

SYLLABUS

FOR

B.Sc. SEMESTER PATTERN IN

BIOTECHNOLOGY V TH SEMESTER

GONDWANA UNIVERSITY

GADCHIROLI

INDIA

SESSION 2014-2015

Gondwana University, Gadchiroli
Teaching & Examination Scheme
Bachelor of Science
Three Year (SIX SEMESTER) Degree course

BIOTECHNOLOGY

1. There shall be total six Semesters. Total 3000 Marks.
2. The Division / Grade of the student shall be calculated on the basis of Science subjects as per the previous yearly pattern.
3. Each semester shall comprise of 90 teaching days.
4. Semester I and II shall be of 600 Marks
5. Semester III to IV shall be of 450 Marks
6. Semester V to VI shall be of 450 Marks
7. Biotechnology subject in each semester will comprise of
 - a. Two theory papers – 50 Marks each
 - b. One internal assessment based on two theory papers for 10 Marks each. Total 20 Marks.
 - c. One practical / Laboratory work – Total 30 marks
8. In addition to above Semester I and II will have
 - a. One compulsory English paper of 60 marks with 15 marks internal assessment.
 - b. One second language paper (Supp Eng / Hindi / Marathi / Urdu / etc) of 60 Marks with 15 marks internal assessment.
9. The Internal assessment shall be conducted by the University approved teachers in the relevant subjects.
10. The internal assessment shall be done by the respective college one month prior to the final exam of each semester. The Marks shall be sent to the university immediately after the internal assessment is over.
11. The pattern of Internal assessment and guidelines for the same shall be prepared by the respective subject Board of Studies
12. All Theory papers shall be divided into four units. Each unit shall be covered in 7.5 hours.
13. The theory question papers shall be of 3 hours duration and comprise of 5 questions with internal choice and with equal weightage to all units. (as per the previous pattern)
14. Practical exam shall be of 8 hours duration for one day.
15. Table of teaching and examination scheme attached.

Teaching & Examination Scheme

Bachelor of Science

Three Year (SIX SEMESTER) DEGREE COURSE

B. Sc. Part III (Semester V and VI)

S. No.		Subject	Teaching scheme			Examination scheme										
			Th + Tu (Periods)	Pr (Periods)	Total Periods	Theory						Practical			Total Marks / credits (Th, Pr, IA)	
						Duration Hrs	Max Marks Th paper	Min Passing Marks Th	Max Marks Int Assessment	Min Passing IA	Total	Min passing Marks	Duration Hrs	Max marks practical		Min passing marks
1	Semester-V	Biotechnology Paper I- Genetic Engineering	3+@	-	6+@	3	50	18	10	4	120	22	-	-	-	150
2		Biotechnology Paper II-Plant Biotechnology	3+@	-		3	50	18	10	4		22	-	-	-	
3		Practical	-	6	6	-	-	-	-	-	-	-	6-8*	30	11	
4	Semester-VI	Biotechnology Paper I- Environmental Biotechnology	3+@	-	6+@	3	50	18	10	4	120	22	-	-	-	150
5		Biotechnology Paper II-Animal Biotechnology	3+@	-		3	50	18	10	4		22	-	-	-	
6		Practical	-	6	6	-	-	-	-	-	-	-	6-8*	30	11	
Grand Total of Semester V & VI: 450 each semester = TOTAL - 450 Marks per semester																

Note: Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment; @ = Tutorials wherever applicable; * = If required, for two days.

B.Sc. Biotechnology

Semester-V

Paper -I Genetic Engineering

Unit 1- Introduction of Genetic Engineering

- A. Basics of genetic engineering
- B. DNA manipulation enzymes: nucleases, ligases, polymerases alkaline phosphatase, T4 polynucleotide kinase.
- C. Restriction endonuclease enzyme and their types
- D. Isolation of DNA- lysis of cells, direct purification of DNA
- E. Generation of DNA fragments for cloning- cDNA, Genomic DNA library
- F. Amplification of DNA: polymerase chain reaction (PCR)

Unit 2- Cloning Vectors and r-DNA Preparation

- A. Plasmid vectors (pBR322, pUC 18/19)
- B. Cosmid vectors
- C. Bacteriophage vector (lambda phage)
- D. Phagemid vector
- E. Artificial chromosome (YAC, BAC)
- F. Insertion of foreign DNA into a vector (use of linkers, adaptors and homopolymer tailing)

Unit 3- Insertion of rDNA into host cells

- A. Transformation
- B. Transfection- calcium phosphate coprecipitation, DEAE-dextran mediated transfection
- C. Particle gun method
- D. Lipofection
- E. Microinjection
- F. Screening of recombinants- direct section and Blue-White selection method

Unit 4- Application of rDNA

- A. Gene therapy-somatic gene therapy
- B. DNA fingerprinting
- C. Interferon production
- D. Disease diagnosis- antenatal diagnosis, genetic counseling
- E. Monoclonal antibodies production

B.Sc. Biotechnology
Semester-V

Paper -II Plant Biotechnology

Unit 1- Introduction to Plant Tissue Culture

- A. Introduction and history of cell and tissue culture technique.
- B. Plant tissue culture media (composition and preparation and its role in media)
- C. Role of growth hormone (auxins, cytokinins and others)
- D. Callus and suspension cultures: initiation and maintenance, single cell clones.

Unit 2- Techniques of Plant Tissue Culture

- A. Shoot tip culture: rapid clonal propagation and production of virus free plants.
- B. Organogenesis. embryogenesis
- C. Embryo culture and embryo rescue.
- D. Protoplast isolation, culture and fusion.
- E. Selection and regeneration of hybrid plants, cybrid.
- F. Production of haploid plants: anther and pollen culture

Unit 3- Plant Transformation Technology

- A. Basis of tumor formation, hairy root.
- B. General features of Ti and Ri plasmids.
- C. Mechanism of DNA transfer, role of virulence genes, use of Ti and Ri as vectors
- D. Methods of nuclear transformation, biological and physical transformation methods.
- E. Brief idea of chloroplast transformation.

Unit 4- Application of Plant Tissue Culture

- A. Herbicide resistance -phosphinothricine glyphosate, sulfonyl urea
- B. Insect resistance-Bt genes.
- C. Virus resistance, coat protein mediated nucleocapsid gene.
- D. Fungal resistance, disease resistance, nematode resistance.
- E. Improvement of crop yield and quality - long shelf life of fruits and flowers.
- F. Male sterile lines.

B.Sc. Biotechnology Semester-V

PRACTICALS

Genetic Engineering and Plant Biotechnology

1. *Isolation of genomic DNA
2. *Isolation of Plasmid DNA
3. Isolation of λ phage DNA
4. Isolation of Chloroplast DNA
5. *Restriction digestion of DNA
6. Construction of recombinant DNA
7. DNA amplification by PCR method
8. Preparation of plant tissue culture media.

9. Surface sterilization.
10. *Protoplast fusion and culture
11. *Establishment of callus culture
12. Establishment of suspension cell culture
13. Establishment of regeneration from callus cells.
14. *Anther culture: production of haploids
15. Embryo culture
16. Organ Culture
17. Cytology of callus.
18. Hardening of tissue culture raised plants

Note: -

1. Underlined practicals are considered as major practicals.
2. Practical with asteric mark are compulsory practicals.
3. At least 10 (4 major and 6 minor Compulsory) practical to be carried out in a semester.
4. The theory involved with each practical must be taught before conducting the practical.

Distribution of marks during semesterwise practical examinations of B.Sc. III (Semester V)

1. One major experiment-		10
2. Two minor experiment-	2 X 5=	10
3. Viva voce-		5
4. Practical record-		5

Total		30

Duration of exam will be 8 hrs. on a day

**TEXT BOOKS & REFERENCES FOR THEORY AND PRACTICALS FOR B.Sc.
semester V:**

BIOTECHNOLOGY, U. SATYANARAYAN, BOOKS AND ALLIED, 2007

1. BIOTECHNOLOGY, B. D. SINGH, KALYANI PLB, 2007
2. COMPREHENSIVE BIOTECHNOLOGY, RAMAWAT K. G., SHAILY GOYAL, S. CHAND, 2001
3. TECHNIQUES IN LIFE SCIENCES, DR. D. B. TEMBHARE, HIMALAYA PUBLICATION, 2004
4. PLANT CELL CULTURE, R. N. DIXON, OXFORD UNI. PRESS NEWYORK, 2004
5. ADVANCES IN BIOTECHNOLOGY, S. N. JOGDAND, HIMALAYA PUBLISHING HOUSE, 2007
6. BIOTECHNOLOGY, B. D. SINGH, KALYANI PUBLICATION LUDHIANA 2007
7. BIOTECHNOLOGY, MOHAN P. ARORA, HIMALAYA PUBLISHING HOUSE, 2007
8. GENE BIOTECHNOLOGY, S.N. JOGDAND, HIMALAYA PUBLISHING HOUSE, 2007
9. MOLECULAR CLONING VOL-I, SAMBROOK AND RUSSEL, COLD SPRING HARBOR LAB. PRESS, 2007
10. GENES VI, BENJAMIN LEWIN, OXFORD UNI. PRESS NEWYORK, 1998
11. MOLECULAR BIOLOGY-I RECOMBINANT DNA, T. A. BROWN, ACADEMIC PRESS, 1998
12. BIOTECHNOLOGY A LAB. MANUAL, JEFFERY M. BECKER, ACADEMIC PRESS, 1998
13. PLANT BIOTECHNOLOGY-PRACTICAL MANUAL, C.C.GIRI, ARCHANA GIRI, I.K.INT.PUB HOUSE 2007
14. AN INTRODUCTION TO MOLECULAR BIOTECHNOLOGY, MICHEL WINK, WILEY VCH VERLOG PUB. 1999
15. PLANT BIOTECHNOLOGY AND ITS APPLICATION, ASHAVINI KUMAR, SHEKHA ROY, I.K.INT.PUB HOUSE 2007
16. GENOME, ALAM BERNOT, JOHN WILLEY AND SONS 2007
17. PLANT PHYSIOLOGY, LINCOLN TALZ, SINADUAR ASSOCIATES, 2006
18. PLANT BIOTECHNOLOGY, K.G.RAMAWAT, S.CHAND, 2008
19. TEXT BOOK OF BIOTECHNOLOGY, R.C.DUBEY, S.CHAND, 2009
20. TECHNIQUES FOR ENGINEERING GENES, BUTTERWORTH, HEINEMANM, OPEN UNIVERSITY PUBL, 2004
21. BIOTECHNOLOGY LABORATORY COURSE, BUCKER, OPEN UNIVERSITY PUBL, 2004
22. INVITRO CULTIVATION OF OF ANIMAL CELLS, BUTTERWORTH, HEINEMANM, OPEN UNIVERSITY PUBL, 2004
23. TISSUE CULTURE, RAJENDRA REDDY, J.P.ABHAI SHANKAR, COMMAN WEALTH PUB, 2008
24. EXPERIMENTAL BIOTECHNOLOGY, MADHAV SHARMA, NIRMAL TRIPATR, CRESCENT PUB CORPORATION, 2008
25. GENETICS, MONROE W. STRICKBERGER, PEARSON EUD., 2008
26. EXPERIMENTS IN MICROBIOLOGY, PLANT PHYSIOLOGY AND BIOTECHNOLOGY, K. ANEJA, 2007
27. BIOCHEMICAL METHODS, SADASHIVAM, 2006
28. TEXT BOOK OF PRACTICAL BOTANY VOL-I AND II, B. P. PANDEY, 2008, S. CHAND, DELHI
29. TEXT BOOK OF BOTANY, S. N. PANDEY AND P. S. TRIVEDI, 2008, VIKAS PUBLICATION HOUSE, DELHI
30. GENETICS, P.J. RUSSEL, BENJAMIN/CUMMINGS.
31. PRINCIPLES OF GENETICS, E.J. GARDNER, 2006, JOHN W.H. SONS INC.
32. PRINCIPLES OF GENETICS, D.P. SUNTAN & M.J. SIMMONS, 2005, JOHN WILEY & SONS INC
33. GENETICS, MONROE W. STRICKBERGER, 2008, PEARSON EUD.
34. GENETICS- C.B. PAWAR, 2005, S. CHAND, NEWDELHI.
35. GENETICS- STRICKBERGER, 3RD EDI., PHI LEARNING PVT. LTD. NEWDELHI.

