

Scheme of Teaching and Examination
M.Sc. (Biotechnology) SEMESTER PATTERN
SEMESTER: FIRST

T: Lectures, P: Practical, TU: Tutorial/Assignment

S N	Subject Code	Name of Subject	Hrs/ Week		Credits		Examination Scheme								
							Theory				Practical				
			T	P/ TU	Theory	Practical	Paper Hrs	Max External; Marks	Max Internal Marks	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	BT- 101	Cell Biology	04	06	04		3	100		100	4	--	--	--	--
2	BT - 102	Macromolecules and Enzymology	04	06	04		3	100		100	4	--	--	--	--
3	BT - 103	Microbes: Physiology and Genetics	04	06	04		3	100		100	4	--	--	--	--
4	BT- 104	Biology of the Immune system	04	06	04		3	100		100	4	--	--	--	--
5	BT - 105	Lab Course I	--	P 01		12	--	--	--	--	-	80	20	100	5
6	BT - 106	Lab Course II	--	P 02		12	--	--	--	--	--	80	20	100	5
		TOTAL	16	24	16	24				400				200	

Total Credits: 40

Scheme of Teaching and Examination
M.Sc. (Biotechnology) SEMESTER PATTERN
SEMESTER: SECOND

T: Lectures, P: Practical, TU: Tutorial/Assignment

S N	Subject Code	Name of Subject	Hrs/ Week		Credits		Examination Scheme								
							Theory				Practical				
			T	P/ TU	Theory	Practical	Paper Hrs	Max Theory	Max Internal	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	BT - 201	Molecular Biology	04	06	4		3	100		100	4	--	--	--	--
2	BT - 202	Bioprocess Engineering & Technology	04	06	4		3	100		100	4	--	--	--	--
3	BT - 203	Plant Biotechnology	04	06	4		3	100		100	4	--	--	--	--
4	BT - 204	*Elective Paper (Choice Based) 1) Bioenergetics 2) Phytosecondary metabolites 3) Drug Discovery 4) Protein Structure prediction and analysis 5) Transgenic Technology 6) Statistics for Biologist 7) Entrepreneurship Biotechnology	04	06	3		3		75	75	4	--	--	--	--
5	BT - 205	Lab Course III		P 02		12	--	--	--	--	--	80	20	100	5
6	BT- 206	Lab Course IV		P 02		12	--	--	--	--	--	80	20	100	5
		Seminar		01	1								25	25	5
		TOTAL	16	25	16	24				375				225	

Total Credits: 40

Scheme of Teaching and Examination
M.Sc. (Biotechnology) SEMESTER PATTERN
SEMESTER: THIRD

Appendix-C

T: Lectures, P: Practical, TU: Tutorial/Assignment

S N	Subject Code	Name of Subject	Hrs/ Week		Credits		Examination Scheme								
			T	P/ TU	Theory	Practical	Theory				Practical				
							Paper Hrs	Max Theory	Max Internal	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	BT – 301	Animal Cell Science & Technology	04	06	04		3	80	20	100	4	--	--	--	--
2	BT – 302	Genetic Engineering	04	06	04		3	80	20	100	4	--	--	--	--
3	BT – 303	Biostatistics and Bioinformatics	04	06	04		3	80	20	100	4	--	--	--	--
4	BT - 304	Lab Course V		P 02		18	--	--	--	--	--	80	20	100	5
5		Internal Assessment		01		02		--	--	--	--	--	25	25	5
6		Assignment				02		--	--	--	--	--	50	50	5
7		Seminar		01	1		-	--	--	--	--		25	25	5
		TOTAL	16	20	13	22	-	--	--	300	--	--	--	200	--

Total Credits: 35

Scheme of Teaching and Examination
M.Sc. (Biotechnology) SEMESTER PATTERN
SEMESTER: FOURTH

Appendix-D

T: Lectures, P: Practical, TU: Tutorial/Assignment

S N	Subject Code	Name of Subject	Hrs/ Week		Credits		Examination Scheme								
			T	P/ TU	Theory	Practical	Theory				Practical				
							Paper Hrs	Max Theory	Max Internal	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	BT - 401	Environmental Biotechnology	04	06	04		3	100	--	100	4	--	--	--	--
2	BT - 402	Industrial Biotechnology (Special)	04	06	04		3	100	--	100	4	--	--	--	--
3	BT - 403	Elective Paper (Choice Based) 1) Bioenergetics 2) Phytosecondary metabolites 3) Drug Discovery 4) Protein Structure prediction and analysis 5) Transgenic Technology 6) Statistics for Biologist 7) Entrepreneurship Biotechnology	04	06	03		3	--	75	75	4	--	--	--	--
4	BT- 404	Lab Course VI				18						80	20	100	5
5	BT- 405	Project		06		06						125	--	125	5
		TOTAL	12	24	11	24	-	--	--	275	--	--	--	225	--

Total Credits: 35

Notes :

1. The syllabus is based on four Credits per theory paper (Four hours per week) and six credits per practical (6 hours per week). The minimum 50 clock hours per theory paper are expected from the teacher to complete the course. There shall be exemption of one clock hour per week per student from the total work load to the concerned project supervisor. The supervisor will not guide more than four candidates for the project work. Comprehensive two-day practical exams shall be held for each Lab Course. Twenty per cent marks shall assign for internal assessment, which would be based on class test and attendance.
2. The topic of the projects will be given by the concerned supervisor after approval from the Head of the department. There will be no duplication of the topics of the project work. Project will be based upon research and actual bench work.
3. The topic of the project will be allotted to the students at the end of Second Semester of M. Sc. The project will begin from Third semester and will continue up to the end of the fourth Semester.
4. Students should submit three typed copies of the project (along with soft copy) to the Head of the department before the commencement of Final Practical examination in the Fourth Semester.
5. There shall be a panel consisting of external examiner, Head of Department and supervisor for evaluation of the project.
6. There shall be at least 2 to 3 external examiner for a batch of up to 10 students or 3 to 5 external for a batch more than 10 students for the evaluation of project.
7. There shall be an open *viva voce* on project.
8. Distribution of Marks :

Project	100 marks
Viva voce	25 marks
9. Each student should opt for comprehensive interactive course (Elective paper – any one) of 3 credits theory and 6 credits for respective practical. The topic of specialization and course content will be determined by the concern teacher. The evaluation of the elective paper should be done by the concern teacher and Head of Department.
10. Each student has to deliver Seminar in Semester II and III. The student will be evaluated by concern Teaching member and Head of the Department. The topic will be selected from an emerging area of Biotechnology.
11. The regular assignments shall be given to each student during the semester III, which will be related to course content. The assignment will be evaluated by faculty and head of department.
12. Internal assessment shall be based on surprise test / Open book test/ Midterm test.
13. Invited lectures from eminent researchers, industrialist and others on recent issues related to Biotechnology will be organized

M.Sc. (Biotechnology) programme is of 2 years (four semesters) duration. The credit structure for this programme is given below in table no. 1.

TABLE 1

Course work	Credits				Total
	Semester I	Semester II	Semester III	Semester IV	
Core courses	16	12	12	08	48
Elective Courses	--	09	--	09	18
Lab courses	24	18	18	12	72
Seminar	--	01	01	--	02
Project				06	06
Assignment			02		02
Internal Assessment			02		02
Total	40	40	35	35	150

A ten point rating scale is used for the evaluation of the performance of the student to provide letter grade for each course and overall grade for the Master's Programme. Grade points are based on the total number of marks obtained by him/her in all the heads of examination of the course. These grade points and their equivalent range of marks are shown separately in table no. 2-A and table no. 2-B. The performance of the student in theory subjects shall be evaluated in accordance with table no. 2-A. Following Table 2-B depicts the evaluation of students in practical/laboratory/project/seminar.

TABLE 2-A (Theory Subjects)

Grade	Range of Marks obtained out of 100 or Equivalent fraction	Grade Points	Remarks (Not to be displayed On transcripts)
A+	90-100	10	Outstanding
A	80-89	9	Excellent
B+	70-79	8	Very Good
B	60-69	7	Good
C+	55-59	6	Fair
C	50-54	5	Average
D	40-49	4	Below Average
F	Below 40	0	Fail

TABLE 2-B (Practical/Laboratory/Project/Seminars)

Grade	Range of Marks obtained out of 100 or Equivalent fraction	Grade Points	Remarks (Not to be displayed On transcripts)
A+	90-100	10	Outstanding
A	80-89	9	Excellent
B+	70-79	8	Very Good
B	60-69	7	Good
C+	55-59	6	Fair
C	50-54	5	Average
F	Below 50	0	Fail

Equivalence of the conventional division/class with the CGPA is in accordance with the following table no. 4.

Table 4. Equivalence of Class/Division to CGPA

TABLE 3: Final Grade Points for SGPA and CGPA

Grade Points	Final Grade	Remarks (Not to be displayed On transcripts)
9.00-10.00	A+	Outstanding
8.00 – 8.99	A	Excellent
7.00-7.99	B+	Very Good
6.00-6.99	B	Good
5.50 – 5.99	C+	Fair
5.00 – 5.49	C	Average
4.00 – 4.99	D	Below Average

Sr. No.	CGPA	Class/Division
1	7.50 or more than 7.50	First Class with Distinction
2	6.00 or more but less than 7.49	First Class
3	5.50 or more but less than 5.99	Higher Second Class
4	5.00 or more but less than 5.49	Second Class

The overall performance of a student is evaluated by assigning appropriate weightage to all the **four** semesters in order to maintain the quality of education. A student is permitted to appear for the semester examination subject to he or she has a minimum attendance of 75% in theory and practical classes, completes all his/her internal/ sessional assignments and clears all his/her dues. Nonappearance in any examination is treated as the student having secured zero mark in that subject examination.

The evaluation is based on an average weightage system. Every subject has credit points based on the hours of study required. Every student is assessed in a subject with appropriate weightage to internal/sessional work and semester examination, thereby making the students study regularly. Every student is awarded Grade points out of maximum 10 points in each subject. (based on 10 Points Scale). Based on the Grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) are computed.

Computation of SGPA & CGPA

Every student is awarded points out of maximum 10 points in each subject. (based on 10 Points Scale). Based on the Grade points obtained in each subject the Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) are computed. The computation of SGPA & CGPA, is as under:

Semester Grade Point Average (SGPA) is the weighted average of points obtained by a student in a semester and is computed as follows:

$$SGPA = \frac{U_1 \times M_1 + U_2 \times M_2 + \dots + U_n \times M_n}{U_1 + U_2 + \dots + U_n}$$

Where U_1, U_2, \dots are subject credit of the respective course and M_1, M_2, \dots are the Grade Points obtained in the respective subject (out of 10)

The Semester Grade Point Average (SGPA) for all the four semesters is also mentioned at the end of every semester.

The Cumulative Grade Point Average (CGPA) is used to describe the overall performance of a student in the course and is computed as under:

$$CGPA = \frac{\sum_{n=1}^4 SGPA(n)C_n}{\sum_{n=1}^4 C_n}$$

Where SGPA (n) is the nth Semester SGPA of the student and C_n is the nth Semester total credit. The SGPA and CGPA are rounded off to the second place of decimal.

Illustrative Example for Results in Grade Point System**Name of the Student: XYZ****M.Sc. (Biotechnology) Semester Pattern - Semester : First**

S N	Subject Code	Name of Subject	Mark Obtained		Grade Points (out of 10)		Grade	
			Theory	Practical	Theory	Practical	Theory	Practical
1	BT- 101	Cell Biology	63/100	--	7	--	B	--
2	BT - 102	Macromolecules and Enzymology	78/100	--	8	--	B+	--
3	BT - 103	Microbes: Physiology and Genetics	84/100	--	9	--	A	--
4	BT- 104	Biology of the Immune system	53/100	--	5	--	C	--
5	BT - 105	Lab Course I	--	74/100	--	8	--	B+
6	BT - 106	Lab Course II	--	73/100	--	8	--	B+

Note:

$$U1 = 4, U2 = 4, U3 = 4, U4 = 4, U5 = 12, U6 = 12,$$

$$M1 = 7, M2 = 8, M3 = 9, M4 = 5, M5 = 8, M6 = 8,$$

$$SGPA = \frac{U1 \times M1 + U2 \times M2 + \dots + U_n \times M_n}{U1 + U2 + \dots + U_n}$$

$$U1 + U2 + \dots + U_n$$

$$= \frac{4 \times 7 + 4 \times 8 + 4 \times 9 + 4 \times 5 + 12 \times 8 + 12 \times 8}{4 + 4 + 4 + 4 + 12 + 12}$$

$$= \frac{308}{40} = 7.7$$

$$= 308/40 = 7.7$$

SGPA for First Semester = 7.7 Grade: B+

Total credits for First Semester = 40

Illustrative Example for Results in Grade Point System**Name of the Student: XYZ****M.Sc. (Biotechnology) Semester Pattern - Semester : Second**

S N	Subject Code	Name of Subject	Mark Obtained		Grade Points (out of 10)		Grade	
			Theory	Practical	Theory	Practical	Theory	Practical
1	BT - 201	Molecular Biology	71/100	--	8	--	B+	--
2	BT - 202	Bioprocess Engineering & Technology	81/100	--	9	--	A	--
3	BT - 203	Plant Biotechnology	56/100	--	6	--	C+	--
4	BT - 204	*Elective Paper (Choice Based) 1) Bioenergetics 2) Phytosecondary metabolites 3) Drug Discovery 4) Protein Structure prediction and analysis 5) Transgenic Technology 6) Statistics for Biologist 7) Entrepreneurship Biotechnology	59/75	--	8	--	B+	--

5	BT - 205	Lab Course III		64/100	--	7	--	B
6	BT- 206	Lab Course IV	--	73/100	--	8	--	B+
		Seminar	--	19/25	--	8	--	B+

Note:

$$U1 = 4, U2 = 4, U3 = 4, U4 = 3, U5 = 12, U6 = 12, U7 = 1$$

$$M1 = 8, M2 = 9, M3 = 6, M4 = 8, M5 = 7, M6 = 8, M7 = 8$$

$$SGPA = \frac{U1 \times M1 + U2 \times M2 + \dots + U_n \times M_n}{U1 + U2 + \dots + U_n}$$

$$= \frac{4 \times 8 + 4 \times 9 + 4 \times 6 + 3 \times 8 + 12 \times 7 + 12 \times 8 + 1 \times 8}{4 + 4 + 4 + 3 + 12 + 12 + 1}$$

$$= \frac{304}{40} = 7.6$$

$$= 304/40 = 7.6$$

$$= 304/40 = 7.6$$

SGPA for Second Semester = 7.6 Grade: B+

Total credits for Second Semester = 40

**Illustrative Example for Results in Grade Point System
M.Sc.(Biotechnology) Semester Pattern - Semester : Third**

Name of the Student: XYZ

S N	Subject Code	Name of Subject	Mark Obtained		Grade Points (out of 10)		Grade Points (out of 10)	
			Theory	Practical	Theory	Practical	Theory	Practical
1	BT - 301	Animal Cell Science & Technology	53/100	--	5	--	C	--
2	BT - 302	Genetic Engineering	71/100	--	8	--	B+	--
3	BT - 303	Biostatistics and Bioinformatics	74/100	--	8	--	B+	--
4	BT - 304	Lab Course V		89/100	--	9	--	A
5		Internal Assessment	--	19/25	--	8	--	B+
6		Assignment	--	26/50	--	5	--	C
7		Seminar		19/25		8		B+

Note:

$$U1 = 4, U2 = 4, U3 = 4, U4 = 18, U5 = 2, U6 = 2, U7 = 1$$

$$M1 = 5, M2 = 8, M3 = 8, M4 = 9, M5 = 8, M6 = 5, M7 = 8$$

$$SGPA = \frac{U1 \times M1 + U2 \times M2 + \dots + U_n \times M_n}{U1 + U2 + \dots + U_n}$$

$$= \frac{4 \times 5 + 4 \times 8 + 4 \times 8 + 18 \times 9 + 2 \times 8 + 2 \times 5 + 1 \times 8}{4 + 4 + 4 + 18 + 2 + 2 + 1}$$

$$= \frac{280}{35} = 8$$

$$= 280/35$$

$$= 280/35$$

SGPA for Third Semester = 8

Grade: A

Total credit mark for Third Semester = 35

Illustrative Example for Results in Grade Point System

Name of the Student: XYZ

M.Sc. (Biotechnology) Semester Pattern - Semester : Fourth

S N	Subject Code	Name of Subject	Mark Obtained		Grade Points (out of 10)		Grade Points (out of 10)	
			Theory	Practical	Theory	Practical	Theory	Practical
1	BT - 401	Environmental Biotechnology	63/100	--	7	--	B	--
2	BT - 402	Industrial Biotechnology (Special)	78/100	--	8	--	B+	--
3	BT - 403	Elective Paper (Choice Based) 1) Bioenergetics 2) Phytosecondary metabolites 3) Drug Discovery 4) Protein Structure prediction and analysis 5) Transgenic Technology 6) Statistics for Biologist 7) Entrepreneurship Biotechnology	60/75	--	8	--	B+	--
4	BT- 404	Lab Course VI	--	76/100	--	8	--	B+
5	BT- 405	Project	--	96/125	--	8	--	B+

Note:

U1 = 4 , U2 = 4, U3= 3 ,U4= 18, U5 = 6

M1 = 7 , M2 = 8, M3 = 8 , M4 = 8 , M5 = 8

SGPA = $\frac{U1 \times M1 + U2 \times M2 + \dots + Un \times Mn}{U1 + U2 + \dots + Un}$

$U1 + U2 + \dots + Un$

= $\frac{4 \times 7 + 4 \times 8 + 4 \times 8 + 18 \times 8 + 6 \times 8}{4 + 4 + 3 + 18 + 6}$ = 284 /35

4+4+3+18+6

SGPA for Fourth Semester = 8.1 Grade: A Total credits for Fourth Semester = 35

CGPA = $(7.7 \times 40 + 7.6 \times 40 + 8 \times 35 + 8.1 \times 35) / 150$

= 1176 / 150

= 7.8

Result: **Grade:** **B+**
