

SYLLABUS FOR Ph.D. COURSE WORK BOTANY

(Under Revised Ordinance 16 notified vide letter no/Acad./2018/1944 dated 24/05/2018)
(Academic Session 2018 – 2019 & Onwards)

SCHEME OF EXAMINATION

Number & Title of the Paper	Credit	End Semester Exam		
		Maximum Marks	Minimum Marks	Total
PAPER I RESEARCH METHODOLOGY	4	100	50	100
PAPER II REVIEW OF PUBLISHED RESEARCH IN RELEVANT FIELD (IN THE FORM OF THESIS)	3	100	50	100
PAPER III COMPUTER APPLICATIONS	3	100	50	100
PAPER IV PLANTS IN HUMAN WELFARE	3	100	50	100
PAPER V COMPREHENSIVE VIVA VOCE (VIRTUAL CREDITS)	3	100	50	100

*SCHEME OF EXAMINATION AS APPROVED BY EXECUTIVE COMMITTEE OF THE UNIVERSITY

PAPER – I RESEARCH METHODOLOGY

Unit – I

Sampling technique, sterilization technique, various methods for isolation of pure culture, methods for measurement of microbial growth, manipulation of environment, nutritional and genetic parameters, maintenance and preservation of microbes (pure culture). Introduction to cell & tissue culture. Design & lab setup of tissue culture laboratory, Tissue culture media (Composition preparation), Types of culture.

Unit - II

Chromatographic techniques – Gel filtration, ion exchange chromatography, hydrophobic interaction and reverse phase chromatography, affinity chromatography, gas chromatography, high performance liquid chromatography, fast protein liquid chromatography; Application in separation of proteins.

Unit - III

Molecular Biology and spectroscopic techniques – Comet Assay; Real time PCR; RAPD, RFLP, ARDRA and Fluorescence *in situ* hybridization techniques. Atomic absorption

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spectroscopy, infrared spectroscopy, nuclear magnetic resonance spectroscopy, mass spectrometry including ESI MS and MALDI-TOF MS and Applications.

Unit - IV

Electrophoretic and centrifugation techniques - SDS and Native PAGE, Agarose gel electrophoresis, isoelectric focusing and two-dimensional electrophoresis, proteome analysis; Differential and density gradient centrifugation, analytical ultracentrifugation, separation of DNA/RNA using ultracentrifugation technique, determination of molecular weight and Sedimentation coefficient.

Unit - V

Quantitative methods; Principles and Designs of Experiments; Tools Parametric and Non-parametric statistics. Confidence interval, Errors. Levels of significance, Regression and Correlation coefficient. Analysis of variance - one way and two way classifications; Multiple Comparisons – Least Significant Difference Test, Duncan's New Multiple Range Test; Factorial Analysis; Analysis of Covariance.

PAPER-II REVIEW OF PUBLISHED RESEARCH IN RELEVANT FIELD (IN THE FORM OF THESIS)

PAPER - III COMPUTER APPLICATION

Unit - I

Features and applications related to presentation of text in suitable format and saving the MS WORD data for future applications. Practical knowledge of MS Word to type the script, insert tables, figures and graphs to prepare thesis and research papers in presentable format.

Unit – II

Construction of spreadsheets from the experimental data. MS EXCEL design and application of formula for calculations and their applications to the experimental data. Use of statistical tools, preparation of graphs, histograms and charts.

Unit – III

Preparation of powerpoint presentations based on the topic of research. Insertion of MS power point figures, graphs, charts in presentation. Preparation of scientific posters for presentations. Use of various presentation techniques.

Unit – IV

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Method of preparing data sheets and entering the data according to its characteristics. Use of SPSS & various statistical tools on SPSS. Internet Overview of networking, Internet and its applications. Applications exploring various websites and search engines for collecting quality literature and secondary data related to research work.

Unit – V

Data processing, Data mining; Bioinformatics – concept and applications; Biological databases – Primary and Secondary; Sequence Databases (EMBL, GenBank, DDBJ, SWISS-PROT, PIR, TrEMBL); Protein Family/Domain Databases (PROSITE, Pfam, PRINTS & SMART); Structure Database (PDB); Tools like BLAST, FASTA and EMBOS.

PAPER-IV PLANTS IN HUMAN WELFARE

Unit –I

Scope of Plants in welfare of society: World biomes, Botanical aspects of National Park & Botanical gardens in India. Plant identification centres, herbaria in India & Documentation (Floras & Monographs).

Unit –II

Importance of food plants: Wheat (*Triticum aestivum*), Rice (*Oryza sativa*) Maize (*Zea mays*), Arhar (*Cajanus cajan*), Chana (*Cicer arietinum*). Plants used in Textile: Cotton (*Gossypium hirsutum*), Semal (*Bombax ceiba*), Jute (*Corchorus capsularis*), Patsan (*Hibiscus cannabinus*) & Sunnhemp (*Crotalaria juncea*).

Unit –III

Plants used in Dye: Palash (*Butea monosperma*), Henna (*Lawsonia inermis*), Neel (*Indigofera tinctoria*), Kattha (*Acacia catechu*), Turmeric (*Curcuma longa*). Plants used in timber: Teak (*Tectona grandis*), Sal (*Shorea robusta*), Beeja (*Pterocarpus marsupium*), Arjun (*Terminalia arjuna*) & Shisham (*Dalbergia sissoo*).

Unit –IV

Plants used in Condiments & Spices: Dalchini (*Cinnamomum zeylanicum*) & Kali mirch (*Piper nigrum*). Plants used in beverages: Coffee (*Coffea arabica*) & Tea (*Camellia sinensis*). Plants used in Oil yielding: Nariyal (*Cocos nucifera*) & Mungphali (*Arachis hypogea*). Plants used in Narcotics: Bhang (*Cannabis sativa*) & Poppy (*Papaver somniferum*). Plants used in Gum: Kullu (*Sterculia*

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urens), Gugal (*Commiphora wightii*) & Rubber (*Ficus elastica*). Plants used in Paper & Pulp: Bans (*Dendrocalamus strictus*) & Nilgiri (*Eucalyptus obliqua*).

Unit –V

Plant and Human Health, Uses of Plants in different systems of medicine: Allopathic, Homeopathic, Aurvedic, Herbal medicine and concept of Herbal cosmetics. Important Drug industries in India based on plants. Major Drug Plants: Ashwagandha (*Withania somnifera*), Sargandha (*Rauwolfia serpentina*), Adhusa (*Adhatoda vasica*), Amla (*Phyllanthus emblica*), Neem (*Azadirachta indica*), Punarnava (*Boerhavia diffusa*), Safed musli (*Chlorophytum borivillianum*), Kalmegh (*Andrographis paniculata*), Kalihari (*Gloriosa superba*), Gwarpatha (*Aloe vera*), Satawar (*Asparagus racemosus*) & Kali musli (*Curculigo orchioides*).

PAPER-V COMPREHENSIVE VIVA VOCE

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