M.Phil. BOTANY (F.T) PROGRAMME – Course Structure Under CBCS

(For the candidates admitted from the academic year 2015-2016 onwards)

S. No.	Sem	Paper	Hrs/ Week	Credit	Exam Hrs.	Marks		
						Internal	External	Total
1	I	Core course I – Microscopy, Histology, Cell and Tissue culture	6	4	3	40	60	100
2	I	Core course II - Instrumentation	6	4	3	40	60	100
3	I	Core Course III - Bioinformatics, Biostatistics and Research methodology	6	4	3	40	60	100
4	I	Elective paper – Teaching and Learning Techniques	6	4	3	40	60	100
5	II	Dissertation	-	8	-	*Viva – Voce* (50)	Dissertation (150)	200
			24	24				600

CORE COURSE I – GENERAL PAPER
(MICROSCOPY, HISTOLOGY, CELL AND TISSUE CULTURE)

Course code	: JSMPBT3
Hours per week	: 6
Credit	: 4 I
internal Marks	: 40
External Marks	: 60

Unit I

Microscopy – Light microscopy – Phase contrast and interference microscopy – Polarization microscopy – Fluorescence microscopy – Electron microscopy – Confocal microscopy. Sample preparation for light and electron microscopy.

Unit II

Histological techniques – Fixation; Dehydration; Clearing; Embedding; Microtomy – types of microtomes; Staining – use of stains – staining of plant materials.

Unit III

Fixation – chemistry of fixation; aldehyde fixatives; Metallic ions and complexes; practical fixative solutions; freeze-drying; cryopreservation.

Unit IV

Cell and Tissue culture – Microbial cell culture; culture media; plant cell and tissue culture; synthetic medium; organotypic culture; protoplasmic fusion.

Unit V

Laboratory management – Basic requirements; maintenance of instruments; disposal of hazardous laboratory materials and chemicals, good laboratory management - Bio safety.

REFERENCES:

- Rana, SVS*Biotechniques: Theory and Practice* Rastogi Publications, Meerut.
- Pattel LR, Bhalachander BL and Jeeraji H *An introduction to microtechnique,* S. Chand & Co. Pvt. Ltd., New Delhi.
- Dwivedi JN and Singh RB *Essential of Plant Techniques* Scientific Publications, Jodhpur
- Christian GD, Atomic Absorption Spectroscopy, Wiley and sons, New York.
- Jayaraman J, Laboratory Manual in Biochemistry, Wiley Eastrn Ltd., New Delhi.
- Gunasekaran P, Laboratory Manual in Microbiology, New Age India, New Delhi.
- Jensen WA, Botanical, Wiley Eastrn Ltd., New Delhi.

CORE COURSE II – INSTRUMENTATION

Course code : JSMPBT2
Hours per week : 6
Credit : 4
Internal Marks : 40
External Marks : 60

Unit I

Spectrophotometry – Beer–Lambert relationship; Instrumentation and applications of spectrophotometry; atomic absorption spectroscopy, flame emission photometry, infra-red resonance spectrophotometry.

Unit II

Electrophoresis – Introduction, Electrophoresis of enzymes, electrophoresis of proteins, nucleic acids. Principles, methodology and applications of Southern, Northern and Western blotting, Gel Documentation System.

Unit III

Chromatography - Introduction, principle and applications Liquid – solid chromatography, paper chromatography, Gas-liquid chromatography, HPLC, NMR

Unit IV

Centrifuge - Principles of centrifugation, types and applications of centrifuges

Unit V

Polymerase Chain Reaction – types and applications of PCR, primer, restriction enzymes, ligation, transformation, expression.

REFERENCES:

- Dwivedi JN and Singh RB *Essential of Plant Techniques* Scientific Publications, Jodhpur
- Christian GD, Atomic Absorption Spectroscopy, Wiley and sons, New York.
- Jayaraman J, Laboratory Manual in Biochemistry, Wiley Eastrn Ltd., New Delhi.
- Gunasekaran P, Laboratory Manual in Microbiology, New Age India, New Delhi.
- Jensen WA, Botanical, Wiley Eastrn Ltd., New Delhi.
- Rana, SVS*Biotechniques: Theory and Practice* Rastogi Publications, Meerut.
- Pattel LR, Bhalachander BL and Jeeraji H *An introduction to microtechnique,* S. Chand & Co. Pvt. Ltd., New Delhi.

CORE COURSE III – BIOINFORMATICS, BIOSTATISTICS AND RESEARCH METHODOLOGY

Course code : JSMPBT1
Hours per week : 6
Credit : 4
Internal Marks : 40
External Marks : 60

Unit I

Applications of computers in Biological research; Bioinformatics – list of software and their applications; Proteomics – 2D gel, analysis of putative proteins, trans-membrane domains, signal peptide, antibacterial properties. Genomics – definition, genome, functional genomics; Metabolomics – definition, types of metabolites, metabolome, NMR profile.

Unit II

Biostatistics – sampling methods and designs, presentation of data, measure of central tendency, measure of dispersion or spread, tests of significance, ANOVA.

Unit III

Bioethics - intellectual property rights, protection of IPR in India, protection of farmers rights, traditional knowledge, patents and bio-piracy.

Unit IV

Research – types, objective and approaches. Hypothesis; Definition, characteristics, types, significance. Literature collection, webbrowsing. Writing review of Literature and Journal article - for publication and proof correction. – Need for review of literature – consulting source material – different systems of citing references – journal abbreviations.

Unit V

Research report – introduction - components of research report – experimental design - tables and figures – typing – formatting.

REFERENCES:

- Gurumani N *Research Methodology for Biological Sciences*, MJP Publishers, Chennai
- Dwivedi JN and Singh RB *Essential of Plant Techniques* Scientific Publications, Jodhpur
- Christian GD, Atomic Absorption Spectroscopy, Wiley and sons, New York.
- Jayaraman J, Laboratory Manual in Biochemistry, Wiley Eastrn Ltd., New Delhi.
- Gunasekaran P, Laboratory Manual in Microbiology, New Age India, New Delhi.
- Jensen WA, Botanical, Wiley Eastrn Ltd., New Delhi.
- Rana, SVS*Biotechniques: Theory and Practice* Rastogi Publications, Meerut.
- Pattel LR, Bhalachander BL and Jeeraji H *An introduction to microtechnique,* S. Chand & Co. Pvt. Ltd., New Delhi.

Elective paper – Teaching and Learning Techniques

Course code	: JSMPBT4
Hours per week	: 6
Credit	: 4
Internal Marks	: 40
External Marks	: 60

Unit I - Computer Application

Computer system: Characteristics, parts and their functions – Different generations of computer – Operation of computer: Switching on/off/restart/ Mouse control, Use of key board and some functions of key – Information and communication technology (ICT): Definition, Meaning Features, Trends – Integration of ICT in teaching and learning – ICT applications: Using word processors, Spread sheets, Power point slides in the classroom – ICT for research: on-line journals.

Unit II - Communication

Communication: Definitions – Elements of Communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication: Spoken and Written; Non-verbal Communication. Skills of Communication: Listening , Speaking, Reading and Diction and Vocabulary – Classroom communication and dynamics.

Unit III – Communication Technology

Communication Technology: Bases, Trends and Development – skills of using Communication Technology – Computer Mediated Teaching, Multimedia, E-content – Satellite based communication: EDUSAT and ETV Channels. Communication through web: Audio and Video applications on the internet, Interpersonal communication through the web.

Unit IV – Pedagogy

Instructional Technology: Definition, Objectives and Types. Lecture with power point presentation – versatility of lecture technique – Demonstration: Characteristics, Principles, Planning Implementation and Evaluation – Teaching-learning Techniques: Team Teaching, Group discussion, seminar, workshop, symposium and panel discussion – modes of teaching: CAI, CMI and WBI.

Unit V – Teaching Techniques

Teaching Techniques: Definition, Meaning and Nature - Types of Teaching skills: Skill of set induction, Skill of stimulus variation, Explaining, probing Questions, Black Board Writing and Closure – Integration of Teaching – Evaluation of Teaching.

REFERENCES:

- Bala Rani Sharma (2007) Curriculum Reforms and Teaching Methods, Sarup and Sons, New Delhi.
- Don Skinner (2005) Teacher Training, Edinburgh University Press Ltd., Edinburgh.
- Information and Communication Technology in Education: A Curriculum for schools and programme for Teacher development, Jonathan Anderson and Tom Van Weart, UNESCO, 2002.
- Kumar KL (2008) Educational Technology, New Age International Publishers, New Delhi.
- Mangal SK (2002) Essential of Teaching - Learning and Information Technology, Tandon publications, Ludhiana.
- Michael D and William (2000) Integrated Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New York.

- Pandey Sk (2005) Teaching Communication, Commonwealth Publishers, New Delhi.
- Singh VK and Sudarshan KN (1996) Computer Education, Discovery Publishing Company, New York.
- Ram Babu A and Dandapani S (2006) Microteaching, Vol. I and II, Neelkammal Publications, Hyderabad.
- Sharma RA (2006) Fundamentals of Educational Technology, Surya Publications, Meerut.
- Vanaje M and Rajasekar S (2006) Computer Education, Neelkammal Publications, Hyderabad.

PROJECT
(Dissertation and *Viva - Voce*)

Course code : JSMPBT5D
Viva-Voce : 50