HINDI MAHAVIDYALAYA

(AUTONOMOUS & NAAC RE-ACCREDITED)

(Affiliated to Osmania University)

Nallakunta, Hyderabad-44

B.SC. III YEAR SEMESTER V & VI

DEPARTMENT OF BIOTECHNOLOGY

2018-2019

2 pages

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
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Department of Genetics
Osmania University, Hyderabad-07.

7/7/18

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1. Dr. Chaithri
   Asst. Prof.,Department of Biotechnology & Genetics
   Osmania University, Hyderabad

2. Mrs. Sandhya Rani
   Department of Biotechnology
   Andhra Mahila Sabha Arts & Science College (Autonomous)
   Osmania University Campus, Hyderabad

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
COMPOSITION OF THE BOARD OF STUDIES IN AN AUTONOMOUS COLLEGE

Composition: Department of Biotechnology

1. Head of the department concerned (Chairman)
   Mrs. Nita Kulkarni – Department of Biotechnology

2. The entire faculty of each specialization.
   Mrs. Nita Kulkarni

3. One expert to be nominated by the vice-chancellor from a panel if six recommended by the College Principal.

   Prof. A. Roja Rani, Chairman, BOS, Dept. of Biotechnology & Genetics,
   Osmania University

4. Two experts in the subject from outside the college to be nominated by the Academic Council.

   1. Dr. Chaithri, Asst. Prof, Dept. of Biotechnology & Genetics,
      Osmania University, Hyd.

   2. Mrs. Sandhya Rani, Department of Biotechnology,
      Andhra Mahila Sabha Arts & Science College, Hyd.

(a) Experts from outside the College whenever special courses of studies are to be formulated-to be nominated.

(b) Other members of staff of the same faculty.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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DEPARTMENT OF BIOTECHNOLOGY
BOARD OF STUDIES
AGENDA OF THE MEETING

SATURDAY – 07TH JULY 2018

3.1. Welcome address by the chair.

3.2. Details of credit based choice system.

3.3. Discussion on Common Core Syllabus.

3.4. Marks allotted for Internal and end Semester exams.

3.5. Discussion on Semester Exam Model Paper & Internal Exam Model Paper

3.6. Discussion on Practical Exam Model Paper

3.7. Panel of Examiners

3.8. Any other matter

3.9. Vote of Thanks

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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DEPARTMENT OF BIOTECHNOLOGY
BOARD OF STUDIES
ACADEMIC YEAR – 2018-19
MINUTES OF BOS MEETING

BOS meeting of the Department of Biotechnology was held on 07th July 2018 at 11:30AM.

The following members were present

Prof. A.Roja Rani	-	University Nominee
Mrs. Nita Kulkarni	-	Chairperson
Dr. Chaithri	-	Member
Mrs. Sandhya Rani	-	Member

3.1. Welcome address by the chair

The chair welcomed the University Nominee, Ex-officio Member BOS, O.U Department of Biotechnology and Members of B.O.S.

3.2. Details of choice based credit system.

Members were informed that TSCHE has referred that from the academic year 2016-17 autonomous institutions have to follow CBCS i.e. From the Academic Year 2016-17 Osmania University has instructed all the Degree colleges including Autonomous Degree colleges to follow CBCS under which after passing the exam student will get the Grade in the Final Result. 3 Credits are given for theory paper and 1 credit is given for practical in semester V & VI of B.Sc.III year.

3.3. Discussion and Distribution of Common Core Syllabus.

i. Members were informed by the chair that Department of Biotechnology, Hindi Mahavidyalaya is following common core syllabus prescribed by Osmania University for B.Sc. III Year, Semester V and VI.

ii. The syllabus comprises of 3 units each of core and elective. There are two electives (A & B) for each semester from which the student can opt for any one.

Syllabus copy for both the semesters is enclosed.

Syllabus was approved by the Members of BOS.

3.4. Marks allotted for Internal and End Semester exams.

1. Internal assessment is of 15 marks. In each Semester two internal assessments of 15 Marks will be conducted and an average of both the internal assessments will be added in the marks of theory exam.
2. Theory Question paper is of 60 marks.
3. Total allotted marks are 75.
4. Internal assessment is of 10 marks for SEC/GE. One internal assessment of 10 Marks will be conducted and added in the marks of theory exam.
5. Theory Question paper for SEC/GE is of 40 marks.
6. Total allotted marks are 50 for each SEC/GE.

The distribution of marks was approved by the Members of BOS.

3.5. Discussion on Pattern and Model Paper of Semester exam and Model Paper of Internal Exam

1. It was informed by the department that as per Osmania University CBCS guidelines there is no assignment for 3 credits core and elective papers. In each Semester Two Internal exams will be conducted for 15 marks. The internal assessment will have three sections.

   Section – A 10 Multiple choice questions, each carries ½ marks (10X½ = 5M)
   Section– B 10 Fill in the blanks, each carries ½ marks (10X ½ = 5M) and
   Section– C 5 short notes, each 1mark (5X1=5)

   Average of marks of these two internal exams will be taken.

2. Semester exam will be conducted as per the Almanac which will be provided by the exam branch. Internal exam duration will be 30Mnts and Semester exam duration will be of 3 hrs.

3. Model Question paper for Semester V and Semester VI was discussed. Theory paper for each Semester will have 2 sections.

   (i) Section A contains 8 short Questions. The student has to answer five questions. Each Question carries 3 Marks (5X3=15 Marks).

   (ii) Section B contains 3 Essay type Questions with internal choice. Each Question carries 15 Marks (3X15=45 Marks).

4. Model Question paper for SEC Semester V and Semester VI was discussed. Theory paper for each SEC will have 2 sections.
   (i) Section A contains 2 short Questions. The student has to answer TWO questions. Each Question carries 5 Marks (2X5=10 Marks)
   (ii) Section B contains 2 Essay type Questions with internal choice. Each Question carries 15 Marks (2X15=30 Marks)

- Pattern of Model Theory Question Papers for DSC (V &VII), DSE (VI & VIII A/B), and SEC Paper 3 and Paper 4 &GE (1 & 2) are enclosed.
- Pattern of Model Theory Question Papers for DSC, DSE, GE &SEC was approved by Members of BOS.

3.6. Discussion on Practical Exam Model paper.

It was decided in BOS meeting that 50 Marks Practical Exam of 3 hrs will be held in each Semester (V &VI) for DSC & DSE and 1 credit will be given for Practical in each Paper.

- It is decided that the practical examinations held for B.Sc. II years (Semester III & IV) from the academic year 2017-18 onwards will have the pattern of 25 marks scheme and the credits will remain the same i.e. 1 credit. The duration of the exam will be 2 hours.
- Pattern of Model Practical Question Papers for Semester – V(DSC & DSE) & Semester VI (DSC & DSE) & Semester III & IV are enclosed.
- Pattern of Model Practical Question Papers was approved by Members of BOS

3.7. Panel of Examiners

The panel of examiners was approved by the members.

- List is enclosed

3.8. Any other matter.

The Semester I, II, III & IV syllabus is approved & followed for the Academic year 2018-2019.There is no changes in the syllabus & pattern.

3.9. Vote of Thanks

Meeting concluded with the Vote of Thanks by Mrs.Nita Kulkarni

Chairperson | University Nominee | Members | Principal

Prof. A. Roja Rani
Chairman, Board of Studies (Biotechnology)
Department of Genetics
Osmania University, Hyderabad-07.

1. PKChaitanya
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I/C. PRINCIPAL
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Nallakunta, Hyderabad-44

ACADEMIC YEAR 2018-19

CBCS STRUCTURE for 2016-17 BATCH

B.SC. BIOTECHNOLOGY, MICROBIOLOGY, CHEMISTRY

THIRD YEAR SEMESTER- V					Semester End exam		4 Continuous Internal Evaluation			
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks	Total	2 HRS
BS501	MOLECULAR PLANT BREEDING	SEC-3	2	2	2	40	30 min	10	50	-
BS502	FUNDAMENTALS OF BIOTECHNOLOGY	GE-1	2	2	2	40	30 min	10	50	-
BS503	BIOTECHNOLOGY – V (MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY)	DSC-1E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS504	MICROBIOLOGY - V (APPLIED MICROBIOLOGY)	DSC-2E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS505	CHEMISTRY-V	DSC-3E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS506	BIOTECHNOLOGY – VI A/B	DSE- 1E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
	A-PLANT BIOTECHNOLOGY									
	B- MEDICAL BIOTECHNOLOGY									
BS507	MICROBIOLOGY- VI	DSE-2E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
	A-IMMUNOLOGY									
	B- PHARMACEUTICAL MICROBIOLOGY									
BS508	CHEMISTRY-VI	DSE-3E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
A	INSTRUMENTAL METHOD OF ANALYSIS									
B	INDUSTRIAL CHEMISTRY AND CATALYSIS									
			34	28		440		110	850	-

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B.SC. III YEAR BIOTECHNOLOGY

SEMESTER – V

PAPER V

DISCIPLINE SPECIFIC CORE THEORY

MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY

Code: BS 505

Instruction	
Theory Classes	3 Hrs/Week
Practical Classes	2 Hrs/Week
Credit for Theory	3
Credit for Practical	1
Duration of Semester Examination	3 Hrs
Duration of Internal Examination	30 Min
Semester Examination Marks	60 Marks
Internal Examination Marks	15 Marks

Objective: The course is aimed at exposing the students to some basic knowledge in MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY

UNIT - I: Gene expression and regulation in prokaryotes

1.1 Structure of prokaryotic gene (promoter, initiator & terminator regions), Structure and functions of RNA polymerase.

1.2 Transcription mechanism- initiation, elongation & proof reading, termination (rho independent & rho dependent); basic concept of reverse transcription

1.3 Genetic code- properties, deciphering of genetic code, wobble hypothesis, aminoacylation

1.4 Translation mechanism- initiation, elongation and termination

1.5 Gene regulation: Negative & Positive control

1.6 Operon conceptLac operon, CAP-cAMP system, Arabinose operon

UNIT - II: Gene expression and regulation in eukaryotes

2.1 Structure of eukaryotic gene (promoter, exons, introns, terminator, enhancer & silencer)

2.2 Transcriptional machinery in eukaryotes (RNA polymerases),structures and transcriptional factors (basic, upstream &regulatory)

2.3 Transcription- initiation (formation of transcriptome), elongation and termination

2.4 Post-transcriptional modifications- capping, polyadenylation, Splicing (self &protein mediated) and alternative splicing

2.5 Translation- initiation, elongation and termination

2.6 Regulation of gene expression in eukaryotes- mating types in yeast

UNIT - III: Recombinant DNA Technology

3.1 Enzymes useful in molecular cloning: Restriction endonuclease, DNA ligases, polynucleotide kinase, klenow enzyme, DNA Polymerase-I,reverse transcriptase, alkaline phosphatase, terminal nucleotidyltransferase.

3.2 Cloning Vectors: PBR 322, Bacteriophage, Cosmid, Phagemid, Shuttle vectors

3.3 Gene transfer techniques: Physical, Chemical and Biological methods.

3.4 Labeling nucleic acids and blotting techniques (Southern, Northern, Western, Zooblot).

3.5 Polymerase Chain Reaction and its applications.

3.6 Applications of recombinant DNA technologies- Agriculture, Medicine.

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B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – V
PAPER V
PRACTICALS
MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY

CODE : BS505P

1. Isolation of DNA from bacterial cells
2. Isolation of plasmid DNA
3. Agarose gel electrophoresis of DNA
4. Quantification of DNA by Spectrophotometer
5. Separation of proteins by SDS-PAGE
6. Polymerase Chain Reaction
7. Restriction digestion of DNA
8. Bacterial Transformation (Selection of transformants with blue white selection)

REFERENCE BOOKS

1. Molecular Biology of the cell. Alberts, B; Bray, D, Lews, J., Raff, M., Roberts, K and Watson, J.D. Garland publishers, Oxford
2. Molecular Biology of the Gene - By Watson, Hopkins, Goberts, Steitz and Weiner (Pearson Education)
3. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
4. Gene Structure & Expression - By J.D. Howkins, Publ: Cambridge
5. Test Book of Molecular Biology - By K.S. Sastry, G. Padmanabhan& C. Subramanyan, Publ: Macmillan India
6. Principles of Gene Manipulation - By R.W. Old & S.B. Primrose, Publ: Blackwell
7. Genes - By B. Lewin - Oxford Univ. Press
8. Molecular Biology &Biotechnol. - By H.D. Kumar, Publ: Vikas
9. Methods for General & Molecular Bacteriology - By P. Gerhardf et al., Publ: ASM
10. Molecular Biotechnology - By G.R. Click and J.J. Pasternak, Publ: Panima
11. Genes and Genomes – By Maxine Singer and Paul Berg
12. Molecular Biology - By D. Freifelder, Publ: Narosa
13. Molecular biology. By;F.Weaver. WCB/McGraw Hill.
14. Gene, Genomics and Genetic Engineering - By Irfan Ali Khan and AtiyaKhanum (Ukaaz Publications).

Chairperson

University Nominee

Prof. A. Roja Rani
Chairman, Board of Studies (Biotechnology)
Department of Genetics
Osmania University, Hyderabad-07.

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(AUTONOMOUS)

B.SC.BIOTECHNOLOGY III YEAR

SEMESTER – V

DSC – PAPER - V

THEORY MODEL QUESTION PAPER

Time: 3hrs **Max. Marks: 60**

SECTION A

I. Write short notes on any Five of the following: **5 X 3 = 15 Marks**

1. A Question from Unit I
2. A Question from Unit II
3. A Question from Unit III
4. A Question from Unit I
5. A Question from Unit II
6. A Question from Unit III
7. A Question from any of I,II,III units
8. A Question from any of I,II,III units

SECTION B

II. Essay Questions. Answer all the Questions **3 X 15 = 45 Marks**

9. (a) A Question from Unit I
   (OR)
   (b) A Question from Unit I

10. (a). A Question from Unit II
    (OR)
    (b). A Question from Unit II

11. (a) A Question from Unit III
    (OR)
    (b) A Question from Unit III

Chairperson University Nominee Members Principal

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(AUTONOMOUS)
B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – V
DSC (PAPER V)
PRACTICAL MODEL QUESTION PAPER

Time – 3 Hrs **Total Marks: 50 Marks**

I.	Minor Experiment	10 Marks
II.	Major Experiment	24 Marks
III.	Spotting	06 Marks
	A B C	
IV.	Record and Viva voce	10 Marks

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – V
PAPER-VI
DISCIPLINE SPECIFIC ELECTIVE THEORY (A)
PLANT BIOTECHNOLOGY

Code: BS 508	
Instruction	**3 Hrs/Week**
Theory Classes	**2 Hrs/Week**
Practical Classes	**3**
Credit for Theory	**1**
Credit for Practical	**3 Hrs**
Duration of Semester Examination	**30 Min**
Duration of Internal Examination	**60 Marks**
Semester Examination Marks	**15 Marks**
Internal Examination Marks	

Objective: The course is designed to enhance the knowledge of students about PLANT BIOTECHNOLOGY.

UNIT-I: Basics of Plant Biotechnology

1.1 Introduction to plant tissue culture, totipotency of plant cells (Dedifferentiation, redifferentiation, regeneration of whole plant)

1.2 Nutritional requirements for plant tissue culture: nutrient media macronutrients and micronutrients, media additives (carbon source, vitamins, amino acids)

1.3 Plant growth regulators (cytokinins, auxins, gibberellins).

1.4 Preparation of media, selection and surface sterilization of explants, inoculation, incubation (temperature and light regime), regeneration of plants.

1.5 Initiation of callus cultures and cell suspension cultures

1.6 Regeneration of plants (Organogenesis and embryogenesis)

UNIT- II: Applications of Plant Tissue Culture

2.1. Meristem culture and production of disease free plants

2.2. Micropropogation of elite ornamental, horticultural plants via organogenesis and somatic embryogenesis, encapsulation and production of synthetics seeds.

2.3. Cell suspension cultures (batch and continuous culture) for production of secondary metabolites

2.4. Embryo culture and embryo rescue; Protoplast culture and fusion, Development of somatic hybrids and cybrids and their applications

2.5. Somaclonal variation and their applications; production of haploids, Anther and pollen culture

2.6. Methods of cryopreservation for conservation of plant germplasm

UNIT-III: Transgenic plants and applications

3.1. Herbicide resistant plants: production of glyphosate tolerant plants

3.2. Insect resistant plants: Bt corn, Bt cotton

3.3. Virus resistant plants: Transgenic plants with viral coat protein and viral nucleoprotein

3.4. Transgenic plants with enhanced nutritive values: Vitamin A, Vitamin E

3.5. Stress tolerant plants : Overview of Drought and Light stress

3.6. Transgenic plants as Bioreactor: Antibody production in plants, Biodegradable plastics

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(AUTONOMOUS)
B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – V
PAPER-VI
PRACTICALS (A)
PLANT BIOTECHNOLOGY

CODE: BS508A (P)

1. Preparation of media for tissue culture
2. Surface sterilization methods of explants (seed leaf, inter node &root) and inoculation
3. Establishment of callus cultures –from carrot
4. Cell suspension cultures
5. Protoplast isolation and culture
6. Antherculture
7. Agrobacterium mediated transformation
8. Synthetic seeds production

REFERENCE BOOKS

1. Plant Tissue Culture and its Biotechnological Applications By W. Barz, E. Reinhard, M.H. Zenk
2. Plant Tissue Culture By Akio Fujiwara
3. Frontiers of Plant Tissue Culture By Trevor A. Thorpe
4. In vitro Haploid Production in Higher Plants by S. Mohan Jain, S.K. Sopory, R.E. Veilleux
5. Plant Tissue Culture : Theory and Practice By S.S. Bhojwani and A. Razdan
6. Plant Cell, Tissue and Organ Culture, Applied and Fundamental Aspects By Y.P.S. Bajaj and A. Reinhard

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(AUTONOMOUS)
B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – V
PAPER-VI
DISCIPLINE SPECIFIC ELECTIVES (B)
MEDICAL BIOTECHNOLOGY

Code: BS508B	
Instruction	**3 Hrs/Week**
Theory Classes	**2 Hrs/Week**
Practical Classes	**3**
Credit for Theory	**1**
Credit for Practical	**3 Hrs**
Duration of Semester Examination	**30 Min**
Duration of Internal Examination	**60 Marks**
Semester Examination Marks	**15 Marks**
Internal Examination Marks	

Objective: The course is designed to enhance the basic knowledge of students about MEDICAL BIOTECHNOLOGY.

UNIT-I : Methods for diagnosis of human diseases

1.1 Karyotyping of human chromosomes

1.2 Chromosome banding – G-banding and R-banding technique

1.3 Inheritance patterns in Man – Pedigree analysis

1.4 Prenatal diagnosis - Invasive techniques – Amniocentesis, Chorionic Villi Sampling (CVS); Non-invasive techniques – Ultrasonography

1.5 Diagnosis using monoclonal antibodies - ELISA

1.6 DNA/RNA based diagnosis – HBV, HIV

UNIT-II: Inherited disorders

2.1 Chromosomal disorders caused due to structural chromosomal abnormalities (Deletions, duplications, Translocations)

2.2 Chromosomal disorders caused due to numerical chromosomal abnormalities (autosomal and allosomal)

2.3 Monogenic disorders (autosomal and X-linked diseases)

2.4 Mitochondrial diseases – LHON, MERRF

2.5 Multifactorial conditions – Diabetes &Hypertension; Single Nucleotide Polymorphisms in common diseases: hypertension (Angiotensin Converting Enzyme gene)

2.6 Cancer – types, molecular basis of colon cancer and breast cancer

UNIT-III : Therapeutic approaches for human diseases

3.1 Gene therapy – ex vivo and in vivo gene therapy; somatic and germline gene therapy

3.2 Strategies of gene therapy: gene augmentation – ADA deficiency; Cystic Fibrosis & Familial hyper cholesterolemia

3.3 Stem cells – potency definitions; embryonic and adult stem cells; applications of stem cells – cell based therapies and regenerative medicine

3.4 Encapsulation technology and therapeutics-Diabetes

3.5 DNA based vaccines, subunit vaccines.– Herpes Simplex Virus, Recombinant attenuated vaccines– Cholera

3.6 Basic concept of Nutrigenomics and Pharmacogenomics

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B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – V
PAPER-VI
PRACTICALS(B)
MEDICAL BIOTECHNOLOGY

CODE: BS 508B(P)

1. Karyotyping of normal & abnormal human chromosome sets
2. Human pedigree analysis
3. Estimation of C-reactive protein
4. Dot ELISA
5. Genotyping of candidate genes for diseases by RFLP
6. Detection of DNA damage by comet assay
7. Stem cell isolation
8. Cell culture technique

REFERENCE BOOKS

1. Medical Biotechnology-Pratibha Nallari, V.Venugopal Rao-Oxford Press
2. Introduction to Human Molecular Genetics – J.J Pasternak, John Wiley Publishers.
3. Human Molecular Genetics –Tom Strachen and A P Read, Bios Scxientific Publishers
4. Human Genetics Molecular Evolution, McConkey
5. Recombinant DNA Technology, AEH Emery
6. Principles and Practice of Medical Genetics, I, II, III Volumes by AEH Edts. Emery
7. Molecular Biotechnology.Glick and Pasternak

Chairperson

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(AUTONOMOUS)
B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – V
DSE -PAPER VI A / B

THEORY MODEL QUESTION PAPER

Time: 3hrs Max. Marks: 60

SECTION A

I. Write short notes on any Five of the following: 5 X 3 = 15 Marks

1. A Question from Unit I
2. A Question from Unit II
3. A Question from Unit III
4. A Question from Unit I
5. A Question from Unit II
6. A Question from Unit III
7. A Question from any of I,II,III units
8. A Question from any of I,II,III units

SECTION B

II. Essay Questions. Answer all the Questions 3 X 15 = 45 Marks

9. (a) A Question from Unit I
   (OR)
   (b) A Question from Unit I

10.(a). A Question from Unit II
   (OR)
   (b). A Question from Unit II

11.(a) A Question from Unit III
   (OR)
   (b) A Question from Unit III

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(AUTONOMOUS)
B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – V
DSE (PAPER VI) A / B
PRACTICAL MODEL QUESTION PAPER

Time – 3 Hrs

Total Marks: 50 Marks

V. Minor Experiment — 10 Marks

VI. Major Experiment — 24 Marks

VII. Spotting — 06 Marks

A B C

VIII. Record and Viva voce — 10 Marks

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(AUTONOMOUS)

B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – V
PAPER-3
SKILL ENHANCEMENT COURSE
MOLECULAR PLANT BREEDING

Code: BS 501	
Instruction	
Theory Classes	**2 Hrs/Week**
Duration of Semester Examination	**2 Hrs**
Duration of Internal Examination	**30 Min**
Semester Examination Marks	**40 Marks**
Internal Examination Marks	**10 Marks**

UNIT-I: Molecular markers in Plant Breeding

1. Principles of plant breeding : Breeding methods for self and cross pollinated crops
2. Limitations of conventional breeding
3. Development of molecular markers (RFLP, RAPD, SSRs, ISSRs, SNPs)
4. Construction of molecular maps and linkage analysis
5. Mapping populations for QTLs using molecular markers
6. Use of molecular markers in plant breeding

UNIT-II: Marker Assisted Selection (MAS) for Plant Breeding

1. Selection of traits and markers for MAS
2. Marker -- Trait association
3. Marker assisted backcrossing and recurrent selection
4. Marker assisted hybrid breeding
5. Marker assisted gene pyramiding
6. Improved varieties/germplasm using MAS

Reference Books

1. Gupta PK. 2010. Plant Biotechnology. Rastogi Publications.
2. Chawla HS. 2011. Introduction to Plant Biotechnology. Oxford and IBH Publishing Co. Pvt Ltd.
3. Chittaranjan K. 2006-07. Genome Mapping and Molecular Breeding in Plants. Vols. I-VII. Springer.16
4. Newbury HJ. 2003. Plant Molecular Breeding. Blackwell Publ.Weising K, Nybom H, Wolff K & Kahl G. 2005. DNA Fingerprinting in Plants: Principles, Methods and Applications. Taylor & Francis.

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B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – V
PAPER-3

Credits – 2

SEC - THEORY MODEL PAPER

TIME: 2 HOURS

MAX MARKS: 40

SECTION-A

Answer the following Questions in short: 5 x 2 = 10 Marks

1. Question from Unit -I
2. Question from Unit -II

SECTION-B

Answer the following essay type questions: 2 x 15 = 30 Marks

3. (a) Question from Unit –I
   Or
   (b) Question from Unit –I

4. (a) Question from Unit –II
   Or
   (b) Question from Unit –II

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B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – V
GENERIC ELECTIVE 1
FUNDAMENTALS OF BIOTECHNOLOGY

Code: BS 502	
Instruction	**2 Hrs/Week**
Theory Classes	**2 Hrs**
Duration of Semester Examination	**30 Min**
Duration of Internal Examination	**40 Marks**
Semester Examination Marks	**10 Marks**
Internal Examination Marks	

Objective: The course is designed to enhance the basic knowledge of students about BIOTECHNOLOGY.

UNIT-I: Biotechnology

1.1. Biotechnology, need for biotechnology, current uses of biotechnology

1.2. Historical developments in biotechnology

1.3. Cells- types of cells, cell reproduction, stem cells

1.4. Genes, chromosomes, process of transcription and translation

1.5. Genome sequencing – DNA sequencing

UNIT-II: Producing Genetically modified organisms

2.1. Genetically modified microorganisms – process of genetic engineering
2.2. Genetic modification in plants – advantages of plant cloning, methods of plant cloning
2.3. Genetic modification in animals – animal cloning, cloning method
2.4. Consumer concerns about Biotechnology – food issues, governing of biotechnology
2.5. Ethical issues in Biotechnology – patents on life, bio piracy

Reference Books

1. A Textbook of Biotechnology by B.D. Singh
2. A Textbook of Biotechnology by H.K.Das (Wiley Publications)

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SEMESTER – V

Credits – 2

GE 1- THEORY MODEL PAPER

TIME: 2 HOURS MAX MARKS: 40

SECTION-A

Answer the following Questions in short: 5 x 2 = 10 Marks

1. Question from Unit -I
2. Question from Unit -II

SECTION-B

Answer the following essay type questions: 2 x 15 = 30 Marks

3. (a) Question from Unit –I
   Or
   (b) Question from Unit –I

4. (a) Question from Unit –II
   Or
   (b) Question from Unit –II

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ACADEMIC YEAR 2018-19

CBCS STRUCTURE for 2016-17 BATCH

B.SC. BIOTECHNOLOGY, MICROBIOLOGY, CHEMISTRY

THIRD YEAR SEMESTER- VI					Semester End exam		Continuous Internal Evaluation			Practical HRS
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS601	INTELLECTUAL PROPERTY RIGHTS	SEC-4	2	2	2	40	30 min	10	50	
BS602	APPLICATIONS OF BIOTECHNOLOGY	GE-2	2	2	2	40	30 min	10	50	
BS603	BIOTECHNOLOGY-VII MICROBIAL TECHNOLOGY	DSC-1F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS604	MICROBIOLOGY - VII MEDICAL MICROBIOLOGY	DSC-2F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS605	CHEMISTRY-VII	DSC-3F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS606	BIOTECHNOLOGY-VIII	DSE- 1F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
	A- ANIMAL BIOTECHNOLOGY									
	B- ENVIRONMENTAL BIOTECHNOLOGY									
BS607	MICROBIOLOGY -VIII	DSE-2F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
	A-FOOD MICROBIOLOGY									
	B- INDUSTRIAL MICROBIOLOGY									
BS608	CHEMISTRY-VIII	DSE-3F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
A	MEDICINAL CHEMISTRY									
B	AGRICULTURAL AND FUEL CHEMISTRY									
			34	28		440		110	850	-
	TOTAL Credits			164						

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B.SC. III YEAR BIOTECHNOLOGY

SEMESTER – VI

PAPER-VII

DISCIPLINE SPECIFIC CORE THEORY

MICROBIAL TECHNOLOGY

Code: BS 605

Instruction	
Theory Classes	**3 Hrs/Week**
Practical Classes	**2 Hrs/Week**
Credit for Theory	**3**
Credit for Practical	**1**
Duration of Semester Examination	**3 Hrs**
Duration of Internal Examination	**30 Min**
Semester Examination Marks	**60 Marks**
Internal Examination Marks	**15 Marks**

Objective: The course is designed to enhance the basic knowledge of students about scope of micro organisms in different technologies.

UNIT-I: Introduction to Microbial technology

1.1. Introduction to industrial biotechnology, scope and applications

1.2. Exploitation of microorganisms and their products

1.3. Isolation and screening of microorganisms for industrial products

1.4. Strategies for Strain improvement (mutation, selection, recombination)

1.5. Preservation of industrial microorganisms

1.6. Good manufacturing practices, Intellectual Property Rights and Patenting issues

UNIT-II: Microbial fermentation

2.1. Principles of Fermentation technology

2.2. Fermentation concept and design

2.3. Types of fermentation

2.4. Formulation and design of fermentation media

2.5. Substrates used as Carbon and Nitrogen Inoculum development.

2.6. Factors affecting fermentation process

UNIT-III: Microbial technology products and applications

3.1. Microbial production of Organic acids (Lactic acid, citric acid), Amino acids(Glutamic acid, Aspartic acid, Lysine)

3.2. Fermentation by microbes for food additives: dairy products (Cheese, Yogurt), beverages (Beer, Wine) and antibiotics (Streptomycin, Erythromycin)

3.3. Basic concepts of Food quality and Control

3.4. Therapeutic drugs: Recombinant vaccines, monoclonal antibodies, insulin, vitamins

3.5. Biofuel: Hydrogen, Alcohol, Methane

3.6. Biomining (Extraction of Copper, Aluminum, Uranium and Bioremediation)

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B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – VI
PAPER-VII
MICROBIAL TECHNOLOGY
PRACTICALS

Code: BS 605P

1. Screening of Microorganisms (Primary selection, secondary selection)
2. Production of Citric acid
3. Screening of amylase producing microorganisms
5. Production of wine using common yeast
6. Production of alcohol by fermentation and Estimation of alcohol by colorimetry
7. Production of hydrogen or biogas using cow/cattle dung
8. Production of Penicillin/Ampicillin
9. Production of biofertilizers (*Azolla*)
10. Estimation of Dissolved oxygen in water samples
11. Isolation of microbes from soil or industrial effluents
12. Quality testing of milk by MBRT

REFERENCE BOOKS

1. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
2. Biotechnology -By H.J. Rehm and G. Reed. VIH Publications, Germany
3. Biogas Technology - By b.T. Nijaguna
4. Biotechnology - By K. Trehan
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8. Essentials of Biotechnology for Students - By Satya N. Das
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10. Biotechnology, IPRs and Biodiversity - By M.B. Rao and Manjula Guru (Pearson Education)
11. Bioprocess Engineering - By Shuler (Pearson Education)
12. Essentials of Biotechnology - By Irfan Ali Khan and AtiyaKhanum (Ukaaz Publications)
13. Gene, Genomics and Genetic Engineering - By Irfan Ali Khan and AtiyaKhanum (Ukaaz Publications)

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B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – VI
DSC – PAPER VII

THEORY MODEL QUESTION PAPER

Time: 3hrs **Max. Marks: 60**

SECTION A

I. Write short notes on any Five of the following: **5 X 3 = 15 Marks**

1. A Question from Unit I
2. A Question from Unit II
3. A Question from Unit III
4. A Question from Unit I
5. A Question from Unit II
6. A Question from Unit III
7. A Question from any of I,II,III units
8. A Question from any of I,II,III units

SECTION B

II. Essay Questions. Answer all the Questions **3 X 15 = 45 Marks**

9. (a) A Question from Unit I
(OR)
(b) A Question from Unit I

10.(a). A Question from Unit II
(OR)
(b). A Question from Unit II

11.(a) A Question from Unit III
(OR)
(b) A Question from Unit III

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B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – VI
DSC - PAPER VII)
PRACTICAL MODEL QUESTION PAPER

Time – 3 Hrs **Total Marks: 50 Marks**

I.	Minor Experiment	10 Marks
II.	Major Experiment	24 Marks
III.	Spotting	06 Marks
	A B C	
IV.	Record and Viva voce	10 Marks

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B.SC. III YEAR BIOTECHNOLOGY

SEMESTER – VI

PAPER-VIII

DISCIPLINE SPECIFIC ELECTIVE THEORY (A)

ANIMAL BIOTECHNOLOGY

Code: BS 608A

Instruction	
Theory Classes	**3 Hrs/Week**
Practical Classes	**2 Hrs/Week**
Credit for Theory	**3**
Credit for Practical	**1**
Duration of Semester Examination	**3 Hrs**
Duration of Internal Examination	**30 Min**
Semester Examination Marks	**60 Marks**
Internal Examination Marks	**15 Marks**

Objective: The course is designed to enhance the basic knowledge of students about animal biotechnology.

Unit-I: Animal tissue culture: principles and applications

1.1 Cell culture technique: cell culture media, sterilization techniques

1.2 Cell lines, characteristic feature of cell lines and maintenance

1.3 Methods of separation of various cell types (physical and enzymatic methods)

1.4 Stem cell: Features, culture, embryonic stem cells and adult stem culture methods

1.5 Genetic manipulation of cells – Physical (microinjection) and Chemical methods

1.6 Commercial applications of cell culture: Cell based manufacturing (vaccines), toxicity testing and tissue engineering

UNIT-II: Animal improvement for desired traits by biotechnology interventions

2.1 Scope for biotechnological interventions (Buffalo as multipurpose livestock)

2.2 Model organisms and their significance (Cattle, Fish)

2.3 DNA micromanipulation

2.4 Somatic cell nuclear transfer

2.5 Embryo sexing

2.6 Gene mapping and identification of genes of economic importance in farm animals

UNIT-III: Developments in Molecular markers in Livestock and Transgenic Animals

3.1 Developments in Livestock Genomics (Estimated Breeding Value -EBV)

3.2 Molecular markers (RFLP, RAPD and SNP) and applications

3.3 Animal transgenesis- methods and applications

3.4 Animal cloning – Case study-Dolly

3.5 Applications of animal biotechnology: Gene therapy,milk production, meat production and aquaculture production

3.6 Ethical consideration of transgenic animals

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B.SC. III YEAR BIOTECHNOLOGY

SEMESTER – VI

PAPER-VIII

PRACTICALS

ANIMAL BIOTECHNOLOGY

Code: BS 608A (P)

1. Preparation of Animal cell culture media
2. Isolation of cells from Chicken Liver
3. Isolation of cells from Chick Embryo
4. Establishment of primary cell culture :Liver/Spleen
5. *In vitro* and *in vivo* preparation of somatic metaphase chromosomes;
6. Protocol of Animal cloning procedure
7. Molecular marker application
8. Gene transfer technique

REFERENCE BOOKS

1. Lasley JF. 1987. *Genetics of Livestock Improvement.* 3rd Ed. IBH.
2. Text book of Animal Biotechnology by B Singh. The Energy and Resources Institute (teri)
3. Ross CV. 1989. *Sheep Production and Management.* Prentice Hall.
4. Schmidt GM & Van Vleck LD. 1974. *Principles of Dairy Science.* WH Freeman.
5. Turner HN & Young SSY. 1969. *Quantitative Genetics in Sheep Breeding.* MacMillan.
6. Van Vleck LD, Pollak EJ &Bltenacu EAB. 1987. *Genetics for Animal Sciences.* WH Freeman.
7. Crawford RD.1990. *Poultry Breeding and Genetics.* Elsevier.
8. Singh RP &KumarJ. 1994. *Biometrical Methods in Poultry Breeding.* Kalyani.

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B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – VI
PAPER-VIII
DISCIPLINE SPECIFIC ELECTIVE THEORY (B)
ENVIRONMENTAL BIOTECHNOLOGY

Code: BS 608B	
Instruction	**3 Hrs/Week**
Theory Classes	**2 Hrs/Week**
Practical Classes	**3**
Credit for Theory	**1**
Credit for Practical	**3 Hrs**
Duration of Semester Examination	**30 Min**
Duration of Internal Examination	**60 Marks**
Semester Examination Marks	**15 Marks**
Internal Examination Marks	

Objective: The course is designed to make the students aware about applications of Biotechnology in Environmental Conditions.

UNIT-I: Environmental Pollution

1.1 Introduction to environment and pollution

1.2 Types of pollution - air, water and land pollution

1.3 Types of pollutants–inorganic, organic and biotic sources

1.4 Sources of pollution – domestic waste, agricultural waste, industrial effluents and municipal waste

1.5 Climate change, greenhouse gases and global warming

1.6 Impact of pollution on environment and measurement methods

UNIT-II: Bioenergy and Bio-fuels

2.1 Renewable and non-renewable energy resources

2.2 Fossil fuels as energy source and their impact on environment

2.3 Non-conventional source – biomass as source of bioenergy

2.4 Types of biomass – plant, animal and microbial biomass

2.5 Production of biofuels: biodiesel, ethanol

2.6 Production of biomethane, biohydrogen

UNIT- III: Bioremediation and Restoration of Environment

3.1 Microbial treatment of waste water (sewage of industrial effluent) - aerobic and anaerobic methods

3.2 Solid waste and management; Bioremediation – concepts and types (in-situ and ex-situ); Bioremediation of toxic metal ions – biosorption and bioaccumulation

3.3 Composting of organic wastes

3.4 Microbial bioremediation of pesticides and Xenobiotic compounds

3.5 Phytoremediation- concepts and application

3.6 Conservation of biodiversity

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B.SC. III YEAR BIOTECHNOLOGY

SEMESTER – VI

PAPER-VIII

PRACTICALS (B)

ENVIRONMENTAL BIOTECHNOLOGY

Code: BS 608B(P)

1. Estimation of BOD in water samples
2. Estimation of COD in water samples
3. Estimation of Total dissolved solid
4. Isolation of microorganisms from soil/industrial effluents
5. Production of hydrogen or biogas using cow/cattle dung
6. Identification and characterization of bioremediation microorganisms
7. Conservation of useful microorganisms
8. Production of ethanol from waste byproducts

REFERENCE BOOKS

1. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
2. Biotechnology -By H.J. Rehm and G. Reed. VIH Publications, Germany
3. Biogas Technology - By b.T. Nijaguna
4. Biotechnology - By K. Trehan
5. Industrial Microbiology - By L.E. Casida
6. Food Microbiology - By M.R. Adams and M.O. Moss
7. Introduction to Biotechnology - By P.K. Gupta
8. Essentials of Biotechnology for Students - By Satya N. Das
9. Bioethics – Readings and Cases - By B.A. Brody and H. T. Engelhardt. Jr. (Pearson Education)
10. Biotechnology, IPRs and Biodiversity - By M.B. Rao and Manjula Guru (Pearson Education)
11. Bioprocess Engineering - By Shuler (Pearson Education)
12. Essentials of Biotechnology - By Irfan Ali Khan and AtiyaKhanum (Ukaaz Publications)

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B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – VI
DSE-PAPER –VIII A / B

THEORY MODEL QUESTION PAPER

Time: 3hrs | Max. Marks: 60

SECTION A

I. Write short notes on any Five of the following: 5 X 3 = 15 Marks

1. A Question from Unit I
2. A Question from Unit II
3. A Question from Unit III
4. A Question from Unit I
5. A Question from Unit II
6. A Question from Unit III
7. A Question from any of I,II,III units
8. A Question from any of I,II,III units

SECTION B

II. Essay Questions. Answer all the Questions 3 X 15 = 45 Marks

9. (a) A Question from Unit I
(OR)
(b) A Question from Unit I

10.(a). A Question from Unit II
(OR)
(b). A Question from Unit II

11.(a) A Question from Unit III
(OR)
(b) A Question from Unit III

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B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – VI
DSE-PAPER VIII A / B

PRACTICAL MODEL QUESTION PAPER

Time – 3 Hrs **Total Marks: 50 Marks**

I.	Minor Experiment	10 Marks
II.	Major Experiment	24 Marks
III.	Spotting	06 Marks
	A B C	
IIII.	Record and Viva voce	10 Marks

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B.SC. III YEAR BIOTECHNOLOGY
SEMESTER – VI
PAPER 4
SKILL ENHANCEMENT COURSE
INTELLECTUAL PROPERTY RIGHTS

Code: BS 601

Instruction	**2 Hrs/Week**
Theory Classes	**2 Hrs**
Duration of Semester Examination	**30 Min**
Duration of Internal Examination	**40 Marks**
Semester Examination Marks	**10 Marks**
Internal Examination Marks	

Objective: The course is designed to enhance the basic knowledge of students about intellectual property rights.

UNIT-I: Introduction to Intellectual Property Rights

1.1 Intellectual property rights (IPR): genesis and scope.

1.2 Types of Intellectual property rights: patent, trademarks, copyright, design registration, trade secret, geographical indicators, plant variety protection.

1.3 Patents- objectives, rights, procedure of obtaining and working of patents, infringement.

1.4 Copyrights - works protected under copyright law, rights, transfer of copyright.

1.5 Trademarks - protection of good will, defenses, domain name.

1.6 Geographical indications – International position, multilateral treaties, national level, Indian position.

1.7 International organizations – World Trade Organization (WTO), Trade-Related Aspects of Intellectual Property Rights (TRIPS), General Agreement on Tariffs and Trade (GATT).

UNIT-II: Biotechnology and Intellectual Property Rights

2.1 Plant varieties protection- Rights of farmers, breeders and researchers, National gene bank, International union for the protection of new varieties of plants (UPOV), protection of plant varieties and farmers' rights act, 2001

2.2 Animal breeder's rights, patenting animal breeds: Example of Animal patents (Dolly the cloned sheep, Super-salmon, Sex-selection in Animals, genetically manipulated dairy cows)

2.3 Patenting microbes and organisms - Novelty, International Depository Authorities (IDAs), submitting details of the deposit.

2.4 Patenting genes - Pros and cons, ethics, examples

2.5 Patenting markers and variants - examples

2.6 Product vs process patent - Product life cycle and process design.

REFERNCE BOOKS

1. An Introduction to Ethical, Safety and Intellectual Property Rights Issues in Biotechnology" by Padma Nambisan
2. IPR, Biosafety and Bioethics" by Goel and Parashar
3. Genetically Modified Crops and Agricultural Development (Palgrave Studies in Agricultural Economics and Food Policy)" by MatinQaim
4. Biosafety and Bioethics" by Rajmohan Joshi
5. Bioethics and Biosafety in Biotechnology" by V Sree Krishna
6. Biotechnology, IPRs and Biodiversity - By M.B. Rao and Manjula Guru (Pearson Education)
7. Text Book of Biotechnology- By H.K. Das (Wiley Publications)
8. Biotechnology-By H.J. Rehm and G. Reed. VIH Publications, Germany

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SEMESTER –VI
PAPER- 4

Credits – 2

SEC - THEORY MODEL PAPER

IME: 2 HOURS MAX MARKS: 40

SECTION-A

Answer the following Questions in short: 5 x 2 = 10 Marks

1. Question from Unit -I
2. Question from Unit -II

SECTION-B

Answer the following essay type questions: 2 x 15 = 30 Marks

3. (a) Question from Unit –I
   Or
   (b) Question from Unit –I

4. (a) Question from Unit –II
   Or
   (b) Question from Unit –II

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B.SC. III YEAR BIOTECHNOLOGY

SEMESTER – VI

GENERIC ELECTIVE 2

APPLICATIONS OF BIOTECHNOLOGY

Code: BS 602

Instruction	
Theory Classes	**2 Hrs/Week**
Duration of Semester Examination	**2 Hrs**
Duration of Internal Examination	**30 Min**
Semester Examination Marks	**40 Marks**
Internal Examination Marks	**10 Marks**

Objective: The course is designed to enhance the basic knowledge of students about APPLICATIONS OF BIOTECHNOLOGY.

UNIT-I: Biotechnological applications in health care

1.1 Molecular diagnosis – monoclonal antibodies, DNA probes, Microarrays

1.2 DNA finger- printing

1.3 Gene therapy

1.4 Recombinant therapeutic proteins – insulin, interferon, growth hormone

1.5 Stem cells and regenerative medicine

1.6 Transgenic animals – transgenic mice and transgenic fish

UNIT-II: Biotechnological applications in agriculture and environment

2.1 Transgenic plants : Preservation of fruits, altered flower colors

2.2 Transgenic plants : Male sterility, photosynthetic efficiency

2.3 Bioremediation - Genetically engineered bacteria for bioremediation

2.4 Biofertilizers

2.5 Biopesticides

2.6 Biological pest control

RECOMMENDED BOOKS

1. Introduction to Human Molecular Genetics – J.J Pasternak, John Wiley Publishers.
2. Human Molecular Genetics –Tom Strachen and A P Read, Bios Scxientific Publishers
3. Human Genetics Molecular Evolution, McConkey
4. Recombinant DNA Technology , AEH Emery
5. Principles and Practice of Medical Genetics, I, II, III Volumes by AEH Edts. Emery
6. Medical Biotechnology-PratibhaNallari,V.Venugopal Rao-Oxford Press
7. Plant Cell, Tissue and Organ Culture Applied and Fundamental Aspects by Y.P.S. Bajaj and A. Reinhard
8. Molecular Biotechnology-Glick
9. Concepts in Biotechnology - By D. Balasubramanian, C.F.A. Bryce, K.Dharmalingam, J. Green and KunthalaJayaraman
10. Biodegradation and bioremediation Academic pressBY:San Diego.
11. Biotechnology in the sustainable environment,Plenumpress,NY
12. Basic principles of Geomicrobiology.By:A.D.Agate.
13. Biotechnology-U.Satyanarayana
14. Plant Tissue Culture and its Biotechnological Applications By W. Barz, E. Reinhard, M.H. Zenk
15. Plant Tissue Culture By Akio Fujiwara
16. Frontiers of Plant Tissue Culture By Trevor A. Thorpe
17. Plant Tissue Culture : Theory and Practice By S.S. Bhojwani and A. Razdan

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Chairman, Board of Studies (Biotechnology)
Department of Genetics
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – VI

Credits – 2

GE 2- THEORY MODEL PAPER

TIME: 2 HOURS

MAX MARKS: 40

SECTION-A

Answer the following Questions in short: 5 x 2 = 10 Marks

1. Question from Unit -I
2. Question from Unit -II

SECTION-B

Answer the following essay type questions: 2 x 15 = 30 Marks

3. (a) Question from Unit –I
   Or
   (b) Question from Unit –I

4. (a) Question from Unit –II
   Or
   (b) Question from Unit –II

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Affiliated to Osmania University
Nallakunta, Hyderabad-44

ACADEMIC YEAR 2018-19

CBCS STRUCTURE for 2017-18 BATCH

B.SC. BIOTECHNOLOGY, MICROBIOLOGY, CHEMISTRY

SECOND YEAR SEMESTER-III					Semester End exam		Continuous Internal Evaluation		Total	Practical
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS301	A/B	SEC-1	2	2	2	40	30 min	10	50	-
BS302	English - III	CC-1C	5	5	3	80	30 min	20	100	-
BS303	Second Language - III	CC-2C	5	5	3	80	30 min	20	100	-
BS304	**BIOTECHNOLOGY – III Biochemistry and Biostatistics**	DSC-1C	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
BS305	MICROBIOLOGY-III Microbial Physiology and Enzymology	DSC-2C	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
BS306	CHEMISTRY - III	DSC-3C	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
			30	27		440		110	625	-
SECOND YEAR SEMESTER-IV										
BS401	A/B	SEC-2	2	2	2	40	30 min	10	50	-
BS402	English - IV	CC -1D	5	5	3	80	30 min	20	100	-
BS403	Second Language - IV	CC-2D	5	5	3	80	30 min	20	100	-
BS404	**BIOTECHNOLOGY – IV Microbiology and Immunology**	DSC-1D	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
BS405	MICROBIOLOGY-IV Microbial Genetics and molecular biology	DSC-2D	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
BS406	CHEMISTRY - IV	DSC-3D	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25

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B.SC.BIOTECHNOLOGY II YEAR
SEMESTER – III & IV
PAPER – III & IV
PRACTICAL MODEL QUESTION PAPER

Time – 2 Hrs **Total Marks: 25 Marks.**

I.	Minor Experiment	05 Marks
II.	Major Experiment	10 Marks
III.	Spotting	06 Marks
	A B C	
IV.	Record and Viva voce	04 Marks

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B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – V & VI
DSC (V & VII) / DSE (VI & VIII) A/B - INTERNAL MODEL PAPER

TIME: ½ HOUR | MAX MARKS: 15

SECTION-A

MULTIPLE CHOICE QUESTIONS | 10x ½ = 5 Marks

TEN (10) MCQ ½ MARK EACH

SECTION-B

FILL IN THE BLANKS: | 10 x ½ = 5 Marks

TEN (10) FIB ½ MARK EACH

SECTION-C

SHORT NOTE QUESTIONS: | 5 x 1 = 5 Marks

FIVE (5) 1(ONE) MARK EACH

*****

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B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – V & VI
PAPER-3 & 4
SEC - INTERNAL MODEL PAPER

TIME: 1/2 HOURS **MAX MARKS: 10**

SECTION-A

FILL IN THE BLANKS: **10 x ½ =5 marks**

TEN (10) FIB ½ MARK EACH

SECTION-B

MULTIPLE CHOICE QUESTIONS **10 x ½ =5 marks**

TEN (10) MCQ ½ MARK EACH

*****

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1. PK Chaitanya

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B.SC.BIOTECHNOLOGY III YEAR
SEMESTER – V & VI
GE 1 & 2 - INTERNAL MODEL PAPER

TIME: 1/2 HOURS **MAX MARKS: 10**

SECTION-A

FILL IN THE BLANKS: **10 x ½ =5 Marks**

TEN (10) FIB ½ MARK EACH

SECTION-B

MULTIPLE CHOICE QUESTIONS **10 x ½ =5 Marks**

TEN (10) MCQ ½ MARK EACH

*****

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DEPARTMENT OF BIOTECHNOLOGY

PANEL OF EXAMINERS

S.No.	Name and Designation	Mobile No.
1	**Mrs. Sandhya Rani** Andhra Mahila Sabha Arts & Science College (Autonomous) Hyderabad	9390405439
2	**Smt. G. Y. Kavitha** A V Degree College Domalguda, Hyderabad	9395321541
3	**Ms. Jayasree** Govt Women's Degree College Begumpet, Hyderabad	9959652621
4	**Smt. C. H Pradyutha** Reddy Women's College Mehdipatnam, Hyderabad	9705335025
5	**Dr. Chaithri** Dept. of Biotechnology & Genetics Osmania University, Hyderabad	9550008070
6	**Dr. Surekha Rani** Department of Biotechnology & Genetics Osmania University, Hyderabad	9866620067

PKChaithri 7/7/18.

7/7

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