PERIYAR UNIVERSITY PERIYAR PALKALAI NAGAR SALEM - 636 011



DEGREE OF MASTER OF PHILOSOPHY CHOICE BASED CREDIT SYSTEM SYLLABUS FOR M.Phil. BOTANY (FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2017-2018 ONWARDS)

COURSE STRUCTURE

SEM	CODE	Course title	Hrs.	Marks		Total
				IA	EA	
Ι	Core course –I	Research methodology	6	25	75	100
	Core course –II	Advances in Botany	6	25	75	100
	Core course –III	Papers On Topic of		25	75	100
		Research (Guide will				
		prepare the syllabus and it				
		will be send to COE				
	Core course –IV	Dissertation and Viva voce		Dissertation 150 marks		
			Viva voce 50marks			
				Total 200 marks		

CIA COMPONENTS

Test - 15Marks Seminar – 10 marks

SEMESTER I (For Students Admitted from the academic year 2016 – 2017)

M. Phil., BOTANY DEGRÉE CORE COURSE-I: RESEARCH METHODOLOGY

Unit-I

Microscopy-principles and applications. Light, dark field, phase contrast, polarization, Differential interference contrast (DIC) and Fluorescent microscopy. Electron microscope - SEM and TEM. Atomic Force Microscopy. Calibration and Microscopic Measurements.

Unit-II

Centrifugation - Principle and Principle and Types of centrifuges. Ultra Centrifugation, density gradient centrifugation and continuous centrifugation. Separation of organelle and macromolecules. Spectrophotometer-Principle-Beer Lambert's Law. UV, IR, FTIR, Atomic Absorption Spectroscopy, CD, Stop Flow, Mass

, MALDI-TOF and NMR.

Unit-III

Chromatography: Principle, Procedures and Application of TLC, PC, Gel filtration and Ion exchange, Affinity Chromatography, GC, GLC, HPLC/FPLC and HPTLC. Applications of Chromatography in biological research.

Electrophoresis: Principle of Gel electrophoresis, Polyacrylamide gel electrophoresis (PAGE & SDS PAGE) and Agarose gel electrophoresis, comet assay and capillary electrophoresis. Two dimensional electrophoresis and isoelectrofocussing.

Unit-IV

Statistical Methods- Population and sampling, data collection, analysis and graphical representation. Measures of Central Tendency, Measures of Dispersion-Standard Deviation, Correlation and Regression analysis, Probability -normal and binomial distribution. Statistical testing: F-test, t-test and chisquare test.

Experimental design, ANOVA one way and two way analysis, statistical softwares-MS Excel and SPSS, DMRT (Duncan Multiple Range Test). Experimental designs – Concepts, Principles (Replication, Randomization), Completely Randomized Design (CRD), Randomized complete Block design (RCBD).

Unit -V

Data collection, analysis and research publications: Choosing the problem for research, Data collection, analysis and Research publications Data collection and analysis-Web browsing and searching and Electronic, biological data bases - Sequence Structure Databases NCBI, PubMed, of full Research publications, preparation manuscripts-LCD Review, Thesis writing, paper, short communications and preparations. Bibliography, Index card and Proof reading.

References

- 1. Batschelet, E. (1991). Introduction to mathematics for life scientists. Springer international student edn., Narosa publishing House, New Delhi.
- 2. Cannel, J.P. (1998). Natural Products Isolation. Humana Press, New Jersey, USA.
- 3. Forthofer, L. (1995). Introduction to Biostatistics, Academic press, New York.
- 4. George Casella and Roger L. Berger, 2003. Statistical Inference II Ed. Duxbury Advanced Series, Thomson Press.
- 5. Gupta,S.C. and Kapoor, V.K. (2002) Fundamentals of mathematical statistics, (11th Edn.). Sultan Chand & Sons, New Delhi.
- 6. Harborne, J.B. (1998). Phytochemical Methods. Chapman & Hall, London.
- 7. Jayaraman, J, 1985. Laboratory Manual in Biochemistry, Wiley Eastern Ltd.
- 8. Johansen, M., 1940. Plant Microtechnique, McGraw Hill Publishing Company, New Delhi.
- 9. Jordan, D.W. and Smith, P. 2002. Mathematical Techniques. Oxford University press, New Delhi.
- 10. Khan and Khan. 1994. Biostatistics. Vikas Publishing House Pvt. Ltd. New Delhi.
- 11. Khan, I.A., and Khannum, A., (1994). Fundamentals of Biostatistics, Vikas, Pub., Hyderabad.
- 12. Kothari, C.R., 2004. Research Methodology Methods and Techniques, New Age International.
- 13. Panse and Sukhatme. 1992. Statistical Methods for Agricultural workers. ICAR, New Delhi.
- 14. Primrose, etal. (2005). Principles of gene manipulation. Black Well Science, London
- 15. Sambrok and Russel. (2001). Molecular cloning-A laboratory manual. Cold Spring Laborat ory Press, New York.
- 16. Steel and Torrie, 1986. Principles and Procedures of Statistics with special reference to Biological Sciences.
- 17. Stock, R and Rice, C.B. F., 1980. Chromatographic methods, Chapman and Hall Ltd. London.
- 18. Wilson K, Walker, J. (1994). Principle and techniques of practical biochemistry,(4thEd) Cambridge university press.

MODEL QUESTION PAPER M. Phil., BOTANY DEGREE EXAMINATION CORE COURSE I RESEARCH METHODOLOGY

Time: 3Hrs.

Part A ($5 \times 5 = 25$ Marks)

Max. Marks: 75

Answer all questions; All questions carry equal marks (either a or b); Draw diagrams wherever necessary; Each answer should not exceed 300 words.

1. a) Write short notes on Fluorescent Microscope.

Or

b) Explain the working mechanisms of SEM.

2. a) Write short notes on Principle of centrifugation.

Or

- b) Discuss NMR Spectroscopy.
- 3. a) Write the application of HPLC

Or

b) Write short notes on Agarose gel electrophoresis.

4. a) Describe the measures of central tendency.

b) Discuss about the applications of correlation in biological research.

5. a)Write notes on NCBI and PubMed

Or

b)"Editing is essential for manuscript preparation "-Justify

Part B (5 x 10= 50 Marks)

Answer all questions; All questions carry equal marks (either a or b); Draw diagrams wherever necessary; Each answer should not exceed 1000 words.

6. a) Explain the working mechanisms of TEM

Or

- b) Give detail account on Atomic force microscopy
- 7. a) Discuss the principle and mechanism of UV Spectroscopy

Or

b) Explain the principle and mechanism of Ultra Centrifugation.

8. a) Explain in detail different types of chromatography and their application.

Or

- b) Explain two dimensional Electrophoresis s and write its application
- 9. a) A cross involving different gene gave rise to F2 generation of tall and dwarf in the ratio 110:90 by means of chi -square test prove whether this value is deviating from 3:1 ratio (Table value =3.841 and level of significance 5%)

Or

- b) Explain relationship between coefficient of correlation and regression with example.
- 10. a). Explain the Chi-square test with suitable examples.

(or)

b). Give an account on Data collection.

SEMESTER I M. Phil., BOTANY DEGREE CORE COURSE-II: ADVANCES IN BOTANY

Unit-I: Plant Biodiversity

Biodiversity Concepts, principles and scope. *In situ* conservation: Sanctuaries, National parks, Biosphere reserves, Mangroves – *Ex situ* conservation: Botanical gardens, Gene banks, Seed Banks, Cryobanks – Activities of IUCN, NBPGR – Applications of molecular markers in Biodiversity. Red Data Books, Plant biodiversity databases.

Unit-II: Molecular Biology

Isolation and amplification of nucleic acid- Genome DNA (*E.coli*), Plasmid DNA, total RNA, Polymerase chain reaction - Types and its application. Phosphatase treatment of cloning vectors, use of adapters and linkers in cloning-screening of recombinants-labeling of nucleic acids by radioactive methods

plaque and colony hybridization- Blotting techniques Southern, Northern and Western -DNA sequencing and Microarray.

Unit-III: Plant Physiology and Biochemistry

Membrane Transport Proteins – Signal transduction – Light harvesting complexes – CO₂ sequestration – overview of respiratory cycles – Synthesis of membrane lipids – Phytochemical and biochemical properties of cryptochromes – Physiological role of brassinosteroids – Polyamines – Genetic and molecular analysis of photoperiodism – Molecular aspects of stress physiology.

Unit-IV: Plant Biotechnology

Tissue culture techniques for *In vitro* Plant Conservation: Culture room and lab facilities. Media composition and preparation – plant growth regulators, Callus culture - Subculture, differentiation, and regeneration. Organogenesis, embryogenesis, Synthetic seed technology. Role of tissue culture in secondary metabolite production and technology. Intellectual property Rights – Forms of protection – copy right, trade mark, patent - Plant Breeders rights.

Unit-V: Nanobiotechnology

Social background of technological revolution – Nano technology and its types, magnitude of size, shape and phase of molecules – top down and bottom up approaches - delivery systems (Liposome nanocontainers for drug and gene delivery) – Fluorocarbons for drug delivery- Bionanomachines – protease nanolithography (quantum dots) – microparticles, Nanorobots.

Reference books

- 1. Bryan C Williams and Keith Wilson 1983, A biologist's guide to practical techniques of Practical Biochemistry Second edition. Edward Arnold Publications.
- 2. Buchanan, B.B., Ruissem, W. and Jones, R.L. (2000). Biochemistry and Mol. Biology of Plants. American Society of Plant Physiologists, Maryland, USA.
- 3. Dixon.R.A, 1994, Plant cell culture, A Practical approach.IRL press. Oxford, London.
- 4. Dodds.I.H, and Roberts. L.W, 1995, Experiments in plant tissue culture. Cambridge University press, London.
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- 7. Freifelder.D.1990.Molecular Biology. Narosa publishing house, New Delhi.
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- 9. Kleinsmith, L.J. and Kish, V.M. (1995) Principles of cell and molecular biology 2nd Edn. Harper Collins college publishers, New York, USA.
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- 15. Murray Moo Young. Plant biotechnology, comprehensive biotechnology series, Pergamon press, Netherlands.
- 16. Narayanasamy.S, 1994, Plant cell and tissue culture. Tata McGraw Hill Publishing Co., New Delhi.
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- 19. Singh, B.D. 2003. Plant Biotechnology. Kayani Publishers, New Delhi.
- 20. Vasil.I.L, and Vasil.V.K, 1992, Plant Biotechnology and tissue culture. Kluver Academic Publishers, Netherlands.

MODEL QUESTION PAPER

M.Phil., BOTANY DEGREE EXAMINATION

CORE COURSE II - ADVANCES IN BOTANY

Time: 3Hrs.

Max. Marks: 75

Part A (5 x 5 = 25 Marks)

Answer all questions; All questions carry equal marks (either a or b); Draw diagrams wherever necessary; Each answer should not exceed 300 words.

1. a)Write a short notes on Biosphere reserves

Or

b) Discuss the activities of NBPGR.

2. a) Write notes on Plasmid.

Or

b) Give a short account on Southern Blotting.

3. a) Write a short notes on signal transduction

Or

b) Briefly write about organogenesis.

4. a) Briefly write about polyamines and its application.

Or

b) Write notes on synthetic seed technology.

5. a)Define magnitude of Nanobiotechnology

Or

b) Give notes on nanorobots.

Part B (5 x 10= 50 Marks)

Answer all questions; All questions carry equal marks (either a or b); Draw diagrams wherever necessary; Each answer should not exceed 1000 words.

6. a) Explain the *Ex situ* conservation with suitable example

Or

b) Discuss the various molecular markers and write its application.

7. a) Give a detailed account on PCR and its applications.

Or

b) Write notes on DNA sequencing.

8. a) Briefly discuss the molecular aspects of stress physiology.

Or

b) Write an essay on light harvesting complex

9. a) Explain the role of tissue culture in secondary metabolites production.

Or

b) Give a account on Intellectual Property Rights.

10. a) Describe the technique of Liposome mediated drug delivery.

Or

b) Discuss - nanomedicines are BOON or BANE

MODEL QUESTION PAPER M.Phil., BOTANY DEGREE EXAMINATION (For Students Admitted from the academic year 2017 – 2018) CORE COURSE III – PAPERS ON TOPIC OF RESEARCH

Time: 3Hrs.

Max. Marks: 75

Part-A 5 questions (5 x 5 = 25 Marks) Answer all questions; All questions carry equal marks (either or, one from each unit)

Part-B 5 questions (5 x 10 = 50 Marks) Answer all questions; All questions carry equal marks (either or, one from each unit)