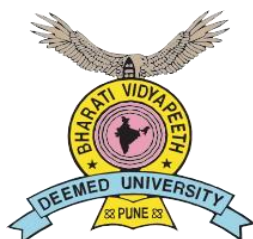


*“Social Transformation through Dynamic Education”*



**Bharati Vidyapeeth (Deemed to be University), Pune**

**YASHWANTRAOMOHITECOLLEGE OF ARTS, SCIENCE & COMMERCE**

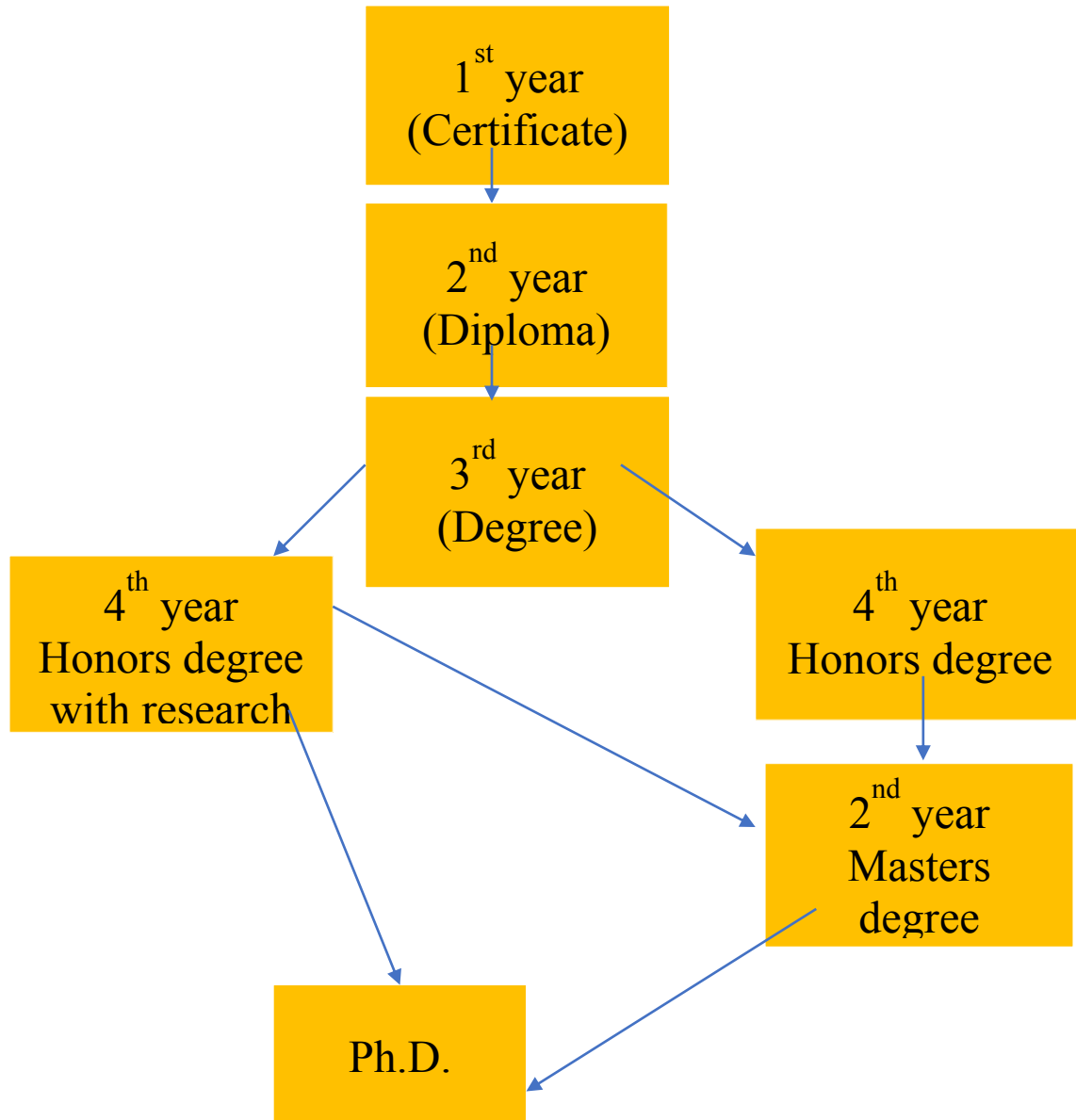
**Erandwane, Pune-411038**

**M.Sc. Microbiology Course Structure**

**As per NEP 2020**

**(To Be Implemented From Academic Year 2023-24)**

## Structure of Higher Education in NEP 2020



## **1. Preamble :**

Completion of graduation course in Microbiology simply provides a platform for basic understanding of the subject. Inventions, innovations and technology have revolutionized and enriched the Microbiology subject. The demand of skilled manpower requires thorough knowledge of the subject. It also demands for incorporating latest knowledge and advanced technologies to fulfill the changing needs of society. The public private sector prefers the experienced manpower. Considering this, M.Sc. Microbiology course as per NEP 2020 guidelines is designed to provide through hand updated knowledge of the subject which makes easy entry of the students in public private sector. Uniqueness of the course is of having on job training, research projects and field projects. During the period students are getting an opportunity to work in industries, laboratories and research institutes. This generates skilled human resources as per the demands of the society. The course has other research elements including research methodology that imparts the knowledge of scientific writing, writing research projects, preparing publications, preparing research posters for the conferences and the entire process also generates innovative minds to work in the capacity of scientists.

## **2. Introduction:**

In the increasingly globalized society, it is important that the younger generation especially the students are equipped with knowledge, skills, mind sets and behaviors which may enable them to perform their duties in a manner so that they become important contributors to the development of the society. This will also help them to fully utilize their educational training for learning a decent living so that the overall standard of their families and surroundings improve leading to development of welfare human societies. To achieve this goal, it is imperative that their educational training is improved such that it incorporates the use of newer technologies, use of newer assessment tools for mid-course corrections to make sure that they become competitive individuals to shoulder newer social responsibilities and are capable of undertaking novel innovations in their areas of expertise. In the face of the developing knowledge society, they are well aware about the resources of self-development using on-line resources of learning which is going to be a major component of learning in the future. The learning should also be a continuous process so that the students are able to re-skill themselves so as to make themselves relevant to the changing needs of the society. In the face of this need, the educational curricula, teaching learning processes, training, assessment methods all need to be improved or even re-invented.

## **3. Learning Outcomes based approach:**

Learning Outcome based approach to curriculum planning (LOCF) is almost a paradigm shift in the whole gamut of higher education such that it is based on first and for the most identifying the outcomes of the learning required for a particular subject of study, and then planning all components of higher education so as to achieve these outcomes. The learning outcomes are the focal point of the reference to

which all planning and evaluation of the end learning is compared and further modifications are made to fully optimize the education of the individuals in a particular subject. For the subject of Microbiology the outcomes are defined in terms of the understanding and knowledge of the students in microbiology and the practical skills the students are required to have to be competitive microbiologist so that they are able to play their role as microbiologist wherever required in the society such as the diseases caused by the microbes, their diagnosis and remedies; The role of microbiologists in the biotechnology industry and how they may be able to fit the bill in the industry. The students are also trained in such a way that they develop critical thinking and problem solving as related to the microbiology. The curriculum developed and the teaching and the evaluation tasks are such that the students are able to apply their knowledge and training of microbiology to solve the problems of microbiology as these exist or appear from time to time in the society. The curriculum envisions that the student, once postgraduate as specialists in a discipline, have an important role to play in the newer developments and innovations in the future in the subject for advancement of the discipline.

#### **4. Postgraduate Attributes in Microbiology:**

- Broaden the outlook and attitude, develop the current skills and abilities, learn new one to excel in studies and career, grow in to responsible global citizens.
- Contour the academic career of the students, make them employable, enhance research acumen and encourage the participation in co-curricular and extracurricular activities.
- Instill skills and abilities to develop a positive approach and be self-contained to shape one's life and also that of colleagues and peers.
- Demonstrate behavioral attributes for the enhancement of soft skills, socialistic approach and leadership qualities for successful career and nurture responsible human being.
- Provide highly skilled and knowledgeable human resources for agricultural sector, food industry, dairy industry, medical and paramedical field, pharmaceutical, space research and research institutes.

#### **5. Qualification Descriptors:**

The following may serve as the important qualification descriptors for a PG degree in Microbiology:

1. Knowledge of the diverse places where microbiology is involved.
2. Understanding of diverse Microbiological processes.
3. Advanced skills and safety issues related to handling of microbes, Good Microbiological practices etc.
4. Advanced skills in working with microbes such as pilot scale culturing, Downstream processes, diagnostics etc.
5. Generation of new knowledge through research projects.
6. Ability to participate in teamwork through microbiology projects.

7. Ability to present and articulate their knowledge of Microbiology.
8. Knowledge of recent developments in the area of Microbiology.
9. Analysis of data collected through study and projects / dissertations / reviews /research, surveys.
10. Ability to innovate so as to generate new knowledge.
11. Ability to acquire intellectual property rights.

## **6. Objectives of the Programme:**

The aim and objectives of the M.Sc. Microbiology program essentially focus to develop skills of student for a successful career.

- a. The course structure emphasizes to put enough efforts in the industry as well as laboratory work so as to gain thorough knowledge of the subject.
- b. The course includes project work that would develop and nourish the scientific approach and research attitude of the students.
- c. Genetic engineering, Biotechnology, Bioinformatics, Immunotherapy are the new horizons of the interdisciplinary subject Microbiology which might provide solutions to various problems of the society. The course work is essentially framed to acquaint the students with all the recent advances in this field.
- d. It is compulsory & essential for the students to read research papers, publications and deliver seminars that would better help them to know the recent advances in the subject and also develop the communication skills.
- e. The program is designed in such a way that it is essential for the students to read original publications, put enough efforts in laboratory work for practicals and project, be acquainted with all the recent advances in the field like Bioinformatics, drug designing and develop all the skills for a successful career.

## **7. Programme Outcomes:**

At the end of this course the students will be able to:

1. Deliver his/her duties in the medical and paramedical field which will aid the diagnosis of diseases and disorders.
2. Extend his/her duties in the field of Microbial Biotechnology.
3. Extend his/her duties in the field of clean environment and sustainable agriculture.
4. Apply his analytical and research skills in the applied / industrial field of Microbiology like Food technology, Pharma Microbiology, Biotechnology
5. Perform duties as research fellows /scientist in biological sciences.
6. Learn desired skills through on job training , internship program and research

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projects

## **8. Course duration:**

The M.Sc. degree course will be of two years duration with four semesters.

## **9. Eligibility for Admission to M.Sc. (Microbiology)course:**

A candidate who has passed the-

- Bachelor of Science from any recognized university with Microbiology as Principle subject (Major) or Microbiology (Honors).
- Bachelor of Science from any recognized university with Botany /Zoology/ Biochemistry/ Biotechnology/ Environmental science as major subjects with Microbiology as subsidiary subject.
- Bachelor of Science from any recognized university with Microbiology as one of the subjects.
- The candidate who has secured aggregate of 50% marks (45 % marks in case of SC/ST) in the graduate course as well as in the Microbiology Subject shall be eligible for admission to the First Year M.Sc. degree course.

**10. Total Intake capacity** : 30

**11. Medium of Instruction** :English

## **12. Rules and Regulations :**

1. The M. Sc. programme is for 2 academic years and 4 semesters. The minimum total number of credits requirements for each programme is 88 credits.
2. A two-year PG programme with one exit option for those who have completed the three-year Bachelor's Degree Programme.
3. The students, after successful completion of 44 credits in the first year of a two-year PG programme may opt for the exit. Such students will be awarded the PG Diploma in Chemistry. They need to re-enter the programme from where they left off, in the college or may admit to any other HEIs within three years of exit and complete the degree programme within a maximum period of 04 years from the date of admission in the first year of the PG Programme.
4. The M.Sc. degree will be awarded to the students who complete a total of 88 credits in a minimum of two years by completing an average of 22 credits per semester.
5. The curricular design of the first year of the two-year PG Programme aligned with that of the fourth year of the four-year Honors Degree Programmes. Research Methodology (aligned with the seventh semester of the fourth year of Honors and Honors with Research Degree of four-year UG Programmes) and OJT/Internship/Field project of 4 credits (aligned with the eighth semester of the fourth year of Honors Degree of four-year UG Programmes) are introduced in the first semester and the second semester, respectively of the first year of Two-Year PG Programmes.

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6. Second Year PG Programmes will include Research Projects of 10 Credits divided uniformly (4 plus 6) over the third and fourth semesters.
7. Each theory credit is equivalent to 15 clock hours of teaching and each practical, project, and internship credit is equivalent to 30 clock hours of laboratory work in a semester.
8. Semester Grade Points Average (SGPA) will be calculated based on 22 credits and Final Cumulative Grade Point Average (CGPA) will be calculated based on 88 credits from all four semesters.
9. The duration of each theory semester is 15-18 weeks in which teaching and continuous internal assessment are mandatory.
10. The duration of each practical semester is 15 to 18 weeks in which at least a 14-week laboratory session and one week of internal evaluation including viva and journal certification are mandatory.
11. All the students admitted to the Post graduation programme in the college should register themselves on the Academic Bank of Credits (ABC) portal and create their ABC ID. Students also need to share their ABC ID to the college examination cell at the beginning of the academic year.

### 13. Credit Distribution of M.Sc. (Microbiology) program:

The overall structure and credit distribution of the course to be implemented from the academic year 2023-2024 onwards is as follows.

Level	Sem	Major Subject				RM	OJT/ FP	RP	Cu. Cr.	Degree
		DSC		DSE						
		T	P	T	P	T				
6	I (VII of B.Sc.Hons)	2 Courses x 4 credit	2 Courses x 2 credits	1 Course x 4 credits	1Course x 2 credits	4	-	-	22	44 PG Diploma (After 3 years degree )
	II (VIII of B.Sc.Hons)	2 Courses x 4 credit	2 Courses x 2 credits	1 Course x 4 credits	1 Course x 2 credits	-	4	-	22	
<b>Exit Option : PG Diploma (44 Credits)</b>										
6.5	III	2 Courses x 4 credit	2 Courses x 2 credits	1 Course x 4 credits	1Course x 2 credits	-	-	4	22	88 PG Degree (After 3 years UG <b>OR</b> PG degree after 4 year UG)
	IV	3 Courses x 4 credit		1 Course x 4 credits	-	-	-	6	22	
<b>PG degree with 88 credits</b>										

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Students completed B.Sc. Honors / Honors with research degree will take admission to M.Sc. II directly.

Year	Level	Semester	DSC		DSE		OJT/ FP	RM	RP	Total Credits
			T	P	T	P				
I	6.0	Sem I	08	04	04	02	-	04	00	22
		Sem II	08	04	04	02	04	-	00	22
II	6.5	Sem III	08	04	04	02	-	-	04	22
		Sem IV	12	00	04	00	-	-	06	22
			36	12	16	06	04	04	10	88

#### 14. Structure of M.Sc. (Microbiology) Program

##### M.Sc. I

Sem.	Course Type	Course Code	Course Name	Hrs/ Week	Credits	Total Credits	No. of Lecture Hrs.
I	DSC	MJMB101	Immunology	4	4	22	60
		MJMB102	Genetics of Prokaryotes and Eukaryotes	4	4		60
		MJMB103	Practicals I (Based on MJMB101)	4	2		60
		MJMB104	Practicals II (Based on MJMB102)	4	2		60
	DSE (Select any One)	ELMB101A	Microbial Ecology & Environmental Microbiology	4	4		60
		ELMB101B	Biostatistics & Bioinformatics	4	4		60
		ELMB101C	Biochemistry	4	4		60
			ELMB102	Practical III (Based on A/B/C)	4		2
CCC	CCCMB101	Research Methodology	4	4	60		
II	DSC	MJMB201	Virology	4	4	22	60
		MJMB202	Molecular Biology & Recombinant DNA technology	4	4		60
		MJMB203	Practicals IV (Based on MJMB201)	4	2		60
		MJMB204	Practicals V (Based on MJMB202)	4	2		60
	DSE (Select any)	ELMB201A	Microbial Systematics & Diversity	4	4		60
		ELMB201B	Proteins and Proteomics	4	4		60



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	One)	ELMB201C	Quantitative Biology	4	4		60
		ELMB202	Practical VI (Based on A/B/C)	4	2		60
	CCC	CCCMB201	OJT/Internship/FP/CEP	30 days x 4 hrs or 15 days x 8 hrs	4		120

### M.Sc. II

Sem.	Course Type	Course Code	Course Name	Hrs /Week	Credits	Total Credits	No. of Lecture Hrs.
III	DSC	MJMB301	Microbial Diseases and Epidemiology	4	4	22	60
		MJMB302	Fermentation Technology I	4	4		60
		MJMB303	Practical VII (Based on MJMB301)	4	2		60
		MJMB304	Practical VIII (Based on MJMB302)	4	2		60
	DSE (Select any One)	ELMB101A	Food Microbiology & Preservation Technology	4	4		60
		ELMB101B	Quality Control in Food and Pharmaceutical Industries	4	4		
		ELMB101C	Fermentation Technology II	4	4		
		ELMB102	Practical III (Based on A/B/C)	4	2		60
	CCC	CCCMB301	Research Project	-	4		120
	IV	DSC	MJMB401	Agricultural Microbiology & Plant Pathology	4		4
MJMB402			Veterinary & Dairy Microbiology	4	4	60	
MJMB403			Microbial Metabolism & Regulation	4	4	60	
DSE (Select any One)		ELMB401A	Analytical Techniques in Microbiology	4	4	60	
		ELMB401B	Advanced Biotechnology	4	4	60	
		ELMB401C	Enzymology & Enzyme Technology	4	4	60	
CCC		CCCMB401	Research Project	-	6	180	

- a. Each theory paper will be covered in 4 lectures of one hour per week. Each practical course shall be covered in two practical turns of two clock hours per week. Thus the students will work for each practical on two days of the week, daily for at minimum two hrs.
- b. Students will have to complete an on job training or internship program or field project / community engagement program of 4 credits (120 clock hours duration) during semester II in the subject related industry / laboratory / research institute or any other academic institute. The 120 hours clock hours should be completed as 15 days x 8 hrs daily or 30 days x 4 hrs daily. He / She may start his on job training or internship program or field project / community engagement program immediately after completion of the theory examination of first semester. He / She has to submit the a brief report and certificate of on job training or internship program or field project / community engagement program to the department before commencement of practical examination. Further, he has to give the presentation of his work at the time of practical examination before external and internal examiners.

#### 14. Scheme of Examination

- a. The assessment of students shall be based on -

- (a) University Examinations (UE)
- (b) Continuous Internal Assessment (IA)

##### Weightage for Assessments (in Percentage)

Course Type	Formative / Internal Assessment	Summative/University Assessment
Theory	40 %	60 %
Practical	40 %	60 %
Projects	40 %	60 %

- For the theory course of 4 credits, there will be an Continuous Internal Assessment of 40 marks and the University Examination of 60 marks of 2.5 hours duration at the end of each semester.
- For the theory course of 2 credits, there will be an Continuous Internal Assessment of 20 marks and the University Examination of 30 marks of 1.5 hours duration at the end of each semester.
- The internal assessment of theory course may be in the form of – Home Assignment/ Oral /Tutorial/ Unit Test / Presentation / Seminar / online mid-semester examination in MCQ pattern etc.
- The distribution of marks for internal assessment will be as –

Mid semester (Online , MCQ pattern)	20
Home Assignment / Oral /Tutorial / Unit Test / Presentation / Seminar / Attendance	20

- The practical examination will be conducted at the end of each semester.
- The practical examination of each practical course will be of 50 marks, out of which University examination will be of 30 marks on three days for minimum of 3 hrs / day.
- Internal assessment of each practical course will be of 20 marks and it will be based on the continuous assessment of the daily work, orals, seminars / presentations, tour / visit reports, class tests, and attendance .
- The final result of the students in each subject will be based on final GPA obtained by the students for the internal assessment and University Examination.

**b. On Job Training / Internship in Semester II :**

Students shall undertake On Job Training/Internship in an Institute/ Industry/ Laboratory relevant to the Microbiology after completion of the first semester of the first year. Each student will have a mentor who will monitor the activity of a student during OJT. The student is expected to learn the day-to-day activities, processes etc. in the industry during OJT. The OJT report is to be prepared in the consultation with the mentors from the department and industry both, for evaluation at the end of the second semester. They are required to submit a neatly typed and bound report and a soft copy to the department. The department shall arrange for a presentation session of 15min at the time examination, each for all the students to share their experience during OJT. The spiral bound report should include information about the industry, work process, products etc. and also specific information of the work done or experience gained by the student in the industry. For the purpose of term end examination, a hard bound report must be duly signed by both the mentors. The students are required to attach an original certificate, mentioning the successful completion of training, issued by the competent authority from the industry where he/she has undergone training.

Assessment shall be done jointly by the internal and external examiner based on the knowledge/skills gained by the student during the SI and the report.

- c. Assessment of Research projects :** The assessment for the said courses should be carried out as Follows -

**Internal Assessment by Research Guide:** The entire project will be internally assessed by research guide for 40 % marks where the candidate works for research project.. Criteria used for

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the assessment will be as follow:

<b>Sr. No.</b>	<b>Criteria</b>
<b>1</b>	Understanding the basic concept of dissertation
<b>2</b>	Fulfillment of Aims and objectives
<b>3</b>	Results, discussion and conclusion
<b>4</b>	Regularity and punctuality
<b>5</b>	Literature Review
<b>6</b>	Fulfillment of Plagiarism norms as per attached certificate
<b>7</b>	Publication of work
<b>8</b>	Potential Applications of the work / Social relevance

**University Evaluation:**

University evaluation will be carried out for 60 % .This will be conducted as open defense presentation. In case of national emergencies, online presentation is allowed. For the purpose of the evaluation the University will appoint two examiners. One examiner will be external having adequate research experience and minimum qualification as Ph.D. Another examiner will be appointed from the institute where, the candidate has registered for his/her postgraduate degree. External examiners as appointed above will evaluate the dissertation of the candidate for 60 % marks. Following criteria should be used for evaluation purpose by external examiners.

<b>Sr.No.</b>	<b>Criteria</b>
<b>1</b>	Understanding the basic concept of dissertation
<b>2</b>	Fulfillment of Aims and objectives
<b>3</b>	Results, discussion and conclusion
<b>4</b>	Regularity and punctuality
<b>5</b>	Literature Review
<b>6</b>	Fulfillment of Plagiarism norms as per attached certificate
<b>7</b>	Publication of work
<b>8.</b>	Potential Applications of the work/Social relevance

**d. Rules regarding ATKT to second year M.Sc. Microbiology course.**

A student will be allowed to keep terms at the second year of the M.Sc. course if her / his terms for the first year have been granted as per university rules.

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**e. Standard of passing:**

For all courses, both University Examinations (UE) and Internal Assessments (IA) constitute separate heads of passing. In order to pass in such courses and to earn the assigned credits, the learner must obtain a minimum grade point of 5.0 (40% marks) at UE and also a minimum grade point of 5.0 (40% marks) at IA.

If a student fails in IA, the learner passes in the course provided he/she obtains a minimum of 25 % in IA and GPA for the course is at least 6.0 (50% in aggregate). The GPA for a course will be calculated only if the learner passes at the UE.

A student who fails at UE in a course has to reappear only at UE as a backlog candidate and clear the head of passing. Similarly, a student who fails in a course at IA has to reappear only at IA as a backlog candidate and clear the head of passing.

The 10 point scale grades and grade points according to the following table:

Range of Marks(out of 100)	Grade	Grade point
$80 \leq \text{Marks} \leq 100$	O	10
$70 \leq \text{Marks} < 80$	A <sup>+</sup>	9
$60 \leq \text{Marks} < 70$	A	8
$55 \leq \text{Marks} < 60$	B <sup>+</sup>	7
$50 \leq \text{Marks} < 55$	B	6
$40 \leq \text{Marks} < 50$	C	5
Marks < 40	D	0

The performances at UE and IA will be combined to obtain the grade point average (GPA) for the course. The Weights for performances at UE and IA shall respectively be 60 % and 40 %. GPA is calculated by adding the UE marks out of 60 and IA marks will be out of 40. The total marks out of 100 are converted to grade point, which will be the GPA.

**f. Formula to calculate Grade points (GP):**

Suppose that, “Max” is the maximum marks assigned for an examination or evaluation based on which GP will be computed. In order to determine the GP, set  $x = \text{Max}/10$  (since we have adapted 10 point system). Then GP is calculated by the formula as shown as below.

Range of Marks at the evaluation	Formula for the grade point
$8x \leq \text{Marks} \leq 10x$	10
$5.5x \leq \text{Marks} < 8x$	Truncate (Marks/x)+2
$4x \leq \text{Marks} < 5.5x$	Truncate (Marks/x)+1

[Typehere]

Two kinds of performance indicators, namely the Semester Grade point average (SGPA) and the Cumulative Grade Point Average (CGPA) shall be computed at the end of each term. The SGPA measures the cumulative performance of a learner in all courses in a particular semester, while the CGPA measures the cumulative performance in all courses since his/her enrolment. The CGPA of learner when he/she completes the programme is the final result of the learner. The SGPA is calculated by the formula  $SGPA = \frac{\sum C_k \times GP_k}{\sum C_k}$ , where  $C_k$  is the credit value assigned to a course and  $GP_k$  is the GPA obtained by the learner in the course. In the above, the sum is taken over all the courses that the learner has undertaken for the study during the semester, including those in which he/she might have failed or those for which he/she remained absent. **The SGPA shall be calculated upto two decimal place accuracy.**

The CGPA is calculated by the formula  $CGPA = \frac{\sum C_k \times GP_k}{\sum C_k}$ , where  $C_k$  is the credit value assigned to a course and  $GP_k$  is the GPA obtained by the learner in the course. In the above, the sum is taken over all the courses that the learner has undertaken for the study from the time of his/her enrolment and also during the semester for which CGPA is calculated, including those in which he/she might have failed or those for which he/she remained absent. **The CGPA shall be calculated up to two decimal place accuracy.**

**The formula to compute equivalent percentage marks for specified CGPA:**

%Marks (CGPA) =	$10 \times CGPA - 10$	If $5.00 \leq CGPA \leq 6.00$
	$5 \times CGPA + 20$	If $6.00 \leq CGPA \leq 8.00$
	$10 \times CGPA - 20$	If $8.00 \leq CGPA \leq 9.00$
	$20 \times CGPA - 110$	If $9.00 \leq CGPA \leq 9.50$
	$40 \times CGPA - 300$	If $9.50 \leq CGPA \leq 10.00$

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**g. Awards of Honours:**

A student who has completed the minimum credits specified for the program shall be declared to have passed in the program. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The criteria for the award of honors are given below.

Range of CGPA	FinalGrade	Performance Descriptor	Equivalent Range Of Marks(%)
$9.50 \leq \text{CGPA} \leq 10.00$	O	Outstanding	$80 \leq \text{Marks} \leq 100$
$9.00 \leq \text{CGPA} \leq 9.49$	A <sup>+</sup>	Excellent	$70 \leq \text{Marks} < 80$
$8.00 \leq \text{CGPA} \leq 8.99$	A	VeryGood	$60 \leq \text{Marks} < 70$
$7.00 \leq \text{CGPA} \leq 7.99$	B <sup>+</sup>	Good	$55 \leq \text{Marks} < 60$
$6.00 \leq \text{CGPA} \leq 6.99$	B	Average	$50 \leq \text{Marks} < 55$
$5.00 \leq \text{CGPA} \leq 5.99$	C	Satisfactory	$40 \leq \text{Marks} < 50$
CGPA below 5.00	F	Fail	Marks Below 40

**h. Format of the transcript:**

Transcript will be provided to the candidate as per Bharati Vidyapeeth (Deemed to be University), Pune rules and respective amendments as implemented by the university.

**i. Grade / class improvement:**

The rules regarding the improvement of grade/class of M. Sc. Course will be as per notification of Bharati Vidyapeeth (Deemed to be University), Pune.

**j. Verification and revaluation:**

There is provision for verification and revaluation of the result. A student can apply for the verification and revaluation of the result within the two weeks from the declaration of the results with the prescribed fee. The verification and revaluation shall be done as per the existing rules of the University.

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### Pattern of Question Paper

For theory courses, end semester question papers will be set by the University. Assessment for theory papers will be done as per the rules laid down by the University. Questions will be designed to test the conceptual knowledge and understanding of the basic and advanced concepts of the subject. There will be **two sections** for each paper. Each section will be of **30 marks** and the pattern of question paper shall be:

### M.Sc. (Microbiology) NEP-2023

**Subject:**

**Day:**

**Time: 2.5 Hrs.**

**Date:**

**Max. Marks: 60**

---

**Instructions: 1) All questions are compulsory.**

**2) Answers to both the sections should be written in a SAME answer book.**

#### SECTION-I

**Q. 1. Attempt / Answer ANY ONE of the following : (15)**

a)

b)

**Q. 2. Attempt / Answer the following:**

a)

**(7)**

b)

**(8)**

**OR**

a)

**(7)**

b)

**(8)**

#### SECTION-II

**Q. 3. Attempt / Answer ANY THREE of the following: (15)**

a)

b)

c)

d)

e)

**Q. 4. Attempt / Answer ANY THREE of the following: (15)**

a)

b)

c)

d)

e)

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