (b) Study the Phyllotaxy of selected Plants. 05
2. Study the epidermal Peels of leaves/Stomatal index of given material 10

   Or

   Study the tracheary elements in the given material by maceration techniques.
3. Study the floral/epidermal/embryological structure of the material provided
   Prepare slide, draw labelled diagram and discuss character. 10
4. Perform the Cytogenetical exercise/experiment, describe the Methodology and write your Observation and Conclusion. 15
5. Analyse the Karyotype of given plants.
6. (a) Describe the given material in Semitechnical language with diagrams, assign it to the relevant family with reasons and draw floral diagram. 15
   (b) Describe reproductive parts with diagrams of given material assign to it to the relevant family with reasons and draw Floral diagram 10
7. Prepare an artificial key of given plant materials. Prepare Phenogram or Dendrogram in given exercise. 10
8. Spots 3x5=15
9. Seminar 15
10. Record 15
11. Viva Voce 10

Paper 3.5 Advanced Plant Pathology-I

Scheme of Examination **Duration : 3 hours** **Max. Marks : 100**

Duration of Examination : 3 Hours

Maximum Marks : 100 Marks
Semester Assessment : 70 Marks
Continuous (Internal) Assessment : 30 Marks

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UNIT-I

Phenomenon of plant infection, penetration, post infection development, factors affecting infection, defense mechanisms.

Host pathogen interaction : There sponse of the host, pathogenecity and virulence, host specific toxins in relation to pathogenesis and disease resistance.

UNIT-II

Plant disease control : Physical control, chemical control, plant quarantines, plant disease resistance and breeding of resistance varieties.

Methods : Techniques of isolation, purification, culture and inoculation of pathogens. Technique of tissue culture and its applications in plant pathology. Raising virus free plants in culture.

UNIT-III

Fungal diseases : Symptomatology and disease identification, some important diseases of cereals : Smuts, rusts, leaf blights, spots, mildews, karnal bunt and flag smut of wheat; covered smut and stripe disease of barley. Brown spot and blast of paddy, downy mildews and Drechlera (Helminthosporium) blights of Maize; ergot and smut of Bajra, leaf spots and smuts of jowar, green ear disease of Bajra.

UNIT-IV

Other Diseases : Red rot and smut of sugarcane; Wilt of cotton, flax and pigeon pea; Flax rust; Blight of gram; Early blight of tomato and potato; Late blight of potato; Tikka disease of groundnut, and downy and powdery mildews of grapes.

UNIT-V

Molecular base of host-parasitic interactions, signal transduction and plant disease development, acquired immunity, SAR, role of salicylic acid in plant disease development, culture of obligate parasites.

Suggested Readings :

1. Agrios, G.N.2005 Plant Pathology. 5th edition Academic Press. New York, USA
2. Alexopoulus, C.J, C.W. Mims and M. Blackwel, 1996. Introductory Mycology, 4th edition, John Wiley and Sons, inc., New York, USA
3. Khan, J.A. and J.Dijkstra. 2002 Plant Virusas Molecular Pathogens. The Haworth Press Inc. USA
4. Mehrotra R.S. and A. Agarwal. 2003 Plant Pathology. 2nd Edition TATA Mc Graw Hill. Pub. Company Ltd. New Delhi.
5. Singh, R.S. 1982. Plant Pathogens. The Fungi. Oxford and IBH Publishing Company, New Delhi, India.
6. Singh, R.S. 1989.Plant Pathogens. The Prokaryotes. Oxford and IBH Publishing Company, New Delhi, India.
7. Trigiano, R.N., M.T. Windham and A.S. Windham. 2008. Plant Pathology : Concepts and Laboratory Exercises. 2nd edition. CRC Press.
8. Vidhyasekram, P. 2004. Concise Encyclopedia of Plant Pathology : Food product Press and Haworth Press Inc. Binghamton.
9. Kaushik, P 1996 Introductory Microbiology Emkay Pub. New Delhi.
10. Mehrotra R.S. 1987 Plant Pathology. TATA MacgrawthllPub. Company Ltd., New Delhi.
11. Purohit S.S. 2002 Microbiology-Fundamentals & applications Agrobios (India) Pub. Jodhpur.

Hyperlink e-books :

Suggested Laboratory Exercises :

1. Culture transfer techniques
2. Techniques for isolation of pureculture

3. Isolation of discrete colonies from a mixed culture
4. Isolation of pure culture from spread plate streak plate preparation.
5. Culture character is tics of microorganisms
6. Grams staining.
7. Todraw camera lucida drawings of fungal spores.
8. Calibration of Microscopes
9. Study of fungal and other disease

Paper 3.6 Advanced Plant Ecology-I (Environmental Biology)

Scheme of Examination **Duration : 3 hours** **Max. Marks : 100**

Duration of Examination : 3 Hours

Maximum Marks	: 100 Marks
Semester Assessment	: 70 Marks
Continuous (Internal) Assessment	: 30 Marks

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UNIT-I

Ecosystem : Concept, structure and function of grassland, forest, fresh water and marine ecosystems, biogeochemical cycles, evolution of ecosystem, ecological energetic and flow of energy.

UNIT-II

Natural Resources : water, soil, energy and wild life management and their remediation, biodiversity conservation, sanctuaries, national parks, non-conventional energy resources, solar, wind, tidal and geothermal energy sources, 3 R's (Reduction, Recycle & Reuse).

UNIT– III

Noise, Land, Radiation and Thermal Pollution : Sources and characteristics. Global Warming, ozone depletion and acid rains. Ganga Action Plan, Ecolabeling and Environmental Auditing, water pollution (Prevention and control of Pollution Act 1974). Air Pollution Act.

UNIT-IV

Plant community characters (Analytic and synthetic), IVI, Consequences of growing human population on environment. Ecosystems: Manmade ecosystems–Urban and rural. Environmental Impact Assessment (EIA), Social Impact Assessment (SIA) and sustainable development. Solid Waste Management.

UNIT-V

Environmental Education and Awareness : Environmental laws & Ethics : Wild Life Protection Act 1972. Poaching and killing of wild life. Forest conservation Act 1980, eco feminism, Social forestry and role of tribals in conservation, environmental economics – issues in perspective global economy, ecopolitics and green policies.

Suggested Readings :

1. Smith, R.L. 1996. Ecology and Field Biology, Harpr Collins, New York
2. Muller-Dombois, D. and Ellenberg, H., 1974. Aims and Methods of Vegetation Ecology, Wiley, New York.
3. Begon, M. Harper, J.L. and Townsend, C.R. 1996. Ecology, Black well Science, Cambridge, U.S.A.
4. Ludwig. J.nad Reynolds, J.F. 1988. Statistical Ecology. John Wiley & Sons.
5. Odum, E.P. 2005. Fundamentals of Ecology, Saunders, Philadelphia.
6. Odum, E.P. 2005. Basic of Ecology, Saunders, Philadelphia.
7. Barbour, M.G., Burk, J.H. and Pitts, W.D. 1987. Terrestrial Plant Ecology, Benjamin/Cummings Publication Company, California.
8. Kormondy, E.J., 1996 Concepts of ecology, Prentice-Hall of India Pvt. Ltd., New Delhi.
9. Chapman, J.L. and Reiss, M.J. 1988. Ecology, Principles and Applications, Cambridge University Press, Cambridge, U.K.
10. Molan, B. and Billharz, S. 1997. Sustainability Indicators, John Wily Sons, New York.
11. Pandey, S.C., G.S. Furland J. Singh1967. Research methods in plant ecology Asia, Pub House, New Delhi.
12. Sharma P. D. 2000. Ecology and Environment, Rastogi Publications, Meerut.

Hyperlink of e-books :

Suggested Laboratory Exercises :

1. To determine minimum size and number of quadrat required for reliable estimate of biomass in grassland.
2. To compare protected and unprotected grassland stand using community coefficients (similarity indices).
3. To estimate IVI of the species inagrass land/woodland using quadrat method.
4. To determine gross and net phytoplankton productivity by light and dark bottle method.

5. To determine soil moisture content, porosity and bulk density of soils collected from varying depths at different locations.
6. To determine the Water holding capacity of soils collected from different locations.
7. To determine percent organic carbon and organic matter in the soils of cropland, grassland and forest.
8. To estimate the dissolved oxygen content in eutrophic and oli gotrophic water samples by azide modification of Wrinkler's method.
9. To estimate chlorophyll content in SO_2 fumigated and unfumigated plant sleaves.
10. To estimate rate of carbon dioxide evolution from different soils using soda lime or alkali absorption method.
11. To study environment alimpact of a given developmental activity using check listasa EIA method.
12. To analyze plant community characters.
13. Soil/water test (different parameters).
14. Compare polluted and non-polluted plants (different parameters).
15. Study of morphological and anatomical adaptations of plants.

University of Kota (Kota)
M.Sc. Semester-III 2024-25 Botany
Skeleton Paper
3.7 a Lab. Course –III Advanced Plant Pathology

Time : 5 Hrs **Max. Mark : 50**

1. Study the histopathology of the material (A). Make suitable preparation of given material. Write symptoms, causal or ganism and identify the disease making patho logical note of the given material. 10
2. Calibratey our Microscope and find out the average size of the fungal spore given to you. 10

Or

Demonstrate the technique used for isolation of given pure or mixed culture.

3. Prepare the slide of given material (B). Draw labelled diagram. Write symptoms and etiology of the disease. 10
4. Spots (2x5)10
5. Record 05
6. Viva-Voce 05

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Skeleton Paper
3.7 b Lab. Course –III Advanced Plant Ecology

Time : 5 Hrs. **Max. Mark : 50**

1. Determine organic matter content/conductivity/PH of the given soil sample. 10

Or

Determine the dissolved O_2 in given water body/total hardness of given water sample.

Or

Determine the Leaf Area index of polluted and non-polluted plants.

2. Determine minimum size of quadrat/density/frequency/abundance/IVI of Her baceous plants pecies of the College campus. 10
3. Prepare the Glycerin mount of the given plant material explaining their anatomical adaptation in relation to habitat. 10
4. Spots (2X5) 10
5. Record 05
6. Viva-Voce 05

Outcomes

1. Understand the concept of RAM and SAM.
2. Understand the principle of polyploidy, mutation and physical and chemical mutagens.
3. Course will provide the understand of history of plant taxonomy and classification of angiosperm.
4. Field trips within and out of campus compilation of field notes and preparation of herbarium sheets of plant species.
5. To develop conceptual skill of plant disease pathogens interaction and disease resistance.
6. To make aware about the environmental legislations and policies.