HINDI MAHAVIDYALAYA
(AUTONOMOUS & NAAC RE-ACCREDITED)
(Affiliated to Osmania University)
Nallakunta, Hyderabad

B.Sc. III YEAR SEMESTER V&VI
DEPARTMENT OF BIOTECHNOLOGY
(2022-2023)

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

COMPOSITION OF THE BOARD OF STUDIES IN AN AUTONOMOUS COLLEGE

I. Composition: Department of Biotechnology

1. Head of the Department concerned (Chairman)
   Smt. Nita Kulkarni, Head-Department of Biotechnology
2. The entire faculty of each specialization
   1. Smt. Nita Kulkarni
   2. Smt. G. Ranganayaki
3. One expert to be nominated by the Vice Chancellor from a panel of six recommended by the College Principal
   1. Prof. Smita C. Pawar, Chairperson, BOS, Dept. of Biotechnology, Osmania University, Hyderabad.
4. Experts on the subject from outside the college to be nominated by the Academic Council.
   1. Prof.Surekha Rani, Head, Department of Genetics Osmania University, Hyderabad.
   2. Dr. S. Prashant, Assistant professor, Department of Biotechnology, Osmania University, Hyderabad.
5. One postgraduate meritorious alumnus to be nominated by the Principal. The Chairman, Board of Studies, may with the approval of the Principal of the College.
   1. Shri Vipin Kumar, M.Sc. Biotechnology.
   2. Shri Vikesh Kumar loan providing officer in SBI Head Office of Mumbai.

(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.
Mrs. G. Ranganayaki – M. Sc. Biotechnology

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF BIOTECHNOLOGY
AGENDA OF THE MEETING

1. Welcome address by the chair.
2. Previous Meeting Details.
3. Details of choice-based credit system.
4. Discussion and Distribution of Common Core Syllabus for all the Semesters (V and VI)
5. Marks allotted for internal and end semester exams.
6. Discussion on Pattern and model paper of Semester Exam and internal exam for all the Semesters (V and VI)
7. Discussion on Practical exam model paper for all the Semesters (V and VI)
8. Panel of Examiners
9. Any other matter
10. Vote of thanks

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF BIOTECHNOLOGY
BOARD OF STUDIES
Academic Year – 2022-2023
Minutes of BOS Meeting

BOS meeting of the Department of Biotechnology was held on ....23..December..2022

The following members were present

Prof. Smita C. Pawar	-	University Nominee
Smt. Nita Kulkarni	-	Chairperson
Prof. Surekha Rani	-	Member of BOS
Dr. S. Prashant	-	Member of BOS

Prof. Smita C. Pawar Professor Chairperson, BOS in Biotechnol Department of Genetics & Biotechno Osmania University, Hyd-500 007

Prof. H. SUREKHA I Department of Genetics & Biotec Osmania University, Hyderabad-5

Dr. S. PRASHANT Assistant Professor (Biotechnology) Department of Genetics Osmania University, Hyderabad - 500 007.

1.1 Welcome address by the chair
The chair welcomed the University Nominee, Chairperson BOS, O.U. Department of Biotechnology and Members of B.O.S.

1.2 Previous Meeting details
The CBCS system has been introduced by Osmania University from 2016-17. The theory and practical syllabus of I, II & III years of B.Sc., question paper pattern for theory and practical, internal assessment pattern, practical examination scheme and panel of examiners were discussed and approved by all the BOS Members in previous BOS meeting.

1.3 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.

1.4Discussion and Distribution of Common Core Syllabus for semesters V and VI.

i. Members were informed by the chair that Department of Biotechnology, Hindi Mahavidyalaya is following common core syllabus prescribed by Osmania University with few changes for B.Sc. III YEAR in V and VI semesters.

Following are the additions in syllabus:
Semester V
Unit 1: 1.2 Laboratory organization – washing and storage facilities, media preparation room, transfer area, culture room, transplantation room
Unit 2: 2.3 – cell suspension culture – measurement methods like cell counting, packed cell volume, fresh and dry weight
2.4 – secondary metabolite production
Unit 3: 3.6 – Gene silencing – detection of intrusive DNA, causes of gene silencing, strategies for avoiding gene silencing
Unit 4: 4.5 – Increased shelf life (Tomato Flavr Savr)
Semester VI:
Unit 2: 2.5 – Introduction and features of biofuels, Process of bioethanol production and ethanol recovery, biodiesel production from lipids and hydrocarbons.
2.6 – Production of biohydrogen – photosynthetic and non-photosynthetic pathway, biogas – factors affecting biogas yields, advantages and disadvantages.
Unit 4: 4.1 – Process of waste water treatment, digester and its types

Unit 3: 3.6 – Gene silencing – detection of intrusive DNA, causes of gene silencing, strategies for avoiding gene silencing
Unit 4: 4.5 – Increased shelf life (Tomato FlavrSavr)
Semester VI:
Unit 2: 2.5 – Introduction and features of biofuels, Process of bioethanol production and ethanol recovery, biodiesel production from lipids and hydrocarbons.
2.6 – Production of biohydrogen – photosynthetic and non-photosynthetic pathway, biogas – factors affecting biogas yields, advantages and disadvantages.
Unit 4: 4.1 – Process of waste water treatment, digester and its types.

ii. The syllabus comprise of 4 units.
iii.Syllabus copy for both the semesters is enclosed.
iv.Syllabus was approved by the Members of BOS.

1.5 Marks allotted for Internal and end Semester exams.

.Internal assessment is of 30 marks in which 20 marks are for ~~online~~/offline test, where students have to answer 20 MCQs in 25 minutes. Each question carries 1 mark. In each Semester two ~~online~~ tests of 20 Marks will be conducted and an average of both the tests will be added in the marks of theory exam.
. Theory Question paper is of 70 marks.
.Total allotted marks are 70 for each theory paper (V &VI).

he distribution of marks was approved by the Members of BOS.
.6Discussion on Pattern and Model Paper of Semester exam and Model Paper of Internal Exam

1. It was informed by the department that in each Semester Two ~~Online~~/offline tests will be conducted for DSC / DSE and GE of 20 marks. The continuous internal assessment will have three sections.

Section – A 20 Multiple choice questions each carries 1 mark (20 x 1 =20M),
Section – B Assignment – 5 Marks
Section – C Seminar – 5 Marks

Average of marks of these two online tests 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 25 Min and Semester exam duration will be of 21/2 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 six questions. Each Question carries 3 Marks (6X3=18 Marks)
ii) Section B contains 4 Essay type Questions with internal choice. Each Question carries 13 Marks (4X13=52 Marks)

4. Model Question paper for GE Semester V was discussed. Theory paper for each Semester will have 2 sections.
i) Section A contains 8 short Questions. The student has to answer six questions. Each Question carries 3 Marks (6X3=18 Marks)
ii) Section B contains 4 Essay type Questions with internal choice. Each Question carries 13 Marks (4X13=52 Marks)

- Pattern of Model Theory Question Papers for DSC and GE for V and VI semester are enclosed.

Pattern of Model Theory Question Papers for DSC and GE was approved by Members of BOS

1.7Discussion on Practical Exam Model paper.

- It is decided that the practical examinations held for B.Sc. Third year (Semester V &VI) 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 3 hours.
- Pattern of Model Practical Question Papers for Paper V and Paper VI are enclosed.
- Pattern of Model Practical Question Papers was approved by Members of BOS

1.8Panel of Examiners

The panel of examiners was approved by the members.

- List is enclosed

1.9Any other matter.

- **Marks allotted for Internal and end Semester exams (SEC SEMESTER III & IV)**

1.Internal assessment is of 15 marks in which 15 marks are for ~~online~~/offline test, where students have to answer 15 MCQs in 20 minutes. Each question carries 1 mark. In each Semester two ~~online~~ tests of 15 Marks will be conducted and an average of both the tests will be added in the marks of theory exam.
2. Theory Question paper is of 35 marks.
3.Total allotted marks are 50 for each theory paper **(SEC SEMESTER III & IV)**

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

- **Discussion on Pattern and Model Paper of Semester exam and Model Paper of Internal Exam**
. It was informed by the department that in each Semester III & IV ~~Online~~/offline tests will be conducted for SEC of 15 marks.
Model Question paper for Semester III and Semester IV SEC was discussed. Theory paper for each Semester will have 2 sections.
i) Section A contains 4 short Questions. The student has to answer three questions. Each Question carries 3 Marks (3 X5 =15 Marks)
ii) Section B contains 2 Essay type Questions with internal choice. Each Question carries 10 Marks (2 X 10 = 20 Marks)

- Pattern of Model Theory Question Papers for SEC for III and IV semester are enclosed.

Pattern of Model Theory Question Papers for SEC was approved by Members of BOS.

1.10 Vote of Thanks

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

Chairperson **University Nominee** **Members** **Principal**

Prof. Smita C. Pawar
Professor
Chairperson- BoS in Biotechnology
Department of Genetics & Biotechnology
Osmania University, Hyd-500 007.

1. Dr. S. PRASHANT
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PRINCIPAL
HINDI MAHA VIDYALAY
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Prof. H. SUREKHA RANI
Department of Genetics & Biotechnology

HINDI MAHAVIDYALAYA

(AUTONOMOUS)

Affiliated to Osmania University, Nallakunta, Hyderabad-44

CBCS STRUCTURE FOR 2022-2023 BATCH

DEPARTMENT OF BIOTECHNOLOGY

B.Sc-BIOTECHNOLOGY/BIOCHEMISTRY, MICROBIOLOGY, CHEMISTRY - ACADEMIC YEAR 2022-2023

THIRD YEAR SEMESTER - V					Semester End Exam		Continuous Internal Evaluation		Total	Practical 3 hours
Code	Course Title	Course Type	HPW	Credits	Duration in Hours	Marks	Exam Duration	Marks		
BS501	English	CC-1E	4	4	1 1/2	35	20 min.	15	50	
BS502	Second language	CC-2E	3	3	2 1/2	70	30 min.	30	100	
BS503	**Basics in biotechnology**	**GE**	**4**	**4**	**2 1/2**	**70**	**30 min.**	**30**	**100**	
BS504	**Plant Biotechnology /Medical Biotechnolgoy**	**DSC-1E**	**4T+3P=7**	**4+1=5**	**2 1/2**	**70**	**30 min**	**30**	**100**	**25**
BS505	Microbiology V	DSC-2E	4T+3P=7	4+1=5	2 1/2	70	30 min	30	100	25
BS506	Chemistry-V	DSC-3E	4T+3P=7	4+1=5	2 1/2	70	30 min	30	100	25

Chairperson

University Nominee

Prof. Smita C. Pawar
Professor
Chairperson- BoS in Biotechnology
Department of Genetics & Biotechnology
Osmania University, Hyd-500 007.

Members

1. Dr. S. PRASHANTH
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Hyderabad - 500 007.

2. H Surekha Rani

Prof. H. SUREKHA RANI
Department of Genetics & Biotechnology
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Principal

PRINCIPAL
HINDI MAHA VIDYALAYA
(AUTONOMOUS)
Arts, Commerce & Science
Nallakunta, Hyderabad-44.

(AUTONOMOUS)

B.Sc. III Year Semester – V

Biotechnology Paper – V- Plant Biotechnology

OPTIONAL – I (A) (DSE – IE)

Code: BS504	**DSC –**
Instruction	
Theory Classes	**4 Hrs/Week**
Practical Classes	**3 Hrs./Week**
Credit for Theory	**4**
Credit for Practical	**1**
Duration of Semester Examination	**2 ½ hours**
Duration of Internal Examination	**25 minutes**
Semester Examination Marks	**70 Marks**
Internal Marks	**30 Marks**

Unit Name	TOPICS	HOURS PER UNIT
1.Fundamentals of plant tissue culture	1.1 Introduction to Plant tissue culture, totipotency of plant cell (dedifferentiation, redifferentiation and regeneration). **1.2 Laboratory organization – washing and storage facilities, media preparation room, transfer area, culture room, transplantation room** 1.3. Nutrition requirements for plant tissue culture: nutrient media – macronutrients and micronutrients, media additives (carbon source, vitamins, amino acids); types of media. 1.4 Plant growth regulators – auxins, cytokinins and gibberellins. 1.5 Preparations of media, Sterilization, selection & surface sterilization of explants, inoculation, incubation and culture of plant tissue in vitro. 1.6. Induction of callus cultures and cell suspension cultures. 1.7. Organogenesis and Somatic embryogenesis.	**15 hours**
2. Applications of Plant tissue Culture	2.1Meristem culture, Micro propagation and their applications. 2.2Encapsulation and production of synthesis seeds and their applications. 2.3Cell suspensions cultures (batch and continuous cultures) and applications, **cell suspension culture – measurement methods like cell counting, packed cell volume, fresh and dry weight** 2.4 Protoplast isolation, Culture and fusion – development of somatic hybrids & cybrids and their applications - **secondary metabolite production** **2.5** Somaclonal variations and its applications. 2.6 Anther and pollen culture for production of haploids & their applications. 2.7 Cryopreservation – conservation of plant germplasm.	**15 hours**
3. Production of Transgenic Plants	3.1. Direct gene transfer techniques – Physical method: Microinjection, Particle bombardment (gene gun) and electroporation & chemical methods. 3.2. Molecular mechanism of Agrobacterium infection and features of Ti plasmid. 3.3. Agrobacterium mediated gene transfer using binary and co-integrate vectors. 3.4. Viral vectors for gene transfer into plants. 3.5. Selection of transgenic plants using reporter and selection	**15 hours**

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – V
Biotechnology Paper – V- Plant Biotechnology
OPTIONAL – I (A) (DSE – IE)

DSC –

Code: BS504	
Instruction	**4 Hrs/Week**
Theory Classes	**3 Hrs./Week**
Practical Classes	**4**
Credit for Theory	**1**
Credit for Practical	**2 ½ hours**
Duration of Semester Examination	**25 minutes**
Duration of Internal Examination	**70 Marks**
Semester Examination Marks	**30 Marks**
Internal Marks	

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	3.6. Genome editing – CRISPR CAS 9 Technology. **Gene silencing – detection of intrusive DNA, causes of gene silencing, ~~strategies for avoiding gene silencing~~** applications.	
4.Applications of Transgenic Plants	4.1. Herbicide resistance in Transgenic plants – glyphosphate tolerance. 4.2. Insect resistant transgenic plants: Bt cotton, Proteinase inhibitors, Lectins. 4.3. Virus, bacterial and fungal resistant transgenic plants. 4.4. Abiotic Stress tolerance: drought, heat and salinity stress tolerant plants. 4.5. Transgenic plants with enhanced nutritional value: Vitamin A, oil, amino acids. **Increased shelf life (Tomato Flavr Savr)** 4.6. Transgenic plants as bioreactors: edible vaccines, antibody production, biodegradable plastics	**15 hours**

Chairperson **University Nominee** **Members**

Prof. Smita C. Pawar
Professor
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1. Dr. S. PRASHANT
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2. H Surekha Rani

Prof. H. SUREKHA RANI
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Principal PRINCIPAL
HINDI MAHA VIDYALA
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Arts, Commerce & Scie
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – V
Biotechnology Paper -V

PRACTICALS
PLANT BIOTECHNOLOGY:

1. Preparation of media for plant tissue culture.
2. Sterilization methods of explants (seed, leaf, inter node & root) and inoculation.
3. Establishment of callus cultures – from carrot/rice.
4. Preparation of synthetic seeds.
5. Meristem culture.
6. Cell suspension cultures.
7. Protoplast isolation and culture.
8. Agrobacterium mediated transformation.

Spotters:

1. Callus cultures.
2. Sterilization techniques: autoclave and hot air oven.
3. Somatic embryo.
4. Synthetic seeds.
5. Meristem culture.
6. Plant regeneration.
7. Cell suspension cultures.
8. Isolation of protoplasts.
9. Particle bombardment (Gene gun).
10. Binary or Co-integrate vectors.
11. Gus gene expression in transgenic plant tissue.
12. Golden Rice.

Chairperson **University Nominee** **Members** **Principal**

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – V
Biotechnology Paper V

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. Veileux
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
7. **Introduction to Plant Biotechnology by H. S. Chawla**
8. **Introduction to Plant Biotechnology by M. K. Razdan**

Chairperson

Department of Biotechnology
Hindi Mahavidyalaya
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University Nominee

Prof. Smita C. Pawar
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Principal

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – V
Biotechnology Paper – V- Medical Biotechnology
OPTIONAL – I (B) (DSE – IE)

Code: BS504(B)	**DSC –**
Instruction	
Theory Classes	**4 Hrs/Week**
Practical Classes	**3 Hrs./Week**
Credit for Theory	**4**
Credit for Practical	**1**
Duration of Semester Examination	**2 ½ hours**
Duration of Internal Examination	**25 minutes**
Semester Examination Marks	**70 Marks**
Internal Marks	**30 Marks**

Unit Name	TOPICS	HOURS PER UNIT
1.Inheritance of human diseases and Karyotyping	1.1. Inheritance patterns – pedigree analysis of autosomal traits. 1.2. Inheritance patterns – pedigree analysis of allosomal traits. 1.3. Factors affecting pedigree pattern – penetrance, expressivity. 1.4. Genetic Heterogeneity – allele and locus heterogeneity. 1.5. Karyotyping of human chromosomes. 1.6. Chromosomes staining – G, Q, R and C banding techniques.	**15 hours**
2. Genetic basis of human disorders	2.1. Chromosomal disorders caused due to structural chromosomal abnormalities (deletions, duplications, translocations and inversions). 2.2. Chromosomal disorders caused due to numerical chromosomal abnormalities (euploidy, aneuploidy, autosomal and allosomal). 2.3. Monogenic disorders (autosomal and X-linked diseases). 2.4. Mitochondrial diseases – LHON, MERRF. 2.5. Multifactorial disorders – diabetes and hypertension. 2.6. Cancer – type of cancer, genetic basis of cancer (Oncogenes, Tumor suppressor genes).	**15 hours**
3. Techniques for diagnosis of human diseases	3.1. Prenatal diagnosis – invasive techniques – amniocentesis, chorionic villi sampling (Down Syndrome); non-invasive techniques – ultrasonography (neural tube defects). 3.2. Diagnosis using enzyme marker – Guthrie test (Phenylketonuria). 3.3. Diagnosis using monoclonal antibodies – ELISA (HIV). 3.4. DNA/RNA based diagnosis – HBV. 3.5. PCR based genotyping techniques for diagnosis – RFLP(MTHFR C677T mutation) 3.6. Chip based diagnosis and applications – colon cancer.	**15 hours**
4. Therapeutic approaches for human diseases	4.1. Recombinant proteins – Human growth hormone, insulin. 4.2. Gene therapy – ex vivo and in vivo gene therapy. 4.3. Stem cells – Potency definitions; embryonic and adult stem cells. 4.4. Applications of Stem cells based therapies and regenerative medicine. 4.5. DNA based vaccines, subunit vaccines – herpes simplex virus; recombinant attenuated vaccines – cholera vaccine. 4.6. Applications of monoclonal antibodies.	**15 hours**

PRINCIPAL
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Chairperson

Department of Biotechnology
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University Nominee

Prof. Smita C. Pawar
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Chairperson- BoS in Biotechnology
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Osmania University, Hyd-500 007.

Members

1. Dr. S [illegible] NT
Assistant Professor
(Biotech[illegible]
Department of [illegible]
Osmania [illegible]
Hydera[illegible]

2. Prof. H. SUREKHA RANI
Department of Genetics & Biotechnology
Osmania University, Hyderabad-500 007.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – V
Biotechnology Paper V

PRACTICALS
MEDICAL BIOTECHNOLOGY

1. Karyotyping of normal human chromosome set.
2. Karyotyping of autosomal abnormality (Down Syndrome).
3. Karyotyping of allosomal abnormality (Klinefelter Syndrome).
4. Chromosome banding – G banding.
5. Human pedigree analysis of autosomal disorder.
6. Human pedigree analysis of allosomal disorder.
7. Estimation of C-reactive protein.
8. DOT ELISA.

Spotters:

1. Identify the Karyotype (Down's syndrome).
2. Identify the Karyotype (Klinefelter Syndrome).
3. Chromosomal banding technique.
4. Identify the inheritance pattern of pedigree (autosomal disorder).
5. Identify the inheritance pattern of pedigree (allosomal disorder).
6. Prenatal diagnosis – invasive technique.
7. Prenatal diagnosis – non-invasive technique.
8. Identify the type of gene therapy – ex vivo/in vivo.
9. Recombinant vaccine.
10. ELISA technique.
11. Identify the SNP genotypes of different samples after performing PCR- RFLP.
12. Count the viable cells on Neubauer chamber (hemocytometer).

PRINCIPAL
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Chairperson **University Nominee** **Members** **Principal**

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1. V.S. PRASHANT
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Prof. H. SUREKHA RANI
Department of Genetics & Biotechnology
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – V
Biotechnology Paper V

REFERENCE BOOKS

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

Chairperson

University Nominee

Prof. Smita C. Pawar
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Members

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Principal

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Arts, Commerce & Science
Nallakunta, Hyderabad-44.

HINDI MAHAVIDYALAYA
NALLAKUNTA, HYDERABAD.
(AUTONOMOUS)

B.Sc. III Year Semester–V (Biotechnology)

Paper–V –Basics in Biotechnology - Generic Elective (GE)

DSC–

Code: BS503	
Instruction	4H / W
Theory Classes	4
Credit for Theory	2 ½ hours
Duration of Semester Examination	25 min
Duration of Internal Examination	70Marks
Semester ExaminationMarks	30Marks
Internal Marks	

UnitName	TOPICS	HOURSPER UNIT
1.Agricultre Biotechnology.	1.1. Plant tissue culture–media ,sterilization ,culture types. 1.2. Micro-propagation ,synthetic seeds ,somatic hybrids and haploid plants. 1.3. Transgenic plants–direct & indirect methods of gene transfer. 1.4. Applications of transgenic plants–improving productivity & nutritional quality. 1.5. Applications of transgenic plants – stress tolerant plants & molecular farming. 1.6. Biofertilizers and biopesticides.	15hours
2. Microbial and industrial biotechnology	2.1. Exploitation of micro-organisms and their products. 2.2. Isolation, screening and selection of microorganisms for industrial products. 2.3. Preservation of microorganisms. 2.4. Strain development and improvement, strategies of strain improvement selection and recombination. 2.5. Production of recombinant DNA vaccine, amino acids , vitamins. 2.6. Single cell protein ,dairy products ,penicillin and streptomycin production.	15hours
3. Animal and Medical Biotechnology.	3.1. Cell culture technique and its application 3.2. Animal breeding (Selective breeding and cross breeding) and its limitations. 3.3. In vitro techniques in animal improvement: in vitro fertilization & microinjection. 3.4. Genetically modified animals : transgenic & knock-outs. 3.5. Mouse models of disease: cancer and diabetes. 3.6. Biophysical techniques : gel electrophoresis and PCR.	15hours
4. Computer applications of Biotechnology.	4.1. Scope of computer applications in Biotechnology. 4.2. Biotechnology tools and resources-role of the internet ,free online tools, downloadable free software. 4.3. Biotechnology web portals–NCBI ,EBI , ExPASy. 4.4. Biological databases: classifications of databases–the primary (Genbank), Secondary (PIR), databases. 4.5. Sequence databases DNA sequence databases (ENA&DDBJ). 4.6. Protein sequence databases(Swissprot & PROSITE)	15hours

Chairperson

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Department of Genetics & Biotechnology
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Hyderabad - 500 007

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1.

2.

Principal

HINDI MAHA VIDYALAYA
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. Biotechnology- III Year
Semesters– V, Paper –V
Theory Model Question Paper

Time: 2 1/2hrs **Max. Marks: 70**

SECTION A

I Write short notes on any Six of the following: 6 X 3 = 18 Marks

1. A question from Unit I
2. A question from Unit I
3. A question from Unit II
4. A question from Unit II
5. A question from Unit III
6. A question from Unit III
7. A question from Unit IV
8. A question from Unit IV

SECTION B

II Answer all the Questions. **4 X 13 = 52 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.

12(a)A question from Unit IV
(OR)
(b) A question from Unit IV.

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. Biotechnology- III Year
Semester – V, Paper – V
Practical Model Question Paper

Time: 3 hrs **Max. Marks: 25**

V.	**Minor experiment**	**(5 Marks)**
VI.	**Major experiment**	**(10 Marks)**
VII.	**Spotting**	**(5 Marks)**
	2) 2) 3) 4) 5)	
VIII.	**Viva & Record**	**(5 Marks)**

Chairperson **University Nominee** **Members** **Principal**

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. Biotechnology- III Year
Semesters– V
GE1 - Basics of Biotechnology
Theory Model Question Paper

Time: 2 1/2hrs **Max. Marks: 70**

SECTION A

I Write short notes on any Six of the following: **6 X 3 = 18 Marks**

1. A question from Unit I
2. A question from Unit I
3. A question from Unit II
4. A question from Unit II
5. A question from Unit III
6. A question from Unit III
7. A question from Unit IV
8. A question from Unit IV

SECTION B

II Answer all the Questions. **4 X 13 = 52 Marks**

9 (a) A question from Unit I
(OR)
(b) A question from Unit I

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(OR)
(b) A question from Unit II.

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(OR)
(b) A question from Unit III.

12 (a)A question from Unit IV
(OR)
(b) A question from Unit IV.

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Affiliated to Osmania University, Nalakunta, Hyderabad-44

CBCS STRUCTURE FOR 2022-2023 BATCH

DEPARTMENT OF BIOTECHNOLOGY

B.Sc-BIOTECHNOLOGY/BIOCHEMISTRY, MICROBIOLOGY, CHEMISTRY - ACADEMIC YEAR 2022-

THIRD YEAR SEMESTER - VI					Semester End Exam		Continuous Internal Evaluation		Total	Practical 3 hours
Code	Course Title	Course Type	HPW	Credits	Duration in Hours	Marks	Exam Duration	Marks		
BS601	**Project in biotechnology/ IPR, Biosafety and Entrepreneurship**	**CC-IF**	**4**	**4**	**1 1/2**	**35**	**20 min.**	**15**	**50**	
BS602	English	CC-2F	3	3	2 1/2	70	30 min.	30	100	
BS603	Second Language	CC-2E	3	3	2 1/2	70	30 min.	30	100	
BS604	**Environmental Biotechnology/ Animal Biotechnology**	**DSC-1F**	**4T+3P=7**	**4+1=5**	**2 1/2**	**70**	**30 min**	**30**	**100**	**25**
BS605	Microbiology VI	DSC-2F	4T+3P=7	4+1=5	2 1/2	70	30 min	30	100	25
BS606	Chemistry-VI	DSC-3F	4T+3P=7	4+1=5	2 1/2	70	30 min	30	100	25

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – VI
Biotechnology Paper – VI – IPR, Biosafety and Entrepreneurship
OPTIONAL – I (A)

Code: BS601 (A)

Instruction	DSC –
Theory Classes	4 Hrs./Week
Credit for Theory	4
Duration of Semester Examination	2 ½ hours
Duration of Internal Examination	25 minutes
Semester Examination Marks	70 Marks
Internal Marks	30 Marks

Unit Name	TOPICS	HOURS PER UNIT
1.Intellectual Property Rights	1.1. Intellectual property – Meaning, Nature. 1.2. Significance and need of protection of intellectual property. 1.3. Types of intellectual property rights: patent, trademarks, copyrights, design registration, trade secret, geographical indicators, plant variety protection. 1.4. Copyright: meaning, nature, historical evolutions and significance. 1.5. Ownership f copyright-rights of authors and owners, trademarks. 1.6. Plant varieties protection and plant breeding rights	15 hours
2. Patent laws	2.1. Patents – concept of patent- historical overview of the patent law in India. 2.2. Kinds f patents – procedure for obtaining patent in India and in other countries. 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 – products life cycle and process design.	15 hours
3.	3.1. Prenatal diagnosis – invasive techniques – amniocentesis, chorionic villi sampling (Down Syndrome); non-invasive techniques – ultrasonography (neural tube defects). 3.2. Diagnosis using enzyme marker – Guthrie test (Phenylketonuria). 3.3. Diagnosis using monoclonal antibodies – ELISA (HIV). 3.4. DNA/RNA based diagnosis – HBV. 3.5. PCR based genotyping techniques for diagnosis – RFLP(MTHFR C677T mutation) 3.6. Chip based diagnosis and applications – colon cancer.	15 hours
4. Therapeutic approaches for human diseases	4.1. Recombinant proteins – Human growth hormone, insulin. 4.2. Gene therapy – ex vivo and in vivo gene therapy. 4.3. Stem cells – Potency definitions; embryonic and adult stem cells. 4.4. Applications of Stem cells based therapies and regenerative medicine. 4.5. DNA based vaccines, subunit vaccines – herpes simplex virus; recombinant attenuated vaccines – cholera vaccine. 4.6. Applications of monoclonal antibodies.	15 hours

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – VI
Biotechnology Paper – VI – Animal Biotechnology
OPTIONAL – II (A)

Code: BS604 (A) **DSC –**

Instruction	
Theory Classes	**4 Hrs/Week**
Practical Classes	**3 Hrs/Week**
Credit for Theory	**4**
Credit for Practical	**1**
Duration of Semester Examination	**2 ½ hours**
Duration of Internal Examination	**25 minutes**
Semester Examination Marks	**70 Marks**
Internal Marks	**30 Marks**

Unit Name	TOPICS	HOURS PER UNIT
1.Animal cell culture: principles and applications.	1.1. Cell culture technique: cell culture media, sterilization techniques. 1.2. Characteristics features of cell lines and cell line maintenance. 1.3. Methods of isolation and separation of various cell types and establishment of cell lines. 1.4. Properties and types of stem cells, culturing of embryonic stem cells and adult stem cells. 1.5. Manipulation of cells: electroporation, transfection, transduction and microinjection. 1.6. Applications of cell culture: manufacturing, toxicity testing and tissue engineering.	**15 hours**
2. In vitro techniques in animal improvement.	2.1. Principles of animal breeding: selective breeding, cross breeding and their limitations. 2.2. Superovulation, collection of semen and ova. 2.3. In vitro maturation of oocytes, artificial insemination. 2.4. In vitro fertilization, embryo collection and embryo sexing. 2.5. Somatic cell nuclear transfer, cloning of animals (example: Dolly) 2.6. Applications of in vitro techniques in animal improvement.	**15 hours**
3. Molecular markers in animal genetics.	3.1. Development in livestock genomics (Estimated Breeding Value – EBV). 3.2. Molecular markers: types and characteristics. 3.3. RFLP and RAPD. 3.4. SNPs and their application in genotyping. 3.5. Identification and isolation of desired genes of interest. 3.6. Marker-assisted selection.	**15 hours**
4. Genetically modified organisms.	4.1. Animal models and their significance 4.2. Mouse models for cancer. 4.3. Generation of transgenic mouse. 4.4. Generation of gene knock-out mouse. 4.5. Genetically modified mice as disease models. 4.6. Applications of genetically modified animals in understanding disease biology and drug development.	**15 hours**

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – VI
Biotechnology Paper VI

PRACTICALS:
ANIMAL BIOTECHNOLOGY

1. Preparation of animal cell culture media.
2. Sterilization of cell culture media.
3. Cell counting by microscopy.
4. Isolation of cells from chicken liver.
5. Establishment of primary cell culture: Liver/Spleen.
6. Preparation of metaphase chromosomes.
7. Culturing suspension cells.
8. Culturing adherent cells

Spotters:

1. Microscope.
2. CO2 Incubator.
3. Biosafety cabinet/Laminar air flow
4. Trypan blue stained cells.
5. Cell culture flasks and dishes.
6. Metaphase slide.
7. Autoclave.
8. Centrifuge.
9. Examples of an RFLP.
10. Microinjection into egg cells.

Chairperson

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – VI
Biotechnology Paper VI

REFERENCE BOOKS

1. Text book of Animal Biotechnology by B.Singh. The Energy and Resources Institute (teri).
2. Genetics for Animal Sciences by WH Freeman. Van Vleck LD, Pollak EJ & Bltenacu EAB. 1987.
3. Cancer cell culture: Methods and Protocols: 731 (Methods in Molecular Biology) Humana; 2nded.2011 edition(28 April 2011).
4. Genetic Engineering by V.K. Agarwal and P.S. Varma, S. Chand & Company Lttd, 2009.

Chairperson **University Nominee** **Members** **Principal**

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – VI
Biotechnology Paper – VI –Environmental Biotechnology
OPTIONAL – II (B)

Code: BS604 (B) **DSC –**

Instruction	
Theory Classes	**4 Hrs/Week**
Practical Classes	**3 Hrs/Week**
Credit for Theory	**4**
Credit for Practical	**1**
Duration of Semester Examination	**2 ½ hours**
Duration of Internal Examination	**25 minutes**
Semester Examination Marks	**70 Marks**
Internal Marks	**30 Marks**

Unit Name	TOPICS	HOURS PER UNIT
1.Environmental pollution.	1.1. Introduction to environment and pollution. 1.2. Types of pollution – air, water and soil pollution. 1.3. Types of pollutants – inorganic, organic and biotic. 1.4. Sources of pollution – Domestic waste, agricultural waste, industrial effluents and municipal waste. 1.5. Greenhouse gases, global warming and climate change. 1.6. Measurement methods of environmental pollution – BOD & COD.	**15 hours**
2. Biomass and Biofuels.	2.1. Renewable and non-renewable energy resources. 2.2. Fossil Fuels as energy source and their impact on environment. 2.3. Biomass as source of energy (bioenergy). 2.4. Types of Biomass – Plant, animal and microbial biomass. 2.5. Production of Biofuels: Bioethanol and Biodiesel, **Introduction and features of biofuels, Process of bioethanol production and ~~ethanol~~ recovery, biodiesel production from lipids and hydrocarbons.** 2.6. Production of Biohydrogen and biomethane, **Production of biohydrogen – photosynthetic and non-photosynthetic pathway, biogas – factors affecting biogas yields, advantages and disadvantages.**	**15 hours**
3. Biofertilizers and biopesticides.	3.1. Chemical fertilizers and their impact on environment (eutrophication) 3.2. Concepts of Biofertlizers. 3.3. Types of Biofertlizers – bacterial, fungal and algal Biofertilizers. 3.4. Pesticides and their impact on environment. 3.5. Concepts of biopesticides; types of biopesticides. 3.6. Uses of Biofertlizers & biopesticides3.	**15 hours**

4. Bioremediation of environmental pollutants.	4.1. Waste water treatment – sewage and industrial effluents (aerobic and anaerobic methods), **Process of waste water treatment, digester and its types.** 4.2. Bioremediation – concepts and types (in-situ and ex-situ bioremediation). 4.3. Bioremedtion of toxic metal ions – biosorption and bioaccumulation. 4.4. Composting of organic wastes. 4.5. Microbial remediation of pesticides and xenobiotic compounds. 4.6. Phytoremediation – concept and applications.	**15 hours**

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – VI
Biotechnology Paper VI

PRACTICALS:
ENVIRONMENTAL BIOTECHNOLOGY

1. Estimation of BOD in polluted water samples.
2. Estimation of COD in polluted water samples.
3. Estimation of total dissolved solids in waste water samples.
4. Determination of quality of water sample (Coli form test).
5. Isolation of microorganisms from polluted soil/industrial effluents.
6. Production of hydrogen or biogas.
7. Identification and characterization of bioremediation microorganisms.
8. Production of microbial Biofertilizers.

Spotters:

1. Air/water/soil pollution.
2. Municipal waste.
3. Industrial effluents.
4. Algal blooms.
5. Green house effect.
6. Plant biomass.
7. Waste water treatment plant.
8. Organic composting.
9. Biogas plant.
10. Xenobiotic degrading bacteria.
11. Phytoremediation.
12. Microbial Biofertilizers.

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. III Year Semester – VI
Biotechnology Paper VI

REFERENCE BOOKS

1. Text book of Biotechnology by H.K. Das (Wiley Publications).
2. Biotechnology by H.J. Rehmand 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 y 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 Cses by B.A. Brody andH.T.Engelhardt. Jr. (Pearson Education).

Q0. Biotechnology,IPRS and Biodiversity by M.B. Rao and Manjula Guru (Pearson Publications).

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. Biotechnology- III Year
Semesters– VI, Paper – VI
Theory Model Question Paper

Time: 2 1/2hrs **Max. Marks: 70**

SECTION A

I Write short notes on any Six of the following: **6 X 3 = 18 Marks**

1. A question from Unit I
2. A question from Unit I
3. A question from Unit II
4. A question from Unit II
5. A question from Unit III
6. A question from Unit III
7. A question from Unit IV
8. A question from Unit IV

SECTION B

II Answer all the Questions. **4 X 13 = 52 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.

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(b) A question from Unit IV.

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. Biotechnology- III Year
Semester – VI -Paper – VI
Practical Model Question Paper

Time: 3 hrs **Max. Marks: 25**

I.	Minor experiment	(5 Marks)
II.	Major experiment	(10 Marks)
III.	Spotting	(5 Marks)
	1) 2) 3) 4) 5)	
IV.	Viva & Record	(5 Marks)

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. II Year (Biotechnology) Semester – III

SKILL ENHANCEMENT COURSE-1 (SEC-1) BS 301: INDUSTRIAL FERMENTATION

Code: BS301 **DSC –Instruction**

Theory Classes	**2 Hrs/Week**
Credit for Theory	**2**
Duration of Semester Examination	**1 ½ hours**
Duration of Internal Examination	**20 minutes**
Semester Examination Marks	**35 Marks**
Internal Marks	**15 Marks**

Unit Name	TOPICS	HOURS PER UNIT
1. Production of industrial chemicals, biochemicals, chemotherapeutic products and purification of proteins.	1.1. Propionic acid, butyric acid, 2-3 butanediol, gluconic acid, itaconic acid 1.2. Biofuels; biogas, ethanol, butanol, hydrogen, biodiesel 1.3. Microbial insecticides; microbial flavours and fragrances, newer antibiotics 1.4. Anti cancer agents, amino acids 1.5. Upstream and downstream processing, solids and liquid handling 1.6. Centrifugation, filtration of fermentation broth and anaerobic fermentation	**15 hours**
2. Microbial products of pharmacological interest	2.1. Steriod fermentations and transformations 2.2. Metabolic engineering of secondary metabolism for highest productivity 2.3. Enzyme and cell immobilization techniques in industrial processing 2.4. Rate equations for enzyme kinetics- Simple and complex reactions 2.5. Enzymes in organic synthesis, proteolytic enzymes, hydrolytic enzymes. glucose isomerise 2.6. Enzymes in food technology/organic synthesis	**15 hours**

REFERENCE BOOKS

1. Patel, A.H. (1984). Industrial Microbiology, Mac Milan India Ltd., Hyderabad. 2. Cassida, L.E. (1968). Industrial Microbilogy, Wiley Eastern Ltd. & New Age International Ltd., New Delhi.
3. Crueger, W. and Crueger, A. (2000). Biotechnology - A Text Book of Industrial Microbiology, Panima Publishing Corporation, New Delhi
4. Reedy, G. (Ed.) (1987). Prescott & Dunn's Industrial Microbiology, 4th Edition, CBS Publishers & Distributors, New Delhi.
5. Reddy, S.R. and SingaraCharya, M.A. (2007). A Text Book of Microbiology - Applied Microbiology, Himalaya Publishing House, Mumbai.
6. Singh, R.P. (2007). Applied Microbiology. Kalyani Publishers, New Delhi.
7. Demain, A.L. and Davies, J.E. (1999). Manual of Industrial Microbiology and Biotechnology, ASM Press, Washington, D.C., USA.

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. II Year (Biotechnology) Semester – III
SKILL ENHANCEMENT COURSE -2 (SEC-2) BS 302: IMMUNOLOGICAL TECHNIQUES

Code: BS302 **DSC –Instruction**

Theory Classes	**2 Hrs/Week**
Credit for Theory	**2**
Duration of Semester Examination	**1 ½ hours**
Duration of Internal Examination	**20 minutes**
Semester Examination Marks	**35 Marks**
Internal Marks	**15 Marks**

Unit Name	TOPICS	HOURS PER UNIT
1. Antibody assays - Principle, Methodology and Applications	1.1. Antigen-Antibody reactions: opsonisation, neutralization, precipitation & agglutination 1.2. Immuno diffusion & radial diffusion 1.3. Immunoelectrophoresis-rocket and counter current 1.4. ELISA & western blotting 1.5. Radioimmunology assay &immunofluorescent assay 1.6. Immunohistochemistry	15 hours
Cellular Assays - Principle, Methodology and Applications	2.1. Total and differential count in human peripheral blood KB/S LTE 2.2. Separation of mononuclear cells from human peripheral blood. 2.3. Cell viability assay using tryphan blue 2.4. Lymphocyte transformation assay 2.5. Enumeration of T & B cells from human peripheral blood 2.6. Micro cytotoxicity assay for HLA typing	15 hours

REFERENCE BOOKS

1. Essential Immunology by I Roitt, Publ: Blackwell
2. Immunology by G. Reever& I. Todd, Publ. Blackwell
3. Cellular and Molecular Immunology by Abbas AK, Lichtman AH, Pillai S. Saunders publication, Philadelphia
4. Kuby's Immunology by Golds RA, Kindt TJ, Osbome BA. W.H. Freeman and company, New York

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. II Year (Biotechnology) Semester – IV
SKILL ENHANCEMENT COURSE-3 (SEC-3) BS 401: MOLECULAR MARKERS IN PLANT BREEDING

Code: BS401 — **DSC –Instruction**

Theory Classes	**2 Hrs/Week**
Credit for Theory	**2**
Duration of Semester Examination	**1 ½ hours**
Duration of Internal Examination	**20 minutes**
Semester Examination Marks	**35 Marks**
Internal Marks	**15 Marks**

Unit Name	TOPICS	HOURS PER UNIT
1. Molecular markers in Plant Breeding	1.1 Types of markers morphological. cytological, biochemical and genetic markers 1.2. Development of molecular markers-scope in plant breeding; criteria for ideal molecular markers 1.3. Types of molecular markers 1.4. Hybridization based molecular markers-RFLP 1.5. PCR based molecular markers - RAPD, SSRS. AFLP 1.6. Sequence based molecular markers - SNPs and DArTs	**15 hours**
2. Applications of Molecular markers in Plant Breeding	1.1. Segregating populations - hackcross, double haploid, F&F, families, RILS 1.2. Linkage mapping and QTI. mapping 1.3. Marker Assisted Selection (MAS)-procedure and applications 1.4. Map based cloning of genes 1.5 Fingerprinting - fingerprinting genotypes: assessment of genetic similarity among genotypes: conservation, evaluation and use genetic resources 1.6. Hybrid testing	**15 hours**

REFERENCE BOOKS

1. Gupta PK 2010. Plant Biotechnology. Rastogi Publications.
2. Chawla IIS 2011. Introduction to Plant Biotechnology. Oxford and IBII Publishing Co. Pvt Lid.
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 PublWeising K, Nybom H. Wolff K &Kahl G.
5. DNA Fingerprinting in Plants: Principles, and Applications Taylor & Francis.

Methods

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B.Sc. II Year (Biotechnology) Semester – IV

SKILL ENHANCEMENT COURSE-4 (SEC-4) BS 402: DRUG DESIGNING

Code: BS402 — **DSC –Instruction**

Theory Classes	2 Hrs/Week
Credit for Theory	2
Duration of Semester Examination	1 ½ hours
Duration of Internal Examination	20 minutes
Semester Examination Marks	35 Marks
Internal Marks	15 Marks

Unit Name	TOPICS	HOURS PER UNIT
1. Introduction to Drug Discovery	1.1. Drug discovery process - historical perspective and challenges 1.2. Drug targets: proteins- receptors, ion channels and transporters, DNA- gene specific inhibitors of transcription 1.3. Drug target identification and validation genetic approaches to identify target candidates such as mapping disease loci, role of bioinformatics in the analysis of nucleic acid sequence, protein sequence and structure 1.4. Structural bioinformatics prediction of 3D structure of protein using homology modeling, threading and Ab-initio approach 1.5. Structure-based drug design active site detection, docking, binding energy calculations 1.6. Ligand-based drug design: computational methods to screen databases for new leads	15 hours
2. Strategies of Drug Development	2.1. Strategies of drug designing: lead generation through combinatorial chemistry 2.2. Preparation of active compounds: natural products, synthetic compounds, semi synthetic compounds 2.3. Lead identification. High throughput screening and hit generation - small molecule drugs, large molecule drugs. 2.4. Lead optimization: Properties of druggable compounds (Lipinski rule), pharmacokinetics and pharmacodynamics 2.5. Screening of lead molecules from the phase I-IV to final drug molecule. 2.6. Pharmacogenomics: it's role in drug development and optimization	15 hours

REFERENCE BOOKS

1. Textbook of Drug Design Krogsgaard-Larsen, Liljefors and Madsen (Editors), Taylor and Francis, London UK, 2002.

2. Drug Discovery Handbook S.C. Gad (Editor) Wiley-Interscience Hoboken USA, 2005.

3. Advanced Computer- Assisted Techniques in Drug Discovery in Methods and Principles in Medicinal Chemistry by Han van de Waterbeemd (ed.) Volume 3,1994, Publishers, New York, NY (USA)

4. Virtual Screening for Bioactive Molecules by in Methods and Principles in Medicinal Chemistry, Edited by Hans-Joachim Bohm and Gisbert Schneider, Volume 10, 2000

5. Burger's Medicinal Chemistry and Drug Discovery, 6th Edition, Vol. 1. Principles and Practice, edited by M. E. Wolff, John Wiley & Sons: New York, 2003.

6. Real world drug discovery: A chemist's guide to biotech and pharmaceutical research by Robert M. Rydzewski, Elsevier Science, I edition (2008)

7. Drug discovery and development: Technology in transition by Raymond G Hill, Churchill Livingstone, 2 edition (2012)

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc. Biotechnology- II Year
Semesters– III & IV
SEC II & IV
Theory Model Question Paper

Time: 1 1/2hrs **Max. Marks: 50**

SECTION A

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

1. A question from Unit I
2. A question from Unit I
3. A question from Unit II
4. A question from Unit II

SECTION B

II Answer all the Questions. **2 X 10 = 20 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.

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B.Sc. Biotechnology- III Year
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1	Mrs. Sandhya Rani Andhra Mahila Sabha Arts & Science College (Autonomous) Hyderabad	9390405439
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8	Dr. K. S. N. Jyothi, Lecturer, Koti Women's College, Hyderabad	9676083339
9	Dr. K. Prasanna Latha, Sr. Scientist, Global Medical Education & Research Foundaton(GMERF)	

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