

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



**B.Sc. II YEAR SEMESTER III & IV**  
**DEPARTMENT OF**  
**BIOTECHNOLOGY (2021-2022)**



# HINDI MAHAVIDYALAYA

(AUTONOMOUS & NAAC RE-ACCREDITED)

(Affiliated to Osmania University)

Nallakunta, Hyderabad



**B.Sc. II YEAR SEMESTER III & IV**  
**DEPARTMENT OF**  
**BIOTECHNOLOGY (2021-2022)**

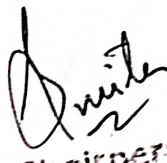
**HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD  
(AUTONOMOUS AND NAAC RE-ACCREDITED)  
DEPARTMENT OF BIOTECHNOLOGY**

**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.

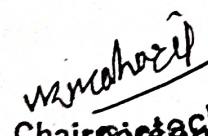
  
Dr. Surekha Rani  
Associate Professor  
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2. Dr. S. Prashanth  
Assistant Professor  
Department of Genetics and Biotechnology  
Osmania University.

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


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

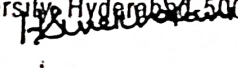

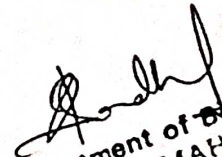
  
Department of Biotechnology  
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Chairperson  
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Principal  
HINDI MAHA VIDYA  
(AUTONOMOUS)  
Arts, Commerce, Hy  
Nallakunta, Hy

- Members
- 
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  -   
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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
  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

*Nita Kulkarni*  
Department of Biotechnology  
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Nallakunta, Hyderabad-44.

*Nita Kulkarni*  
Chairperson  
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*H. Surekha Rani*  
Dr. H. Surekha Rani  
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*S. Prashant*  
DR. S. PRASHANT  
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*P. Sandhya Rani*  
Department of Biotechnology  
ANDHRA MAHILA  
Arts & Science College



**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

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

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

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

*maharaj*  
**Department of Biotechnology**  
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Nallakunta, Hyderabad-44.

*Principal*  
**PRINCIPAL**  
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*Sudha*  
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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 enclosed.
- 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 2 1/2 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. L. Suresh

*G. L. Suresh*  
Department of Biotechnology  
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Nallakunta, Hyderabad-44.

*G. L. Suresh*  
University Nominee

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

**Members**  
1. *Surekha Rani*  
Associate Professor  
Department of Genetics & Biotechnology  
Osmania University Hyderabad - 500 007

2. *Prashant*  
**PRASHANT**  
Assistant Professor  
(Biotechnology)  
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Osmania University,  
Hyderabad - 500 007

*Sandhya*  
Department of Biotechnology  
ANDHRA MAHILA SABHA  
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**PRINCIPAL**  
**HINDI MAHA VIDYALAYA**  
(AUTONOMOUS)  
Arts, Commerce & Science  
Nallakunta, Hyderabad  
**Principal**



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(AUTONOMOUS)

Affiliated to Osmania University, Nallakunta, Hyderabad-44

## CBCS STRUCTURE FOR 2020-2021 BATCH

B.Sc - BIOTECHNOLOGY, MICROBIOLOGY, CHEMISTRY

ACADEMIC YEAR 2020-2021

Code	Course Title	Semester End Exam			Continuous Internal Evaluation		Total	Practical 3 hours		
		Course Type	HPW	Credits	Duration in Hours	Marks			Exam Duration	Marks
IS301	SEC - 1	SEC-1	2	2	1 1/2	35	20 min.	15	50	
IS302	SEC - 2	SEC-2	2	2	1 1/2	35	20 min	15	50	
IS303	English-III	CC-1C	4	4	2 1/2	70	30 min.	30	100	
IS304	Second Language-III	CC-2C	4	4	2 1/2	70	30 min.	30	100	
IS305	Biotechnology – III Molecular Biology and Recombinant DNA Technology	DSC-1C	4T+3P=7	4+1=5	2 1/2	70	30 min	30	100	25
IS306	Microbiology III	DSC-2C	4T+3P=7	4+1=5	2 1/2	70	30 min	30	100	25
IS307	Chemistry-III	DSC-3C	4T+3P=7	4+1=5	2 1/2	70	30 min	30	100	25
			(33)	(27)		425		175	675	

### SECOND YEAR SEMESTER - III

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

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

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**Associate Professor**  
 Department of Biotechnology  
 Osmania University, Hyderabad-500 007.

*Dr. H. Surekha Rani*  
**Principal, Commerce & Science**  
 Nallakunta, Hyderabad-44.

**PRINCIPAL**

**HINDI MAHA VIDYALAYA**  
 (AUTONOMOUS)

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

- H. Surekha Rani*  
Associate Professor  
(Department of Biotechnology)
- Dr. H. Surekha Rani*  
Assistant Professor  
(Department of Genetics)
- Dr. H. Surekha Rani*  
Assistant Professor  
(Department of Genetics)

*Dr. H. Surekha Rani*  
**Department of Biotechnology**  
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*Dr. H. Surekha Rani*  
**Department of Biotechnology**  
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**HINDI MAHAVIDYALAYA, NALLAKURU**  
**(AUTONOMOUS)**  
 B.Sc. II Year Semester – III  
 Biotechnology Paper III – Molecular Biology and Recombinant DNA Technology

Code: BS104  
 –Instruction  
 Theory Classes  
 Practical Classes  
 Credit for Theory  
 Credit for Practical  
 Duration of Semester Examination  
 Duration of Internal Examination  
 Semester Examination Marks  
 Internal Marks

DSC  
 4 Hrs/Week  
 3 Hrs/Week  
 4  
 1  
 2 ½ hours  
 25 minutes  
 70 Marks  
 30 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. 1.2. Organization of prokaryotic genome and eukaryotic nuclear genome. 1.3 Organization of Mitochondrial and chloroplast genomes. 1.4. DNA Replication – Semi-Conservative DNA replication – Messelson and Stahl experiment, enzymes involved in the replication of DNA, Origin of replication fork. 1.5. Replication of prokaryotic genome and nuclear genome of eukaryotes. 1.6 Mutations – types of mutations; spontaneous mutations and induced mutations, Mutagens – Physical and Chemical mutagens. 1-7 DNA damage & repair mechanism	15 hours
2. Gene expression in prokaryotes and eukaryotes.	2.1 Structure of prokaryotic gene; Structure of eukaryotic gene; Structure and functions of prokaryotic RNA polymerase - subunits 2.2 Transcription machinery in eukaryotes (RNA polymerase) and their structural and functional features. 2.3 Genetic code – properties, Deciphering of genetic code, wobble hypothesis. 2.4. Transcription mechanism in prokaryotes – initiation, elongation & proof reading, termination (rho independent & rho dependent) 2.5. Transcription in eukaryotes – initiation, elongation & termination factors.	15 hours



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

*M. Mohan*  
**Department of Biotechnology**  
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*[Signature]*  
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**Chairperson**  
**Board of Studies In Biotechnology**  
**Department of Genetics**  
**Osmania University Hyd.**

**PRINCIPAL**  
**HINDI MAHA VIDYALAYA**  
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 Pincipal

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

1. *[Signature]*
2. **DR.S.PRASHANT**  
 Assistant Professor  
 (Biotechnology)  
 Department of Genetics  
 Osmania University,  
 Hyderabad - 500 007
3. *[Signature]*

*[Signature]*  
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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**

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)

*Signature*  
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**Osmania University Hyd.**

**Dr. H. Surekha Rani**  
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**500 007.**

- Members**
1. *Signature*
  2. **Dr. S. PRASHANT**  
**Assistant Professor**  
**(Biotechnology)**  
**Department of Genetics**  
**Osmania University,**  
**Hyderabad - 500 007**
  3. *Signature*

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**B.Sc. II Year Semester – III**  
**Biotechnology Paper III**

**REFERENCE BOOKS**

1. Molecular biology of the cell by Alberts, B; Bray, D, Lewis, J, Raff, M, Roberts, K and Watson, 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. Gerhardt 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)

*Surekha*  
**Chairperson**  
**Board of Biotechnology**  
**Hindi Mahavidyalaya**  
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**Dr. H. Surekha Rani**  
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1.

2.

3.

*Prashant*  
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*Prashant*

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Max. Marks: 70

Time: 2 1/2 hrs

SECTION A

6 X 3 = 18 Marks

I Write short notes on any Six of the following:

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

*Muchhal*  
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*Dr. H. Surekha*

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Dr. H. Surekha R. Principal  
Associate Professor  
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Osmania University, Hyderabad-500 007.

1. *Dr. S. Prashant*
2. *Dr. S. Prashant*  
Assistant Professor  
(Biotechnology)  
Department of Genetics  
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Hyderabad - 500 007
- 3.

*Dr. S. Prashant*  
Department of Biotechnology  
HINDI MAHA VIDYA



HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD  
(AUTONOMOUS)

B.Sc Biotechnology-2<sup>nd</sup> Year  
Semester - II - Paper - III  
Practical Model Question Paper

Max. Marks: 25

: 3 hrs

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

*Member*  
Department of Biotechnology  
Hindi Mahavidyalaya  
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University Nominee

**Chairperson**

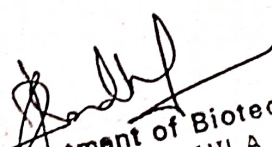
Board of Studies In Biotechnology  
Department of Genetics  
Osmania University Hyd.

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

**Dr.H.Surekha Ran**  
Associate Professor

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

1. **D.S. PRASHANT**  
Assistant Professor.  
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ANDHRA MAHILA SABHA  
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# 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

Code		Course Title	Course Type	HPW	Credits	Semester End Exam		Continuous Internal Evaluation		Total	Practical 3 hours
						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	3	4	2 1/2	70	30 min.	30	100	
BS404	Second Language-IV		CC-2D	3	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	175	175

Dr. H. Surekha Rani, Principal

Associate Professor

Department of Genetics & Biotechnology  
Osmania University, Hyderabad-500097

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Hindi Mahavidyalaya  
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Osmania University, Hyderabad-500097

# HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD

(AUTONOMOUS)

B.Sc. II Year Semester – IV

## Biotechnology Paper IV – Bioinformatics and Biostatistics

Code: BS204

INSTRUCTION

Theory Classes

Practical Classes

Credit for Theory

Credit for Practical

Duration of Semester Examination

Duration of Internal Examination

Semester Examination Marks

Internal Marks

DSC –

4 Hrs/Week

3 Hrs/Week

4

1

2 ½ hours

25 minutes

70 Marks

30 Marks

Unit Name	TOPICS	HOURS PER UNIT
1. Introduction to bioinformatics and biological databases	1.1. Bioinformatics definition, history, scope and applications 1.2. Bioinformatics tools and resources – internet basics, role of internet, free online tools, downloadable free tools 1.3. Bioinformatic web portals – NCBI, EBI, ExpASY 1.4. Biological databases: Classification of databases – primary (Genbank), secondary (PIR), tertiary or composite (KEGG) databases 1.5. Sequence Databases – DNA sequence databases (ENA & DDBJ), Uses of Databases, Data mining 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 2.2. types of sequence alignment – pairwise and multiple alignment, local and global alignment 2.3. Dot matrix comparison of sequences 2.4. Scoring matrices – PAM and BLOSUM 2.5. Pairwise sequence similarity search by BLAST and FASTA 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 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 3.3. Measures of central tendency – mean, median, mode; merits and demerits	15 HOURS



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

*M. Mahesh*  
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*B. Nisha*  
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Dr. H. Surekha Rani  
 Associate Professor  
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 Principal

2. *S. Prashant*  
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*S. Nisha*  
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# HINDI MAHA VIDYALAYA, 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, Swissprot
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

*Surekha Rani*  
Chairperson  
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*Prashant*  
University Nominee  
Chairperson  
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*Sandhya*  
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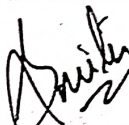


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(AUTONOMOUS)  
B.Sc. II Year Semester - IV  
Biotechnology Paper IV

REFERENCE BOOKS

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

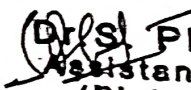
  
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VIDYALAYA, NALLAKUNTA, HYDERABAD  
(AUTONOMOUS)  
B.Sc Biotechnology- II<sup>nd</sup> Year  
Semesters – IV - Paper – IV  
Theory Model Question Paper

Time: 2 1/2 hrs

SECTION A

Max. Marks: 70

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

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

*[Signature]*

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Principal

Dr. S. Suresh Rani  
Associate Professor  
Department of Genetics & Biotechnology  
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2. *[Signature]*  
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD  
(AUTONOMOUS)

B.Sc Biotechnology-2<sup>ND</sup> Year  
Semoster - IV - Paper - IV

Practical Model Question Paper

Time: 3 hrs

Max. Marks:25

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

*Prashant*  
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*Prashant*  
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Members of the Board  
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Associate Professor  
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD  
(AUTONOMOUS)

B.Sc Biotechnology- II<sup>nd</sup> Year

Panel of Examiners

S.No.	Name and Designation	Mobile No.
1	Mrs. Sandhya Rani Andhra Mahila Sabha Arts & Science College (Autonomous) Hyderabad	9390405439
2	Smt. G. Y. Kavitha A. V Degree College Domalguda, Hyderabad	9395321541
3	Ms. Mohammadi Begum B.J.R.Govt Degree College Hyderabad	9948659388
4	Smt. C. H Pradyutha Reddy Women's College Mehdipatnam, Hyderabad	9705335025
5	Dr. S. Prashanth Assistant Professor Department of Biotechnology and Genetics, O.U., Hyderabad	9849667490
6	Dr. Surekha Rani Department of Biotechnology, Osmania University, Hyderabad	9866620067
7	Dr. Rupashree Lecturer Koti Women's College, Hyderabad	9849446549