Hindi Vidya Prachar Samiti's

Ramniranjan Jhunjhunwala College

of Arts, Science & Commerce

(Empowered Autonomous College)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for the B.Sc.

Program: B.Sc. BIOTECHNOLOGY

Program Code: RJSUBT

SEMESTER V

Vertical Under NEP: DSE

Course Code : RJDSEBT351

(REVISED in 2025-26 in alignment with National Education Policy (NEP 2020) facilitating the inter and multidisciplinary learning and multiple entry and exit of the students)

Level 5.5

(CBCS 2025-2026)

THE PREAMBLE

Biotechnology is a fast growing field of science where biological systems are used in diverse applications in the areas of fermentation, environment, diagnosis, treatment, agriculture, food industry etc. It is the most recent offshoot of biological sciences thriving on the latest technological advancements in engineering technology, recombinant DNA technology, computer sciences and many more. Biotechnology is an interdisciplinary field that brings together knowledge from diverse fields such as physics, statistics, mathematics, chemistry, microbiology, biological sciences, information technology, as well the most current technological advancements such as Artificial Intelligence and Machine Learning.

Biotechnology encompasses the study of all living beings including bacteria, archaebacteria, fungi, algae, protozoa, helminths, plants, animals and viruses. It includes the basic understanding of each type of cell - prokaryotic, eukaryotic, viral particles along with their intracellular architecture, their anatomical features, their physiological and biochemical process and their molecular mechanisms of inheritance right from chromosomes, genes to the nucleic acids. Biotechnology as a field of science is the most application oriented field where the knowledge gained in this course has direct and immediate application in the real world, be it pharmaceutical industry, food industry, diagnostics, personalized medicine, genetically modified crops and animals, bioprinting of organs, bioinformatics or clinical research.

Why Biotechnology in R J College?

The Department of Biotechnology was established in 2002. In 2005 MSc (By Papers & Research) and PhD Biotechnology approval from University of Mumbai was received. The department hosts 3 state of the art laboratories equipped with all the required instruments and facilities for carrying out practical sessions of UG and PG courses as well as research projects. We have experienced and well qualified teaching and supporting staff. Individualized and personal training is given to every student for various microbiology, molecular biology, biochemistry and medical diagnostics techniques that are a part of our extensive and inclusive UG and PG curriculum. Under autonomy, the department has made curriculum more robust by incorporating skill-based learning and Value Added Courses (VACs) such as Fermented Foods and Beverages, Clinical Research etc, that impart practical knowledge of the subject to the students. These value added courses are offered to students without any additional charge, from other subjects as well likewise Biotech students can complete VACs offered by other departments. These VACs, mini projects, internships and other co- curricular courses completed by the students help them to earn extra credits every year along with the credits

earned by successfully completing the prescribed course work. The department organizes talks titled 'Gyan-Vigyan' by eminent personalities from industry, research organizations and academia on a regular basis to acquaint the students with the current research and industrial developments.

The Department also offers PG Diploma courses such as Clinical Studies, Data Management & Medical Writing, Post Graduate Diploma in Industrial Hygiene and Safety and Post Graduate Diploma in Medical Laboratory Techniques. In 2019 the department has earned DBT Star college grant which is being used to procure more equipment and instruments so that each student can carry out the molecular biology and other such advanced experiments on an individual basis.

The Department also has its Departmental Library and reading area which the students use after their daily schedule. The library holds more than 1000 subject reference books and journals, and many e-books. Along with these there are books for preparing for Entrance Exams such as JAM, GATE, CSIR-NET, SET, PET which the students can borrow and make the most of the resources and time available.

The department hosts its own **Webpage**, RJBT, showcasing various departmental activities such as competitions, field trips, festivals, popular lecture series by eminent personalities, workshops and research projects. The department has its presence on various social media platforms such as **Facebook** and **Instagram**, this helps in interaction between our current students and alumni. We also have our official **YouTube** channel showcasing various practical techniques, students' videos and eminent talks. We are proud to share that many of our alumni are very well placed in national and international institutes such as Yale university, Max Plank, Pasteur Institute, CCMB, IIT, IISC, BHU and companies such as Biocon Ltd, Reliance Life Sciences to name a few.

PROGRAM OUTCOMES FOR UNDERGRADUATE DEGREE PROGRAMS IN BIOTECHNOLOGY

The undergraduate program in Biotechnology has been designed to empower students to obtain domain knowledge, analyze, apply and innovate. The courses have been designed to hone the analytical skills of students so as to solve real life situations. Modern tools have been introduced for studying biotechnology without compromising on the basic concepts. All the courses in the program are carefully designed to equip students for teaching the subject as well as qualify competitive examinations like GAT B, IIT JAM, JNUEE, CUET PG, etc.

Some basic attributes which a student would acquire after completion of undergraduate program are listed below.

Application of Knowledge

Maintain a high level of scientific excellence in research with specific emphasis on the technological advances in molecular biology techniques and bioinformatics. Create, select and apply appropriate techniques and modern technology in a multidisciplinary way. Apply the subject knowledge to design experiments, analyze and interpret data to reach an effective conclusion.

Ability to convey the concept clearly

They would identify, formulate, and analyze the complex problems and reach a conclusion. Logical thinking with application of biological, physical, and chemical sciences. Learning that develops analytical skills and integrative problem-solving approaches.

Teamwork

Students would perform functions by way of organizing academic events, projects and going on field trips which will build team spirit. Thus the course will help learners to develop qualities of empathy and sympathy for fellow beings.

Honesty and Integrity and Ethics

Students will be aware of ethical issues and regulatory considerations while addressing social and societal needs for growth with honesty.

Environment and Sustainability

The problem-solving skills in students would encourage them to carry out innovative research projects to identify and solve environmental issues. All actions are towards achieving United Nations Sustainable Development Goals.

Lifelong learning and motivating others to learn

Students would lend support to one another for self and institutional growth, contribute to national development and provide equal opportunity.

Global thinking

Students would be equipped with life and technical skills and would be empowered with domain knowledge in thrust areas; these attributes will make them globally competitive.

Programme Specific Outcomes

Sr. No.	A student completing B.Sc. Biotechnology will be able to:
PSO1	Understand concepts in Biotechnology and demonstrate interdisciplinary skills acquired in cell biology, genetics, biochemistry, microbiology and molecular biology.
PSO2	Demonstrate the laboratory skills in cell biology, basic and applied microbiology with an emphasis on technological aspects.
PSO3	Competent to apply the knowledge and skills gained in the fields of Plant biotechnology, animal biotechnology and microbial technology in pharma, food, agriculture, beverages, herbal and nutraceutical industries.
PSO4	Critically analyze the environmental issues and apply the knowledge gained in biotechnology for conserving the environment and resolving the problems.
PSO5	Demonstrate comprehensive innovations and skills in the field of biomolecules, cell biology, molecular biology, bioprocess engineering and genetic engineering of plants, microbes, and animals with respect to applications for human welfare.
PSO6	Critically analyze, interpret data, and apply tools of bioinformatics in various sectors of biotechnology including health and food.
PSO7	Learn and practice professional skills in handling microbes, animals and plants and demonstrate the ability to identify ethical issues related to recombinant DNA technology, genetic engineering, animal handling, intellectual property rights, biosafety, and biohazards.
PSO8	Explore the biotechnological practices and demonstrate innovative thinking in addressing the current day and future challenges with respect to food, health, and environment.
PSO9	Gain thorough knowledge and apply good laboratory and good manufacturing practices in biotech industries.
PSO10	Understand and apply molecular biology techniques and principles in forensic and clinical biotechnology.
PSO11	Demonstrate entrepreneurship abilities, innovative thinking, planning, and setting up of small-scale enterprises.
PSO12	Understand concepts, importance of Biostatistics and to comprehend the principles behind various statistical analytical methods and their uses in biotechnology for data analysis.
PSO13	To develop a deep understanding of the immune system's functions and mechanisms.
PSO14	Gain proficiency in applying immunological techniques for research, diagnostics, and therapeutic innovations.
PSO15	Will be able to apply their knowledge to address emerging infectious diseases and contribute to global immunization strategies.
PSO16	Design, optimize, and scale microbial processes for the efficient production of bio-based products in industrial settings
PSO17	Apply cell biology concepts to analyze cellular structures, functions, and processes, and understand their roles in health, disease, and biotechnology.
PSO18	Apply principles of developmental biology to analyze the genetic, molecular, and

Sr. No.	A student completing B.Sc. Biotechnology will be able to:
	environmental factors that drive organismal development and contribute to understanding developmental disorders.
PSO19	Gain proficiency in ability to accurately identify microorganisms using various laboratory techniques, interpret diagnostic results for infection control, and apply principles of microbiology to clinical practice to support patient care and treatment.
PSO20	Gain knowledge of blood collection, blood cell analysis, and blood disorders like anemia. Learn about blood group systems and the process of blood transfusion
PSO21	Understand the importance of organ function tests in assessing the health of vital organs, as well as their role in the detection, diagnosis, and monitoring of diseases.
PSO22	Understand the clinical significance of using urine, stool, semen, and CSF samples, along with cancer markers, in the detection and diagnosis of diseases.

Progressive Certificate, Diploma, Bachelor's Degree or Bachelor's Degree with Honors provided at the end of each year of exit of the four-years Undergraduate Programme.

	Exit options	Credit Required
1.	**Certificate** upon the successful completion of the First Year (Two Semesters) of the multidisciplinary Four-years Undergraduate Programme/ Five- years Integrated Master's Degree Programme.	44
2.	**Diploma** upon the successful completion of the Second Year (Four Semesters) of the multidisciplinary Four-years Undergraduate Programme/ Five- years Integrated Master's Degree Programme.	88
3.	**Basic Bachelor's Degree** upon the successful completion of the Third Year (Six Semesters) of the multidisciplinary Four-years Undergraduate Programme/ Five- years Integrated Master's Degree Programme.	132
4.	**Bachelor's Degree with Honors** in a Discipline at the successful completion of the Fourth Year (Eight Semesters) of the multidisciplinary Four-years Undergraduate Programme/ Five- years Integrated Master's Degree Programme.	176

Hindi Vidya Prachar Samiti's Ramniranjan Jhunjhunwala College of Arts, Science & Commerce
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NEP - T.Y.B.Sc Biotechnology Syllabus Semester V & VI 2025-26

UGC GRID UNDER NEP 2020

IMPLEMENTED FROM ACADEMIC YEAR 2023-24

YEAR & LEVEL	SEMESTER	MAJOR		MINOR	VSEC		OE	IKS/AEC/VEC			OJT/FP/CEP/CC/RP				TOTAL
		DSC	DSE		VSC	SEC		IKS	AEC	VEC	CC	CEP	FP	OJT	
FY 4.5	I	6	-	6	2	-	2	2	-	2	2	-	-	-	22
	II	6	-	6	-	2	2	-	2	2	2	-	-	-	22
TOTAL	**FY**	**12**	**0**	**12**	**2**	**2**	**4**	**2**	**2**	**4**	**4**	**0**	**0**	**0**	**44**
SY 5.0	III	8	-	3	-	2	3	-	2	-	2	-	2	-	22
	IV	8	-	3	2	2	3	-	2	-	2	2	-	-	22
TOTAL	**SY**	**16**	**0**	**6**	**2**	**4**	**6**	**0**	**4**	**0**	**4**	**2**	**2**	**0**	**44**
TY 5.5	V	10	4	-	4	-	-	-	2	-	-	-	2	-	22
	VI	10	4	-	2	-	-	-	-	-	-	-	-	4	22
TOTAL	**TY**	**20**	**8**	**0**	**6**	0	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**4**	**44**
GRAND TOTAL		48	8	18	10	6	10	2	8	4	8	2	4	4	
		56		**18**	**16**		**10**	**14**			**18**				**132**

Key:

FY = First Year BSc

SY = Second Year BSc

TY = Third Year BSc

DSC= Discipline Specific Course

DSE= Discipline Specific Elective

VSEC = Vocational Skill Enhancement Course

VSC= Vocational Skill Course

SEC = Skill enhancement course

OE = Open Elective

IKS - Indian Knowledge System

AEC = Ability enhancement Course

VEC = Value education Course

CC = Co-Curricular

CEP = Community Engagement Program

FP = Field Project

OJT = On Job Training

THIRD YEAR BACHELOR OF SCIENCE IN BIOTECHNOLOGY

SEMESTER V			
Courses	**Credits**	**Course Titles**	**Course code**
Discipline Specific Course I	4	Basic Immunology and developmental biology	RJDSCBT351
Discipline Specific Course II	4	Microbial Production Technology	RJDSCBT352
Discipline Specific Course Practical	4	Product purification, assays and analysis - Practicals	RJDSCBTP351
Discipline Specific Elective	3	Diagnostic Microbiology	RJDSEBT351
Discipline Specific Elective Practical	1	Diagnostic Microbiology - Practicals	RJDSEBTP351
Vocational Skill Course	4	Industrial Processes	RJVSCBT351
Field Project/ Community Engagement Program	2	Field Project / Community Engagement Program	RJFPBT351/ RJCEP351
Total Credits	**22**		

SEMESTER VI			
Courses	**Credits**	**Course Titles**	**Course code**
Discipline Specific Course I	4	Cancer biology, Immunotechnology and Pharmacology	RJDSCBT361
Discipline Specific Course II	4	Genetic engineering & Ethics	RJDSCBT362
Discipline Specific Course Practical	4	Immunological and pharmacological techniques - Practicals	RJDSCBTP361
Discipline Specific Elective	3	Clinical pathology	RJDSEBT361
Discipline Specific Elective Practical	1	Clinical pathology - Practicals	RJDSEBTP361
Vocational Skill Course	2	Tissue Culture	RJVSCBT361
OJT	4	On-Job Training/ On -Field Training	RJOJTBT361
Total Credits	**22**		

B.Sc. Semester V Biotechnology Syllabus

Course	Course Code	Unit	Topic Headings	Credits	Duration(hr)
Discipline Specific Elective	RJDSEBT351	**Paper Title : Diagnostic microbiology**			
		I	Bacteriology	3	45
		II	Mycology and parasitology		
		III	Automation		

Course	Course Code	Unit	Topic Headings	Credits	Duration
Discipline Specific Elective	RJDSEBTP351	I	**Diagnostic microbiology - Practicals**	1	30

SEMESTER	:	**V**
TITLE	:	**DISCIPLINE SPECIFIC ELECTIVE**
TITLE OF THE SUBJECT/COURSE	:	**Diagnostic microbiology**
COURSE CODE	:	**RJDSEBT351**
CREDITS	:	03
DURATION	:	45 hrs

LEARNING OBJECTIVES	
1	Understand the principles and methods for collecting, transporting, processing, and analyzing specimens from various infection sites (respiratory, gastrointestinal, urinary, blood, and eye infections).
2	Learn the life cycles of common parasites and the correct procedures for collecting, transporting, and processing parasitic specimens for diagnosis.
3	Familiarize with automated and semiautomated systems for microbial identification, including blood count analyzers and methods for detecting bacterial pathogens like Enterobacteriaceae and Staphylococci.

Course Outcome No.	On completing the course, the student will be able to:	PSO Addressed	Bloom's Levels
CO1	To understand specimen collection, transport, and processing for diagnosing infections across different body systems.	19	I, II, III
CO2	To understand **f**ungal infections through direct examination, culture, and biochemical methods, with a focus on Candida species.	19	I, II, III
CO3	To understand automated systems for efficient microbial identification and blood analysis in clinical settings, molecular diagnostic results, including PCR and DNA sequencing, to identify pathogens and determine antibiotic resistance.	19	I, II, III

SEMESTER V			
Course Code: RJDSEBT351		**Course Title: Diagnostic microbiology**	**Credits**
Unit	**Unit Name**	**Topic**	**3**
I	Bacteriology	Guidelines for collection, transport, processing, analysis and reporting of cultures from specific specimen sources for - Infections of the respiratory tract, gastrointestinal tract, Urinary tract, Eye and Infections of the blood.	1
II	Mycology and parasitology	Mycology: Introduction, Laboratory approach for diagnosis of fungal Infections- Specimen collection and transport, Specimen processing, direct examination, Preparation of mounts for study, Selection and inoculation of culture media, Incubation of fungal culture, Identification of Candida. Parasitology: Introduction; Overview of life cycles of parasites. (*Entamoeba histolytica, Ascaris, Plasmodium spp, Giardia lamblia*) Collection, transport and processing of specimens.	1
III	Automation	Automation in hematology: Automated full blood count impedance cell counters, Optical cell counters & automated blood cell morphology Semiautomated and automated identification systems for Enterobacteriaceae, Non fermenters, Mycobacteria, Staphylococci, Anaerobes Newer approaches: use of molecular techniques in diagnosis. PCR and modifications of PCR; DNA sequencing, Strain typing – Pulse field gel electrophoresis, PCR- AFLP	1

References:

1. Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 6th edition, Washington Winn, jr and others. Lippincott Williams & Wilkins.
2. Medical Microbiology, B.S. Nagoba and Asha Pichare.
3. Textbook of medical laboratory technology, 2nd edition, Balani Publishing House. Authors: Praful Godkar and Darshan Godkar.
4. Introduction to MLT 6th ed F.J.Baker & R.E.Silverton Butterworths
5. Medical laboratory technology, A procedure manual for routine diagnostic tests, Volume I,II, III. Kanai Mukherjee. Tata McGraw Hill

SEMESTER	:	**V**
TITLE	:	**DISCIPLINE SPECIFIC ELECTIVE**
TITLE OF THE SUBJECT/COURSE	:	DIAGNOSTIC MICROBIOLOGY - PRACTICALS
COURSE CODE	:	**RJDSEBTP351**
CREDITS	:	01
DURATION	:	30 hrs

LEARNING OBJECTIVES	
1	Gain practical knowledge of diagnostic techniques for fungal infections, including specimen collection, processing, direct examination, culture media selection, and identification of Candida species.
2	Understand the application of molecular techniques (PCR, DNA sequencing, strain typing) in pathogen identification and antibiotic resistance testing.

Course Outcome No.	On completing the course, the student will be able to:	PSO Addressed	Bloom's Levels
CO1	To understand antibiotic sensitivity testing, identify *Candida albicans* and malarial parasites, and understand the use of media and transport methods in microbiological diagnostics.	19	I, II, III, IV

SEMESTER V		
Course Code: RJDSEBTP351	**Course Title: Diagnostic microbiology -Practicals**	**Credits**
Topics		**1**
1. To detect sensitivity of a clinical isolate to different antibiotics using paper disc diffusion method 2. To detect sensitivity of organisms to insoluble antibiotics using ditch method 3. To demonstrate synergistic action of drugs. 4. To determine minimum inhibitory concentration and minimum lethal concentration of an antibiotic. 5. To identify *Candida albicans* using germ tube method 6. To identify fungi from clinical isolates using microscopic method. 7. To identify Malarial parasitic forms in blood smears. 8. To study transport media. 9. To visit a pathology laboratory		1

References:

1. Medical laboratory technology, A procedure manual for routine diagnostic tests, Volume I,II, III. Kanai Mukherjee. Tata McGraw Hill
2. Hand book of MLT -Vellore ed-Dr (Mrs) C. Bharucha, Wesley press, Mysore
3. Atlas of Medical Helminthology and Protozoology, 4th ed. P. L. Chiodini, A. H. Moody, D. W. Manser. Churchill Livingstone
4. A hand book of medical laboratory technology, V. H. Talib 2nd ed.

B.Sc. Semester VI Biotechnology Syllabus

Course	Course Code	Unit	Topic Headings	Credits	Duration
Discipline Specific Elective	**RJDSEBT361**	**Paper Title : Clinical Pathology**			
		I	Hematology	3	45
		II	Organ Function Tests		
		III	Routine examination of body fluids		

Course	Course Code	Unit	Topic Headings	Credits	Duration
Discipline Specific Elective	**RJDSEBTP361**	I	Clinical Pathology -Practicals	1	30

SEMESTER	:	**VI**
TITLE	:	**DISCIPLINE SPECIFIC ELECTIVE**
TITLE OF THE SUBJECT/COURSE	:	CLINICAL PATHOLOGY
COURSE CODE	:	**RJDSEBT361**
CREDITS	:	03
DURATION	:	45hrs

LEARNING OBJECTIVES	
1	To understand blood cell structure, function, abnormalities, and blood group systems for transfusion practices.
2	To comprehend the principles and clinical significance of organ function tests in diagnosing diseases.
3	To learn methods and clinical implications of urine, stool, semen, CSF, and gastric juice analysis in disease diagnosis and management.

Course Outcome No.	On completing the course, the student will be able to:	PSO Addressed	Bloom's Levels
CO1	Understand the composition and functions of blood, including the clinical significance of abnormalities in blood cells and hemoglobin types, and apply knowledge of blood bank operations, such as blood collection, processing, and the clinical relevance of blood group systems and transfusion	20, 21,22	I, III, IV, V
CO2	Understand and analyze the principles, methodologies, and clinical significance of various organ function tests (cardiac, gastric, liver, kidney, and thyroid) to diagnose diseases and interpret abnormal results in the context of human health.	20, 21, 22	I, III, IV
CO3	Understand and apply the theoretical concepts of routine clinical laboratory tests, including urine, stool, CSF, gastric juice, and semen analysis, to interpret results and evaluate their clinical significance in	20, 21,22	I, III, IV

	disease diagnosis and management.		

SEMESTER VI			
Course Code: RJDSEBT361		**Course title: Clinical Pathology**	**Credits**
Unit	**Unit Name**	**Topic**	**3**
I	Hematology	Collection of blood, Anticoagulants, Abnormal forms of RBC; Abnormalities of WBC's; Hemoglobin: types-normal & abnormal, Types of anemia. Blood bank: Human blood group system, Rhesus blood group system and immune antibodies, clinical significance of blood transfusion; collection and processing of blood for transfusion.	1
II	Organ Function Tests	Cardiac Profile Test –Ischemic heart diseases and their manifestation; Groups in CPT, Lipid profile tests. Gastric function Tests – gastric analysis, tests involved. Liver function tests – Types of jaundice; abnormalities of bile pigment and acid, change in enzyme and plasma proteins and their determination. Kidney function test –Groups in KFT; test to determine renal blood flow; clearance test; Diseases of kidney. Thyroid function tests: Introduction – determination of T-3, T-4, TSH	1
III	Routine examination of body fluids	Routine urine analysis - composition of normal urine & routine examination of urine. Routine stool analysis – Importance of stool examination, collection of fecal specimen, physical & Chemical examination Lab examination and clinical significance of CSF and gastric juice Semen analysis - clinical significance, specimen collection, physical, chemical & microscopic examination, sperm morphology Examination of sputum – Clinical significance, specimen collection examination Tumor markers - PSA, hCG, CA 125, CEA, CA 19-9, and AFP	1
References:			

- Textbook of Medical Laboratory Technology, A Godkar, P.B., A Godkar, D.P., 2nd Edition, Bhalani Publishing House
- Introduction to MLT 6th ed F.J.Baker & R.E.Silverton Butterworths.
- Medical laboratory technology, A procedure manual for routine diagnostic tests, Volume I,II, III. Kanai Mukherjee. Tata McGraw Hill
- Hand book of MLT -Vellore ed-Dr (Mrs) C. Bharucha, Wesley press, Mysore
- A medical lab for developing countries- Maurice King-ELBS & Oxford uni press
- A hand book of medical laboratory technology, V. H. Talib 2nd ed.
- Fundamentals of Biochemistry. New central book agency. Author: A. C. Deb

SEMESTER	:	**VI**
TITLE	:	**DISCIPLINE SPECIFIC ELECTIVE**
TITLE OF THE SUBJECT/COURSE	:	DIAGNOSTIC MICROBIOLOGY - PRACTICALS
COURSE CODE	:	**RJDSEBTP361**
CREDITS	:	01
DURATION	:	30 hrs

LEARNING OBJECTIVES	
1	To gain hands-on experience in performing common hematological and biochemical tests

Course Outcome No.	On completing the course, the student will be able to:	PSO Addressed	Bloom's Levels
CO1	Perform and interpret common hematological and biochemical tests, including hemoglobin estimation, blood counts, and kidney function tests, while demonstrating proficiency in laboratory procedures such as physical, chemical, and microscopic examination of biological specimens, ensuring accuracy and reliability in results.	PSO 20, 21, 22	I, III, IV

SEMESTER VI		
Course Code: **RJDSEBTP361**	**Course title:** **Clinical Pathology Practicals**	**Credits**
Topics		1

1. To collect blood by capillary and vein puncture method
2. To determine the concentration of hemoglobin by Acid hematin and Drabkin's method.
3. To determine total RBC in blood sample
4. To determine total WBC in blood sample
5. To perform differential WBC count
6. To determine ESR of the given blood sample
7. To determinePCV of the given blood sample
8. To calculate Red cell indices
9. To determine bleeding time & clotting time
10. To perform Cross matching of the donor and recipient blood samples
11. To examine urine using physical, chemical and microscopic examination methods
12. Estimation of SGPT
13. Estimation of SGOT
14. Estimation of creatinine.
15. Detection of hCG in urine.
16. Estimation of serum cholesterol

THIRD YEAR BACHELOR OF SCIENCE IN BIOTECHNOLOGY

RULES AND REGULATIONS REGARDING ASSESSMENT AND EVALUATION

FOR T.Y UNDER NEP FROM A.Y, 2025-2026 ONWARDS:-

1 A learner appearing for a third year examination under NEP will have a maximum **of 22 credits** and examinations will be of **maximum 550 marks**.

2. Courses having **2 credits, 3 credits and 4 credits** will have examinations of **50, 75, 100** marks respectively.

3. **With regard to Major Course, Minor Course and OEC:**
Continuous evaluation of 40- 60 adopted under autonomy (2018) shall continue for all the courses, for the courses with 2 credits and 50 marks, Internal is of 20 marks (only one IA) and External 30 marks (SEE); while the courses with 3 credits and 75 marks, it is 25 marks (only one IA) and 50 marks (SEE). In the case of courses of 100 marks, the break up of marks will be 40 marks (IA) and 60 marks (SEE).

4. With regard to IKS, VSEC (VSC and SEC), AEC, VEC:
These will be of 2 Credits each and of 50 marks. Continuous evaluation of 40-60 wherein internal is of 20 marks and SEE of 30 marks or only one SEE of 50 marks or continuous evaluation of more than one test by the respective Coordinating department or at directed by the EC

5. With regard to CC:
Vertical of CC shall also be more like a continuous evaluation where a student will be awarded marks on the basis of his/her participation in the co-curricular activities of the department/other departments/associations/extension activities/intercollegiate events and Jeevan Kaushal. A workbook will be provided to a student to keep a record of his/her participation and will be duly signed by the concerned teachers.

6. Duration of examinations:

a. An exam of 20/25 marks shall be of duration of 30 minutes.
b. An SEE exam of 30 marks (offline) shall be of duration of 1 hour.
c. An SEE exam of 50 marks (offline) shall be of duration of 1 1/2 hour
d. An SEE exam of 50 marks (online MCQ) shall be of 60 minutes.
e. An SEE exam of 60 marks (offline) shall be of duration of 2 hours.

7. There shall be **combined passing of Internals and SEE** in a given paper with a **minimum passing percentage of 40.**

8. **Appearing for SEE** for every paper is **compulsory** irrespective of the performance in the internals examinations. A student absent in SEE will be thus declared failing in a given subject.

9. There shall be provision for supplementary examination for the benefit of students who miss their SEE on grounds of medical emergency or representing college at the national level event or any other equivalent event with a special permission granted by the Head of the institution.

10. There shall be no Additional Examinations for any of the Semesters except for the Semester V wherein one chance of credit improvement in Semester V shall be given before the Learner appears for the final Semester VI Examination.

11. A learner appearing for first year exam under NEP shall have an examination of maximum **550 marks** to which effect **ATKT** is allowed for **maximum of 200 marks** corresponding to **failing in 3/4 courses** but must have passed in at least one Theory course of Major/Minor.

Mapping of the course to Local/ Regional/National/International relevance

Biotechnology field deals with the technologies applied to biology, molecular biology, genetics, and many other subfields of biology. Biotechnology utilizes cellular and biomolecular processes to create technologies and products that help improve our lives and nature. By making useful food, such as bread and cheese, and preserving dairy products, we have done these for many years by now. Recent biotechnology develops breakthrough products and technologies to fight diseases, reduce our environmental harm, feed the hungry, use less and cleaner energy, and have safer, cleaner and more efficient industrial manufacturing processes.

Studying biotechnology can lead to a wide range of opportunities to the student in various fields such as healthcare, agriculture, environmental conservation, and industrial processes. Biotechnology can be used to develop new pharmaceuticals, improve crop yields, create biofuels, and even clean up environmental pollutants. It also plays a crucial role in understanding and combating diseases, genetic disorders, and other health-related issues. Overall, studying biotechnology can lead to a career focused on improving human health, food production, and the environment through the application of biological knowledge and techniques.

Class	Course Name	Course Code	Local relevance	Regional relevance	National relevance	Global relevance
TY Biotech	**Discipline Specific Elective** **Diagnostic microbiology**	RJDSEBT 351	It addresses the increasing demand for skilled professionals to diagnose and manage infectious diseases, which are a significant public health concern. It also aligns with the need to enhance laboratory infrastructure and expertise to combat local epidemiological challenges.	Enhancing disease surveillance and response, particularly in areas prone to infectious outbreaks. It equips students with the expertise to support local healthcare systems in diagnosing and managing endemic and emerging diseases effectively.	It plays a vital role in strengthening healthcare infrastructure by improving disease diagnosis, monitoring antibiotic resistance, and supporting public health initiatives. It contributes to effective epidemic management and enhances the overall healthcare system's ability to respond to infectious threats across the country.	It is essential for combating infectious diseases, enabling early detection, and preventing pandemics through accurate diagnostics. It supports international health collaborations and contributes to global efforts in controlling antimicrobial resistance and emerging infectious threats.

Class	Course Name	Course Code	Local relevance	Regional relevance	National relevance	Global relevance
TY Biotech	**Discipline Specific Elective** **Clinical Pathology**	**RJDSEBT361**	Hematology Organ Function Tests Clinical Pathology and Cancer markers	Hematology Organ Function Tests Clinical Pathology and Cancer markers	Hematology Organ Function Tests Clinical Pathology and Cancer markers	Hematology Organ Function Tests Clinical Pathology and Cancer markers