# HINDI MAHAVIDYALAYA

**(AUTONOMOUS & NAAC RE-ACCREDITED)**

**(Affiliated to Osmania University)**

**Nallakunta, Hyderabad**


5 Pages

## B.Sc. I YEAR SEMESTER I & II

## DEPARTMENT OF BIOTECHNOLOGY

## (2020-2021)

# HINDI MAHAVIDYALAYA

## (AUTONOMOUS & NAAC RE-ACCREDITED)
## BOARD OF STUDIES
## DEPARTMENT OF BIOTECHNOLOGY

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Hindi Mahavidyalaya
Nallakunta, Hyderabad

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Osmania University, Hyderabad

Dr. Smita C. Pawar
Head & Associate Professor
Chairperson- BoS in Biotechnology
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   Asst. Professor
   Department of Genetics & Biotechnology,
   Osmania University, Hyderabad

2. Dr. S Prashant
   Asst. Professor
   Department of Genetics & Biotechnology,
   Osmania University, Hyderabad

3. Mrs. Sandhya Rani
   Head- Department of Biotechnology
   Andhra Mahila Sabha Arts and Science College for Women, OU Campus
   Hyderabad

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Head & Associate Professor
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# 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. Mrs. G. Ranganayaki
3. One expert to be nominated by the Vice Chancellor from a panel of six recommended by the College Principal
   1. Dr. 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. Dr. Surekha Rani , Assistant professor, Department of Genetics and Biotechnology Osmania University, Hyderabad.
   2. Dr. S. Prashant , Assistant professor, Department of Genetics and Biotechnology , Osmania University, Hyderabad.
   3. Mrs Sandhya Rani , Head,Department of Biotechnology, Andhra Mahila Sabha Arts & Science College, 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 P. Nithish Reddy, 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

4.1 Welcome address by the chair.

4.2 Previous Meeting Details.

4.3 Details of choice based credit system.

4.4 Discussion and Distribution of Common Core Syllabus for all the Semesters (I and II)

4.5 Marks allotted for internal and end semester exams.

4.6 Discussion on Pattern and model paper of Semester Exam and internal exam for all the Semesters (I and II)

4.7 Discussion on Practical exam model paper for all the Semesters (I and II)

4.8 Panel of Examiners

4.9 Any other matter

4.10 Vote of thanks

# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
## (AUTONOMOUS)
## DEPARTMENT OF BIOTECHNOLOGY
## BOARD OF STUDIES
## Academic Year – 2020-2021
### Minutes of BOS Meeting

**BOS meeting of the Department of Biotechnology was held on 05 – 03 - 2021**
**The following members were present**

| | | |
|---|---|---|
| Dr. Smita C. Pawar | - | University Nominee |
| Smt. Nita Kulkarni | - | Chair person |
| Dr. Surekha Rani | - | Member of BOS |
| Dr. S. Prashant | - | Member of BOS |
| Mrs. Sandhya Rani | - | Member of BOS |

**4.1 Welcome address by the chair**

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

**4.2 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.

**4.3 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.

**4.4 Discussion and Distribution of Common Core Syllabus for semesters I and II.**

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. I YEAR in I and II semesters. The following changes are made in the syllabus:

**Semester I** Additions :-

**Unit 1**

**A) Osmosis, cell membrane permeability.**

**B ) Cell-cell interaction, cytoskeleton.**

**Unit 2**

**C ) Phagocytosis and pinocytosis.**

**D ) Cell division in yeast – Saccharomyces cerevisiae.**

**Unit 3**

**E ) Back cross, test cross.**

**Semester II**

Unit 1

**A ) Fatty acids-importance, classification of fatty acids-saturated and unsaturated**

Unit 2

**B) Amino acids- importance, classification, structure, physical and chemical properties of amino acids**

**Unit 3**

**C) Classification of bacteria and virus.**

**D) Structure and general characteristics of virus and fungi.**

**E) Disease causing pathogens and symptoms (TB, leprosy).**

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.

**4.5 Marks allotted for Internal and end Semester exams.**

1. Internal assessment is of 30 marks in which 20 marks are for online 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.
2. Theory Question paper is of 70 marks.
3. Total allotted marks are 70 for each theory paper (I & II).
4. Internal assessment is of 15 marks for AECC. One online internal assessment of 10 Marks will be conducted and added in the marks of Theory exam.
5. Theory Question paper for AECC is of 35 marks.
6. Total allotted marks are 50 for each AECC.

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

**4.6 Discussion 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 tests will be conducted for DSC 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. It was informed by the department that in each Semester one Online test will be conducted for AECC of 10 marks. The internal assessment will have two sections

   Section – A 10 Multiple choice questions each carries 1 mark (10 x 1 =10M),
   Section – B Assignment/Seminar – 5 Marks

3. 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.

4. Model Question paper for Semester I and Semester II 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)

5. Model Question paper of AECC for Semester I and Semester II was discussed. Theory paper for each AECC will have 2 sections.
   i) Section A contains 4 short Questions. The student has to answer THREE questions. Each Question carries 5 Marks (3X5=15 Marks)
   ii) Section B contains 2 Essay type Questions with internal choice. Each Question carries 10 Marks (2X10=20 Marks)

- Pattern of Model Theory Question Papers for DSC and AECC Paper I and Paper II are enclosed.

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

**4.7 Discussion on Practical Exam Model paper.**

- It is decided that the practical examinations held for B.Sc first year (Semester I & II ) from the academic year 2020-21 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 3 hours.
- Pattern of Model Practical Question Papers for Paper I and Paper II are enclosed.
- Pattern of Model Practical Question Papers was approved by Members of BOS

**2.7 Panel of Examiners**

The panel of examiners was approved by the members.

- List is enclosed

**2.8 Any other matter.**

**2.9 Vote of Thanks**

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

**Chairperson**

**University Nominee**

Dr. Smita C. Pawar
Head & Associate Professor
Chairperson- BoS in Biotechnology
Department of Genetics & Biotechnolgy
Osmania University, Hyd-07

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# CBCS STRUCTURE FOR 2020-2021 BATCH

## B.Sc.-BIOTECHNOLOGY, MICROBIOLOGY, CHEMISTRY

ADEMIC YEAR 2020-2021

### FIRST YEAR SEMESTER – I

| Code | Course Title | Course Type | HPW | Credits | Semester End Exam | | Continuous Internal Evaluation | | Total | Practical 3 hours |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Duration in Hours | Marks | Exam Duration | Marks | | |
| BS101 | Environmental Studies | AECC-1 | 2 | 2 | 1 1/2 | 35 | 20 min. | 15 | 50 | |
| BS102 | English-I | CC-1A | 4 | 4 | 3 | 70 | 20 min. | 30 | 100 | |
| BS103 | Second Language-I | CC-1A | 4 | 4 | 3 | 70 | 20 min. | 30 | 100 | |
| BS104 | Biotechnology I | DSC-1A | 4T+2P=6 | 4+1=5 | 3 | 70 | 25 min | 30 | 100 | 25 |
| BS105 | General Microbiology-I | DSC-1A | 4T+2P=6 | 4+1=5 | 3 | 70 | 20 min | 30 | 100 | 25 |
| BS106 | Chemistry-I | DSC-1A | 4T+2P=6 | 4+1=5 | 2 1/2 | 70 | 25 min | 30 | 100 | 25 |
| | | | 28 | 25 | | 390 | | 180 | 625 | |

### FIRST YEAR SEMESTER – II

| Code | Course Title | Course Type | HPW | Credits | Semester End Exam | | Continuous Internal Evaluation | | TOtal | Practical 3 hours |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Duration in Hours | Marks | Exam Duration | Marks | | |
| BS201 | Basic Computer Skills | AECC-2 | 2 | 2 | 1 1/2 | 35 | 20 min. | 15 | 50 | |
| BS202 | English-II | CC-1B | 4 | 4 | 3 | 70 | 20 min. | 30 | 100 | |
| BS203 | Second Language-II | CC-2B | 4 | 4 | 3 | 70 | 20 min. | 30 | 100 | |
| BS204 | Biotechnology II | DSC-1B | 4T+2P=6 | 4+1=5 | 3 | 70 | 20 min | 30 | 100 | 25 |
| BS205 | General Microbiology-II | DSC-2B | 4T+2P=6 | 4+1=5 | 3 | 70 | 20 min | 30 | 100 | 25 |
| BS206 | Chemistry-II | DSC-3B | 4T+2P=6 | 4+1=5 | 2 1/2 | 70 | 25 min | 30 | 100 | 25 |
| | | | 28 | 25 | | 390 | | 180 | 625 | |

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Dr. Smita C. Mahajal
Head & Associate Professor
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Department of Genetics & Biotechnology
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# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
# (AUTONOMOUS)

**B.Sc. I Year Semester – I**

**Biotechnology Paper I – Cell Biology and Genetics**

| | |
|---|---|
| **Code: BS104** | **DSC –** |
| **Instruction** | |
| **Theory Classes** | **4 Hrs/Week** |
| **Practical Classes** | **2 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. Cell structure and Functions** | 1.1. Cell as basic unit of living organisms, **ultrastructure of prokaryotic cell (cell membrane-models of cell membrane, plasmids, Nucleoid)**<br>1.2. Ultrastructure of eukaryotic cell (cell wall, cell membrane, nucleus, mitochondria, chloroplast, endoplasmic reticulum, Golgi apparatus, vacuoles)<br>1.3. Structure of chromosome-morphology, components of chromosomes (histones and nonhistones), specialized chromosomes (Polytene, Lampbrush)<br>1.4. Chromosomal aberrations- structural and numerical.<br>**1.5. Osmosis, cell membrane permeability.**<br>**1.6. Cell-cell interaction, cytoskeleton.** | **15 hours** |
| **2. Cell Division and Cell cycle** | 2.1. Bacterial cell division<br>2.2. Eukaryotic cell cycle –phases, **Mitosis - Stages (spindle assembly)-significance**<br>2.3. Meiosis- Stages (synaptonemal complex)-significance<br>2.4. Senescence, necrosis and Apoptosis.<br>**2.5. Phagocytosis and pinocytosis.**<br>**2.6. Cell division in yeast – Saccharomyces cerevisiae.** | **15 hours** |
| **3. Principles and mechanism of inheritance.** | 3.1. Mendel's experiments- factors contributing to success of Mendel's experiments.<br>3.2. Law of segregation- Monohybrid Ratio; Law of independent assortment- Dihybrid Ratio, Trihybrid Ratio, **back cross, test cross.**<br>3.3. Deviation from Mendel's laws- partial or incomplete dominance (eg: Flower Color in Mirabilis jalapa), Co-dominance (eg: MN Blood groups), Non allelic interactions-types of epistasis, modification of dihybrid ratios.<br>3.4. Penetrance and Expressivity (eg: Polydactyly, Waardenburg syndrome), pleiotropism, phenocopy- microcephaly, cleft lip.<br>3.5. Multiple alleleism (eg: Coat color in Rabbits, eye color in Drosophila and ABO Blood groups)<br>3.6. X-Y chromosomes - Sex determination in Drosophila, Man, X-linked | **15 hours** |

| | | |
|---|---|---|
| | inheritance– Hemophilia and Color blindness; X-inactivation, **pedigree analysis.** | |
| **4.** Linkage, Recombination and Extension to Mendel's Laws | 4.1. Linkage and recombination- Cytological proof of crossing over, phases of linkage, recombination frequency, gene mapping and map distance<br>4.2. Non-Mendelian Inheritance – Maternal effect (Shell coiling in snail), variegation in leaves of Mirabilis jalapa<br>4.3. Cytoplasmic male sterility in Maize.<br>4.4. Mitochondrial inheritance in human and poky in Neurospora crassa.<br>4.5. Chloroplast inheritance in Chlamydomonas 4.6. Hardy-Weinberg Equilibrium | **15 hours** |

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

**CORE-I: PRACTICALS CELL BIOLOGY AND GENETICS**

1. Microscopic observation of cells: bacteria, fungi, plant and animal
2. Preparation of different stages of Mitosis (onion root tips)
3. Preparation of different stages of Meiosis (grasshopper testis)
4. Preparation of Polytene chromosome from Drosophila salivary gland
5. Monohybrid and dihybrid ratio in Drosophila
6. Monohybrid and dihybrid ratio in Maize
7. Problems on co-dominance, Epistasis, two point and three point test cross, gene mapping.
8. Statistical applications of Hardy-Weinberg Equilibrium

**Spotters:**

1. Prokaryotic Cell(Bacteria),
2. Mitochondria,
3. Chlorolplast,
4. Polytene Chromosomes,
5. Test Cross,
6. Blood Grouping,
7. Hemophilia Pedigree,
8. Crossing Over
9. Synaptonemal Complex,
10. Nucleosome Model.

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Dr. Smita C. Pawar
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## (AUTONOMOUS)
### B.Sc. I Year Semester – I
### Biotechnology Paper I

**REFERENCE BOOKS**


1. Cell & Molecular Biology. E.D.D De Robertis & E.M.F De Robertis, Waverly publication
2. An introduction to Genetic Analysis by Anthony, J.F. J.A. Miller, D.T. Suzuki, R.C. Richard Lewontin, W.M-Gilbert, W.H. Freeman publication
3. Principles of Genetics by E.J.Gardner and D.P. Snusted. John Wiley & Sons, New York
4. The science of Genetics, by A.G. Atherly J.R. Girton, J.F. Mcdonald, Saundern College publication
5. Principles of Genetics by R.H. Tamarin McGrawhill
6. Theory & problems in Genetics by Stansfield, Schaum out line series McGrawhill
7. Molecular Cell Biology Lodish, H., Baltimore, D; fesk, A., Zipursky S.L., Matsudaride, P. and Darnel. American Scientific Books. W.H. Freeman, New York
8. The cell: A molecular approach. Geoffrey M Cooper, Robert E Hausman, ASM press
9. Cell and Molecular Biology, Concepts and Experiments – Gerald Karp, John Wiley & Sons, Inc.
10. Cell Biology And Genetics by P.K. GUPTA 6


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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc Biotechnology- I[st] Year
Semesters – I - Paper – I
Theory Model Question Paper

**Time: 2 1/2 hrs** **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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Dr. Smita C. Pawar
Head & Associate Professor

**HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD**
**(AUTONOMOUS)**
**B.Sc Biotechnology- I[st] Year**
**Semester – I - Paper – I**
**Practical Model Question Paper**

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

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

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc Biotechnology- I$^{st}$ Year
Semester I

AECC-I

# Environmental Studies

Credits – 2

THEORY MODEL PAPER

TIME: 1 $^{1}/_{2}$ HOURS

MAX MARKS: 35

## SECTION-A

3x5=15marks

**Answer the following in short:**

1. Unit I
2. Unit I
3. Unit II
4. Unit II

## SECTION-B

2x10=20marks

**Answer the following essays:**

1 (a) Unit-I

OR

(b) Unit-I

2 (a) Unit - II

OR

(b) Unit - II

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# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD

(AUTONOMOUS)

**B.Sc. I Year Semester – II**

**Biotechnology Paper II - BIOLOGICAL CHEMISTRY AND MICROBIOLOGY**

| | |
|---|---|
| **Code: BS204** | **DSC –** |
| **Instruction** | |
| **Theory Classes** | **4 Hrs/Week** |
| **Practical Classes** | **2 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. Biomolecules | 1.1. Carbohydrates- importance, classification; structure and functions of monosaccharides (glucose & fructose), disaccharides (sucrose, lactose & maltose) and polysachharides (starch, glycogen & insulin)<br>1.2. Proteins- importance, structure of proteins- primary, secondary, tertiary and quaternary, **peptide bond formation.**<br>1.3. Lipids- importance, classification- simple lipids (triacylglycerides & waxes), complex lipids (phospholipids & glycolipids), derived lipids (steroids, terpenes & carotenoids)<br>**1.4. Fatty acids-importance classification of fatty acids-saturated and unsaturated.**<br>1.5. Nucleic acids :structure and chemistry of DNA (Watson and crick) and RNA(TMV) Structure and forms of DNA (A, B and Z)<br>1.6. Enzymes- importance, classification and nomenclature; Michaelis-Menton Equation, factors influencing the enzyme reactions; enzyme inhibition (competitive, uncompetitive & mixed), co-enzymes | 15 hours |
| 2. Bioenergetics | 2.1 Glycolysis, Tricarboxylic Acid (TCA) Cycle,<br>2.2 Electron Transport, Oxidative Phosphorylation<br>2.3 Gluconeogenesis and its significance<br>2.4. Amino acids- importance, classification, structure, physical and **chemical properties of amino acids;** Transamination and Oxidative deamination reactions of amino acids<br>2.5 B-Oxidation of Fatty acids<br>2.6 Glyoxalate cycle. | 15 hours |
| 3. Fundamentals of Microbiology | 3.1 Microscopy: Bright field microscopy, Dark field microscopy, Phase contrast microscopy, Fluorescent microscopy, Scanning and | 15 hours |

| | | |
|---|---|---|
| | Transmission electron microscopy<br>3.2 **Classification of bacteria and virus.**<br>3.3 Structure and general characteristics **of virus and fungi.**<br>3.4 **Structure and classification of algae.**<br>3.5 Disease causing pathogens and symptoms (Eg: Mycobacterium, Hepatitis)<br>3.6 **Disease causing pathogens and symptoms (TB, leprosy).** | |
| 4. Culture and identification of microorganisms | 4.1 Methods of sterilization- physical and chemical methods<br>4.2 Bacterial nutrition nutritional types of bacteria, essential macro micro nutrients and growth factors.<br>4.3 Bacterial growth curve-batch and continuous cultures, synchronous cultures measurement of bacterial growth-measurement of cell number and cell mass.<br>4.4 Factors affecting bacterial growth<br>4.5 Culturing of anaerobic bacteria and viruses<br>4.6 Pure cultures and its characteristics | **15 HOURS** |

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# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
## (AUTONOMOUS)
### B.Sc. I Year Semester – II
### Biotechnology Paper II

**PRACTICALS**
**BIOCHEMISTRY AND MICROBIOLOGY**

1. Preparation of normal molar, molal solutions.
2. Preparation of buffers (acidic, basic ,neutral)
3. Qualitative tests of sugars, amino acids and lipids
4. Estimation of total sugars by anthrone method
5. Separation of amino acids by paper chromatography
6. Estimation of proteins by biuret method
7. Sterilization methods
8. Preparation of microbiological media (bacterial, algal & fungal)
9. Isolation of bacteria by streak, spread and pour plate methods
10. Isolation of bacteria from soil
11. Simple staining and differential staining (gram's staining)
12. Bacterial growth curve
13. Technique of micrometry(ocular and stage)

**Spotters:**

1. Osazone
2. Globular protein
3. Lock and key model
4. Completive inhibition
5. RUBISCO
6. ATP synthase
7. Autoclave
8. Laminar air flow
9. Tyndalization
10. Bacterial growth curve
11. Hot air oven
12. Serial dilution technique

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### B.Sc. I Year Semester – II
### Biotechnology Paper II

**REFERENCE BOOKS**


1. Lehninger Principles of Biochemistry By: David L. Nelson and Cox
2. Biochemistry By: Rex Montgomery
3. Harper's Biochemistry By: Robert K. Murray
4. Enzymes By: Trevor Palmer
5. Enzyme structure and mechanism By: AlanFersht
6. Principles of Biochemistry By: Donald J. Voet, Judith G.Voet, Charlotte W.Pratt
7. Analytical Biochemistry By: Cooper
8. Principles and techniques of Biochemistry and Molecular Biology Edited By: Keith Wilson and John Walker
9. Practical Biochemistry By: Plummer
10. Biology of Microorganisms by: Brock, T.D. and Madigan, M.T.
11. Microbiology by: Prescott, L.M., Harley, J.P. Klein,D.A.
12. Microbiology by: Pelczar, M.J, Chan, E.C.S., Kreig,N


**Chairperson**

**University Nominee**

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**Principal**

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc Biotechnology- I[st] Year
Semesters – II - Paper – II
Theory Model Question Paper

**Time: 2 1/2 hrs** **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.

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

Dr. Smita C. Pawar
Head & Associate Professor

2.

3.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc Biotechnology- I[st] Year
Semester – II - Paper – II
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 Principa

Dr. Smita C. Pawar
Head & Associate Professor
Chairperson- BoS in Biotechnology
Department of Genetics & Biotechnology
Osmania University, Hyd-07

1.

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3.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc Biotechnology- I$^{st}$ Year

Semester II

Basic Computer Skills

AECC- Credits – 2

THEORY MODEL PAPER

TIME: 1 $^{1}/_{2}$ HOURS MAX MARKS: 35

SECTION-A

Answer the following in short: 3x5=15marks

4. Unit I
5. Unit I
6. Unit II
4. Unit II

SECTION-B

Answer the following essays: 2x10=20marks

1 (a) Unit-I

OR

(b) Unit-I

2 (a) Unit - II

OR

(b) Unit - II

Chairperson University Nominee Members Principal

Dr. Smita C. Pawar

**HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD**
**(AUTONOMOUS)**
**B.Sc Biotechnology- I$^{st}$ Year**
**Panel of Examiners**

| S.No. | Name and Designation | Mobile No. |
|---|---|---|
| 1 | Mrs. Sandhya Rani<br>Andhra Mahila Sabha Arts & Science College (Autonomous)<br>Hyderabad | 9390405439 |
| 2 | Smt. G. Y. Kavitha<br>V Degree College<br>Domalguda, Hyderabad | 9395321541 |
| 3 | Ms. Mohammadi Begum<br>B.J.R.Govt Degree College<br>Hyderabad | 9948659388 |
| 4 | Smt. C. H Pradyutha<br>Reddy Women's College<br>Mehdipatnam, Hyderabad | 9705335025 |
| 5 | Dr. S. Prashanth<br>Assistant Professor<br>Department of Biotechnology and Genetics, O.U. , Hyderabad | |
| 6 | Dr. Surekha Rani<br>Department of Biotechnology<br>Osmania University, Hyderabad | 9866620067 |
| 7 | Dr. Rupashree<br>Lecturer<br>Koti Women's College , Hyderabad | 9849446549 |
| 8 | Dr. K. S. N. Jyothi,<br>Lecturer,<br>Koti Women's College, Hyderabad | 9676083339 |

Head & Associate Professor
Chairperson- Board of Studies in Biotechnology
Department of Genetics & Biotechnology
Osmania University

# HINDI MAHAVIDYALAYA

(AUTONOMOUS & NAAC RE-ACCREDITED)

(Affiliated to Osmania University)

Nallakunta, Hyderabad

## B.Sc. II YEAR SEMESTER III &IV

## DEPARTMENT OF

## BIOTECHNOLOGY (2021-2022)

6 pages

# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
## (AUTONOMOUS AND NAAC RE-ACCREDITED)
## DEPARTMENT OF BIOTECHNOLOGY

**Chairperson**

Mrs. Nita kulkarni
Head-Department of Biotechnology
Hindi Mahavidyalaya
Nallakunta, Hyderabad.

**University Nominee**

Professor Smita C Pawar
Chairperson - BOS
Department of Biotechnology
Osmania University, Hyderabad.

Chairperson
Board of Studies in Biotechnology
Department of Genetics
Osmania University Hyd.

**Members of BOS**

1.Dr. Surekha Rani
Associate Professor.
Department of Genetics and Biotechnology
Osmania University, Hyderabad.

Dr.H.Surekha Rani
Associate Professor
Department of Genetics & Biotechnology
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2. Dr. S. Prashanth
Assistant Professor
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Osmania University.

Dr. S. PRASHANT
Assistant Professor
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Hyderabad - 500 007

3. Mrs. P. Sandhya Rani
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Department of Biotechnology
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Nallakunta, Hyderabad-44

University Nominee

Chairperson
Board of Studies in Biotechnology
Department of Genetics
Osmania University Hyd.

Members

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Department of Genetics & Biotechnology
Osmania University, Hyderabad-500 007.

1.

2.

3.

Principal
PRINCIPAL
HINDI MAHA VIDYAL
(AUTONOMOU
Arts, Commerce &
Nallakunta, Hyde

Department of Biotechnology
ANDHRA MAHILA SABHA
Arts & Science College for Wo
O.U. Campus, Hyderabad-7

# 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
3. One expert to be nominated by the Vice Chancellor from a panel of six recommended by the College Principal
   1. Professor 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. Dr. Surekha Rani, Associate Professor, Department of Genetics and Biotechnology, Osmania University, Hyderabad.
   2. Dr. S. Prashant, Assistant Professor, Department of Genetics and Biotechnology, Osmania University, Hyderabad.
   3. Mrs P. Sandhya Rani, Head Department of Biotechnology, Andhra Mahila Sabha Arts & Science College, 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 P. Nithish Reddy, M.sc Genetics.
   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

PRINCIPAL
HINDI MAHA VIDYALAY
(AUTONOMOUS)
Arts, Commerce & Scie
Nallakunta, Hyderaba

Department of Biotechnology
Hindi Mahavidyalaya
AUTONOMOUS & NAAC REACCREDITED)
Nallakunta, Hyderabad-44.

Chairperson
Board of Studies in Biotechnology
Department of Genetics
Osmania University Hyd.

Dr. H. Surekha Rani
Associate Professor
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Dr. S. PRASHANT
Assistant Professor
(Biotechnology)
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Osmania University,
Hyderabad - 500 007

Department of Biotech
ANDHRA MA
Arts & Science Co
O.U. Campus H

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

1.1 Welcome address by the chair.

1.2 Previous Meeting Details.

1.3 Details of choice based credit system.

1.4 Discussion and Distribution of Common Core Syllabus for all the Semesters (III and IV)

1.5 Marks allotted for internal and end semester exams.

1.6 Discussion on Pattern and model paper of Semester Exam and internal exam for all the Semesters (III and IV)

1.7 Discussion on Practical exam model paper for all the Semesters (III and IV)

1.8 Panel of Examiners

1.9 Any other matter

1.10 Vote of thanks

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Board of Studies in Biotechnology
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Dr.H.Surekha Rani
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artment of Biotechnology
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TONOMOUS & NAAC REACCREDITED)
Nallakunta, Hyderabad-44.

Department of Biotechnology
ANDHRA MAHILA SABHA
Arts & Science College for Wome
O.U. Campus, Hyderabad-7.

# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
## (AUTONOMOUS)
## DEPARTMENT OF BIOTECHNOLOGY
## BOARD OF STUDIES
## Academic Year – 2021-2022
### Minutes of BOS Meeting

**BOS meeting of the Department of Biotechnology was held on**
18,.. November,..2021.....
**The following members were present**

| | | |
|---|---|---|
| Professor. Smita C. Pawar | - | University Nominee |
| Smt. Nita Kulkarni | - | Chair person |
| Dr. Surekha Rani | - | Member of BOS |
| Dr. S. Prashant | - | Member of BOS |
| Mrs. P. Sandhya Rani | - | Member of BOS |

**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 TSCHE 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.

**1.4 Discussion and Distribution of Common Core Syllabus for semesters III and IV.**

i. Members were informed by the chair that Department of Biotechnology, Hindi Mahavidyalaya is following common core syllabus prescribed by TSCHE with few changes for B.Sc. II YEAR in III and IV semesters.
ii. The syllabus comprise of 4 units.
iii. **The following are the additions.**

SEMESTER-III

Unit-1:

A) Semi conservative DNA Replication-Messelson and Stahl Experiment

B) Mutagens- Physical and Chemical

Unit 3:

A)Positive and Negative control of Gene Expression

Unit 4:

A) ~~Polymerase Chain Reaction~~

The following are the additions in semester IV

Unit 1:

A) Uses of Databases, Data-mining

B) UNIPROT

Unit 4:

A) F-Test

B) Regression Analysis

iv. Syllabus copy for both the semesters is enlosed.

v. Syllabus was approved by the Members of BOS.

**1.5 Marks allotted for Internal and end Semester exams.**

1. Internal assessment is of 30 marks in which 20 marks are for online 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.

2. Theory Question paper is of 70 marks.

3. Total allotted marks are 70 for each theory paper (III & IV).

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

**1.6 Discussion 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 tests will be conducted for DSC 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 30 Min and Semester exam duration will be of 21/2 hrs.

3. Model Question paper for Semester III and Semester IV 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)

**1.7 Discussion on Practical Exam Model paper.**

- It is decided that the practical examinations held for B.Sc second year (Semester III& IV) from the academic year 2021-22 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 3 hours.
- Pattern of Model Practical Question Papers for Paper III and Paper IV are enclosed.
- Pattern of Model Practical Question Papers was approved by Members of BOS

**1.8 Panel of Examiners**

The panel of examiners was approved by the members.

- List is enclosed

**1.9 Any other matter.**

**2.0 Vote of Thanks**

Meeting concluded with the Vote of Thanks by G. Lahari.

Chairperson — University Nominee

Department of Biotechnology
Hindi Mahavidyalaya
(AUTONOMOUS & NAAC REACCREDITED)
Nallakunta, Hyderabad-44.

Chairperson
Board of Studies In Biotechnology
Department of Genetics
Osmania University Hyd.

Members

1. H. Surekha Rani
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2. Dr. S. PRASHANT
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PRINCIPAL
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Arts, Commerce & Scie
Nallakunta, Hyderabad-4

Principal

# HINDI MAHAVIDYALAYA

(AUTONOMOUS)

Affiliated to Osmania University, Nallakunta, Hyderabad-44

## CBCS STRUCTURE FOR 2020-2021 BATCH

**B.Sc** - BIOTECHNOLOGY, MICROBIOLOGY, CHEMISTRY

**ACADEMIC YEAR 2020-2021**

| SECOND YEAR SEMESTER - III | | | | | Semester End Exam | | Continuous Internal Evaluation | | Total | Practical 3 hours |
|---|---|---|---|---|---|---|---|---|---|---|
| ode | Course Title | Course Type | HPW | Credits | Duration in Hours | Marks | Exam Duration | Marks | | |
| S301 | SEC - 1 | SEC-1 | 2 | 2 | 1 1/2 | 35 | 20 min. | 15 | 50 | |
| S302 | SEC- 2 | SEC-2 | 2 | 2 | 1 1/2 | 35 | 20 min | 15 | 50 | |
| S303 | English-III | CC-1C | 4 | 4 | 2 1/2 | 70 | 30 min. | 30 | 100 | |
| S304 | Second Language-III | CC-2C | 4 | 4 | 2 1/2 | 70 | 30 min. | 30 | 100 | |
| **S305** | **Biotechnology – III Molecular Biology ad Recombinant DNA Technology** | **DSC-1C** | **4T+3P=7** | **4+1=5** | **2 1/2** | **70** | **30 min** | **30** | **100** | **25** |
| S306 | Microbiology III | DSC-2C | 4T+3P=7 | 4+1=5 | 2 1/2 | 70 | 30 min | 30 | 100 | 25 |
| S307 | Chemistry-III | DSC-3C | 4T+3P=7 | 4+1=5 | 2 1/2 | 70 | 30 min | 30 | 100 | 25 |
| | | | 33 | 27 | | 425 | | 175 | 675 | |

Chairperson

University Nominee

Members

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2.
3.

Dr.H.Surekha Rani
Associate Professor
Department of Genetics & Biotechnology
Osmania University, Hyderabad-500 007

Chairperson
Board of Studies in Biotechnology
Department of Genetics
Osmania University Hyd.

Assistant Professor
(Biotechnology)
Department of Genetics

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

Department of Biotechnology
ANDHRA MAHILA SABHA
Arts & Science College for Women
Campus, Hyderabad

# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
## (AUTONOMOUS)
### B.Sc. II Year Semester – III
### Biotechnology Paper III – Molecular Biology and Recombinant DNA Technology

DSC

| | |
|---|---|
| Code: BS104 | |
| –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 | |

| Unit Name | TOPICS | HOURS PER UNIT |
|---|---|---|
| 1. Genome organization and DNA replication | 1.1. DNA as the genetic material – Griffith's transformation experiment, Avery, MacLeod and McCarty's experiments and Hershey & Chase phage – labelling experiment; RNA as the genetic material – Tobacco mosaic virus.<br>1.2. Organization of prokaryotic genome and eukaryotic nuclear genome.<br>1.3 Organization of Mitochondrial and chloroplast genomes.<br>1.4.DNA Replication – **Semi-Conservative DNA replication – Messelson and Stahl experiment,** enzymes involved in the replication of DNA, Origin of replication fork.<br>1.5. Replication of prokaryotic genome and nuclear genome of eukaryotes.<br>1.6 Mutations – types of mutations; spontaneous mutations and induced mutations, **Mutagens – Physical and Chemical mutagens.**<br>1-7 DNA damage & repair mechanism | 15 hours |
| 2.Gene expression in prokaryotes and eukaryotes. | 2.1Structure of prokaryotic gene; Structure of eukaryotic gene; Structure and functions of prokaryotic RNA polymerase - subunits<br>2.2 Transcription machinery in eukaryotes (RNA polymerase) and their structural and functional features.<br>2.3 Genetic code – properties, Deciphering of genetic code, wobble hypothesis.<br>2.4. Transcription mechanism in prokaryotes – initiation, elongation & proof reading, termination (rho independent &rho dependent)<br>2.5. Transcription in eukaryotes – initiation, elongation & termination factors. | 15 hours |

| | | |
|---|---|---|
| | 2.6. translation mechanism - initiation, elongation and termination. | |
| **3. Gene regulation in prokaryotes and eukaryotes** | 3.1 prokaryotic transcriptional regulation (inducible system) – **Positive and Negative control of Gene Expression,** operon concept; lac operon & glucose effect.<br>3.2 prokaryotic transcriptional regulation (repressible system) – tryptophan operon<br>3.3 Post – Transcriptional modification- capping, poly-adenylation<br>3.4 Splicing and alternate splicing<br>3.5 Post – translational modification – glycosylation, acetylation and ubiquitination<br>3.6. Gal regulation in yeast - mating type gene switching | **15 hours** |
| **4. Recombinant DNA Technology** | 4.1. Enzymes used in molecular cloning; restriction endonuclease, DNA ligases, polynucleotide kinase, Klenow enzyme and DNA polymerase<br>4.2. Cloning vectors; PBR 322, bacteriophage, cosmid, phagemid, shuttle vectors<br>4.3 Vectors for library preparation (lambda phage vectors, cosmids, BAC & YAC)<br>4.4. Gene transfer techniques: physical, chemical and biological methods<br>4.5 Selection of recombinant clones – colony hybridization & library screening<br>4.6 Applications of recombinant DNA technologies – agriculture, diagnostic, industrial, pharmaceutics and medicine, ~~**Polymerase Chain Reaction**~~ | **15 Hours** |

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University Nominee

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Board of Studies in Biotechnology
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PRINCIPAL
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Associate Professor
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# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
## (AUTONOMOUS)
### B.Sc. II Year Semester – III
### Biotechnology Paper III

**CORE-I Molecular biology and recombinant DNA technology**

1. Isolation of DNA from bacterial cells / Human blood
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

**Spotters:**

1. PCR
2. RNA polymerase
3. Okazaki fragments
4. Plasmid vector map
5. Prokaryotic gene
6. Eukaryotic gene
7. Splicing
8. Post transcriptional modifications
9. Point mutations
10. Lac operon
11. Tryptophan operon
12. Post translational modifications (PTMS)

Chairperson — University Nominee — Members

Chairperson
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PRINCIPAL
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# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
## (AUTONOMOUS)
### B.Sc. II Year Semester – III
### Biotechnology Paper III

REFERENCE BOOKS


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


Chairperson
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.ScBiotechnology-2nd Year
Semester – II -Paper – III
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) |

Chairperson
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University Nominee

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# HINDI MAHAVIDYALAYA

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## CBCS STRUCTURE FOR 2020-2021 BATCH

B.Sc.-BIOTECHNOLOGY, MICROBIOLOGY, CHEMISTRY

ACADEMIC YEAR 2020-2021

| SECOND YEAR SEMESTER - IV | | | | | Semester End Exam | | Continuous Internal Evaluation | | Total | Practical 3 hours |
|---|---|---|---|---|---|---|---|---|---|---|
| Code | Course Title | Course Type | HPW | Credits | Duration in Hours | Marks | Exam Duration | Marks | | |
| BS401 | SEC - 3 | SEC - 3 | 2 | 2 | 1 1/2 | 35 | 20 min. | 15 | 50 | |
| BS402 | SEC - 4 | SEC - 4 | 2 | 2 | 1 1/2 | 35 | 20 min | 15 | 50 | |
| BS403 | English-IV | CC-1D | 4 | 4 | 2 1/2 | 70 | 30 min. | 30 | 100 | |
| BS404 | Second Language-IV | CC-2D | 4 | 4 | 2 1/2 | 70 | 30 min. | 30 | 100 | |
| **BS405** | **Biotechnology –IV Bioinformatics and Biostatistics** | **DSC-1D** | **4T+3 P=7** | **4+1=5** | **2 1/2** | **70** | **30 min** | **30** | **100** | **25** |
| BS406 | Microbiology-IV | DSC-2D | 4T+3 P=7 | 4+1=5 | 2 1/2 | 70 | 30 min | 30 | 100 | 25 |
| BS407 | Chemistry-IV | DSC-3D | 4T+3 P=7 | 4+1=5 | 2 1/2 | 70 | 30 min | 30 | 100 | 25 |
| | | | 33 | 27 | | 425 | | 175 | 675 | |

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# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD

(AUTONOMOUS)

B.Sc. II Year Semester – IV

**Biotechnology Paper IV – Bioinformatics and Biostatistics**

**Code: BS204**

| | |
|---|---|
| **INSTRUCTION** | **DSC –** |
| **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.Introduction to bioinformatics and biological databases | 1.1. Bioinformatics definition, history, scope and applications<br>1.2. Bioinformatics tools and resources – internet basics, role of internet, free online tools, downloadable free tools<br>1.3. Bioinformatic web portals – NCBI, EBI, ExPASy<br>1.4 Biological databases: Classification of databases – primary (Genbank), secondary (PIR), tertiary or composite (KEGG) databases<br>1.5. Sequence Databases – DNA sequence databases (ENA & DDBJ), **Uses of Databases, Data mining**<br>1.6. Protein sequence databases (Swissport & PROSITE, **UNIPROT**) | **15 hours** |
| 2. Sequence Alignment | 2.1. Basic of sequence alignment – Match, Mismatch, gaps, gaps penalties, scoring alignment<br>2.2. types of sequence alignment – pairwise and multiple alignment, local and global alignment<br>2.3. Dot matrix comparison of sequences<br>2.4. Scoring matrices – PAM and BLOSUM<br>2.5. Pairwise sequence similarity search by BLAST and FASTA<br>2.6. Concepts of phylogeny – distance based (NJ method) and character based (ML method) tree construction methods | **15 hours** |
| 3.~~Descriptive Biostatistics and Probability~~ Biostatistics 1 | 3.1. Introduction to biostatistics, kinds of data and variables- based on nature (numerical – discrete and continuous; categorical – ordinal and nominal)- based on source (primary and secondary data), sample size, sampling methods and sampling errors<br>3.2. Data tabulation and representation methods; graphical methods- stem and leaf plot, line diagram, bar graphs, histogram, frequency polygon, frequency curves; diagrammatic method- pie diagram<br>3.3. Measures of central tendency – mean, median, mode; merits and demerits | **15 HOURS** |

| | | |
|---|---|---|
| | 3.4. Measures of dispersion- range, variance, standard deviation, standard error and coefficient of variation; merits and demerits<br>3.5. Concepts of probability- random experiment, events, probability of an event, probability rules (addition and multiplication), uses of permutations and combinations, random variables (discrete and continuous)<br>3.6. Probability distributions; Binomial &Poisson distributions for discrete variables, normal distributions for continuous variables | |
| 4.~~Applications of bioinformatics~~<br>Biostatistics<br>2. | 4.1. Hypothesis testing- steps in testing for statistical hypothesis, null and alternative hypothesis, level of significance- type -1 and type-2 errors<br>4.2. Test of significance for small samples – Student's t-test (one sample and two sample)<br>4.3. Test of significance for large samples – Z- test for means and proportions<br>F-test<br>4.4. Chi-square test and its applications – goodness of fit, test of independence<br>4.5. Analysis of variance (ANOVA) – one way analysis<br>4.6. Correlation – definition, simple and linear analysis, Karl Pearson's correlation coefficient, regression analysis | **15 hours** |

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# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
## (AUTONOMOUS)
### B.Sc. II Year Semester – IV
### Biotechnology Paper IV

PRACTICALS

**Bioinformatics and biostatistics**

1.Exploring web portals – NCBI, EBI &ExPASy.
2.Literature search through Pubmed and Pubmed central
3. Sequence retrieval from Genbank, ENA, Swisspotrt
4. Pairwise homology search by BLAST and FASTA
5. Calculation of mean, median, mode; Standard deviations, variance, standard error and coefficient of variation
6. Construction of bar diagram, pie diagram, line diagram, histogram
7. Problems on hypothesis testing using Z- test, t- test and Chi-square test
8. Problems on probability and probability distributions

**Spotters:**

1.Line diagram, bar diagram, & pie diagram
2.Histogram, frequency polygon & frequency curve
3. Normal Probable curve
4. Genbank
5. DDBJ
6. SWISS-PORT
7. PROSITE
8. PIR
9. BLAST
10. Pairwise alignment
11. Multiple sequence alignment
12. PAM and BLOSUM
13. Phylogenetic tree

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### Biotechnology Paper IV

**REFERENCE BOOKS**


1. 1. Khan & Khanum (2004), Fundamentals of Biostatistics, II Revised Edition, Ukazz Publication
2. Bailey, N.T.J, Statistical methods in biology, Cambridge University,press
3. Fundamentals of Biostatistics, P. Hanumanth Rao and K.Janardhan
4. Danial, W.W, Biostatistics, Wiley
5. Introduction to Bioinformatics by Aurther M lesk
6. Developing Bioinformatics Computer skills by Cynthia Gibas, Per Jambeck
7. Bioinformatics second edition by David M mount
8. Essential Bioinformatics by JinXiong
9. Bioinformatics Computing by Bryan Bergeron
10. Bioinformatics; Concepts, skills & application by R.S. Rasthogi
11. Queen, J.P., Quinn, G.P., & Keough, M.J, (2002), Experimental design and data analysis for biologists, Cambridge University Press
12. Mahajan, B.k, (2002). Methods in Biostatistics, Jaypee Brothers Publishers


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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
B.Sc Biotechnology- II[nd] Year
Semesters – IV - Paper – IV
Theory Model Question Paper

Time: 2 1/2 hrs  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 & B
(OR)
C & D

10) A & B
(OR)
C & D

11) A & B
(OR)
C & D

12) A & B
(OR)
C & D

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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B.ScBiotechnology-2ND Year
Semester – IV - Paper – IV

Practical Model Question Paper

Time: 3 hrs | Max. Marks:25

I. Minor experiment (5Marks)
II. Major experiment (10Marks)
III. Spotting (5Marks)

1) 2) 3) 4) 5)

IV. Viva & Record (5Marks)

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B.Sc Biotechnology- IInd Year

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|---|---|---|
| 1 | Mrs. Sandhya Rani<br>Andhra Mahila Sabha Arts & Science College (Autonomous)<br>Hyderabad | 9390405439 |
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| 8 | Dr. K. S. N. Jyothi,<br>Lecturer,<br>Koti Women's College, Hyderabad | 9676083339 |
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