FACULTY OF LIFE SCIENCES

SYLLABUS

of

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

(Semester: I-IV)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2025-26

The Heritage Institution
KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)

Upon successful completion of this course, students will be able to:

PSO1: gain and apply knowledge of biotechnology and science concepts to solve problems related to field of environment and biotechnology.

PSO2: design, perform experiments, analyze, and interpret data for investigating complex problems in the field of biotechnology and allied fields.

PSO3: apply ethical principles and commit to professional ethics and responsibilities and norms of the biotechnological practices.

PSO4: design and develop solution to biotechnology problems by applying appropriate tools while keeping in mind safety factor for environment and society.

PSO5: to undertake any responsibility as an individual and as a team in a multidisciplinary environment.

PSO6: contribute to the biotechnology and allied fields in designing, developing, and providing solutions for product/processes/technology development.

PSO7: able to justify societal, health, safety and legal issues and understand the responsibilities in biotechnological engineering practices.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF FOUR YEAR DEGREE PROGRAMME
Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Session: 2025-26
Semester-I

Course No.	Course Title	Course Type	Hours per week	Credits			Total Credits	L	P	CA	Total Marks
				L-T-P							
BBTL -1421 BBTL -1031 BBTL -1431	Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History and Culture	C	4-0-0	4	0	0	4	70	-	30	100
BBTM-1102	Communication Skills in English-I	AEC	3-0-2	3	0	1	4	50	20	30	100
BBTM-1083	Biochemistry-I	DSC	4-0-2	4	0	1	5	50	20	30	100
BBTM-1074	Botany-I	DSC	4-0-2	4	0	1	5	50	20	30	100
BBTM-1345	General Microbiology-I	DSC	4-0-2	4	0	1	5	50	20	30	100
VACF-1491	*Foundation Course	VAC	2-0-0	2	0	0	2	35	-	15	50
Total Credits							25				

[1] Special Course in lieu of Punjabi (Compulsory)
[2] Special Course in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab
***Credits of these papers will not be added towards SGPA/CGPA and only grades will be provided**.

C: Compulsory Course
AEC: Ability Enhancement Course
DSC: **Discipline Specific Courses**
VAC: Value Added Course

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF FOUR YEAR DEGREE PROGRAMME
Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
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Semester-II

Course No.	Course Title	Course Type	Hours per week	Credits L-T-P	Total Credits	L	P	CA	Total Marks
BBTL -2421 BBTL -2031 BBTL -2431	Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History and Culture	C	4-0-0	4-0-0	4	70	-	30	100
BBTM-2102	Communication Skills in English-II	MDC	3-0-2	3-0-1	4	50	20	30	100
BBTM-2063	Genetics	DSC	4-0-2	4-0-1	5	50	20	30	100
BBTM-2484	Cell Biology	DSC	4-0-2	4-0-1	5	50	20	30	100
BBTM-2065	Fundamentals of Biotechnology	DSC	4-0-2	4-0-1	5	50	20	30	100
BBTM-2060	Industrial Biotechnology -I	SEC	2-0-2	2-0-1	3	50	20	30	100
VACD-2161	*Drug abuse and ethical education	VAC	4-0-0	4-0-0	4	70	-	30	100
	Total Credits				30				

[1] Special Course in lieu of Punjabi (Compulsory)
[2] Special Course in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab
***Credits of these papers will not be added towards SGPA/CGPA and only grades will be provided**.

C: Compulsory Course
AEC: Ability Enhancement Course
DSC: **Discipline Specific Courses**
SEC: Skill Enhancement Course
VAC: Value Added Course

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF FOUR YEAR DEGREE PROGRAMME
Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Session: 2025-26
Semester-III

Course No.	Course Title	Course Type	Hours per week	Credits L-T-P	Total Credits	L	P	CA	Total Marks
BBTM-3061	Gene Structure and Function	DSC	3-0-2	3-0-1	4	50	20	30	100
BBTM-3332	Biomathematics and Biostatistics	DSC	4-0-2	4-0-1	5	50	20	30	100
BBTM-3483	Zoology-I	DSC	4-0-2	4-0-1	5	50	20	30	100
BBTM-3064	Immunology-I	DSC	4-0-2	4-0-1	5	50	20	30	100
BBTM-3085	Chemistry-I	MDC	3-0-2	3-0-1	4	50	20	30	100
VACE 3221	*Environmental Studies (Compulsory)	VAC	2-0-0	2-0-0	2	35	-	15	50
VACG-3532	*Gender sensitization	VAC	2-0-0	2-0-0	2	35	-	15	50
Total Credits					27				

***Credits of these papers will not be added towards SGPA/CGPA and only grades will be provided**.

DSC: **Discipline Specific Courses**
MDC: Multidisciplinary Course
VAC: Value Added Course

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF FOUR YEAR DEGREE PROGRAMME
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Semester-IV

Course No.	Course Title	Course Type	Hours per week	Credits L-T-P	Total Credits	L	P	CA	Total Marks
BBTM-4061	Molecular Biology	DSC	4-0-2	4-0-1	5	50	20	30	100
BBTM-4062	Biochemical and Biophysical Techniques-I	DSC	4-0-2	4-0-1	5	50	20	30	100
BBTM-4073	Botany-II	DSC	3-0-2	3-0-1	4	50	20	30	100
BBTM-4084	Biochemistry-II	DSC	4-0-2	4-0-1	5	50	20	30	100
BBTM-4085	Chemistry-II	MDC	3-0-2	3-0-1	4	50	20	30	100
BBTM-4060	Skill development in Biotechnology-I	SEC	2-0-2	2-0-1	3	50	20	30	100
VACM-4502	Moral Education	VAC	2-0-0	2-0-0	2	35	-	15	50
Total Credits					28				

[*]**Credits of these papers will not be added towards SGPA/CGPA and only grades will be provided**.

DSC: **Discipline Specific Courses**
MDC: Multidisciplinary course
SEC: Skill Enhancement Course
VAC: Value Added Course

Bachelor of Science (Bio-Technology) Three Year Degree Programme

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Semester-I

Session: 2025-26

Course Code - BBTL -1421

Course Title: Punjabi (Compulsory)

COURSE OUTCOMES:

CO1: ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਕਵਿਤਾ ਤੇ ਕਹਾਣੀ ਪੁਸਤਕ ਦੇ ਕਵਿਤਾ ਭਾਗ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਵਿਤਾ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਤਾਂ ਕਿ ਉਹ ਆਧੁਨਿਕ ਦੌਰ ਵਿਚ ਚੱਲ ਰਹੀਆਂ ਕਾਵਿ ਧਾਰਾਵਾਂ ਅਤੇ ਕਵੀਆਂ ਬਾਰੇ ਗਿਆਨ ਹਾਸਿਲ ਕਰ ਸਕਣ।ਇਸ ਦਾ ਹੋਰ ਮਨੋਰਥ ਕਵਿਤਾ ਦੀ ਵਿਆਖਿਆ, ਵਿਸ਼ਲੇਸ਼ਣ ਤੇ ਮੁਲੰਕਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਤੋਂ ਜਾਣੂ ਕਰਾਉਣਾ ਵੀ ਹੈ ਤਾਂ ਕਿ ਉਹ ਸਮਕਾਲੀ ਸਮਾਜ ਦੀਆਂ ਸਮੱਸਿਆਵਾਂ ਨੂੰ ਸਮਝ ਸਕਣ ਅਤੇ ਆਲੋਚਨਾਤਮਕ ਦ੍ਰਿਸ਼ਟੀ ਬਣਾ ਸਕਣ।

CO2: ਮੰਚ ਘਰ ਪੁਸਤਕ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਮੁੱਲਵਾਨ ਗਿਆਨ ਦੇਣਾ ਹੈ।

CO3: ਪੈਰ੍ਹਾ ਰਚਨਾ ਅਤੇ ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉਤਰ ਦੇਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ।

CO4: ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ:ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ ਉਪਭਾਸ਼ਾ ਵਿਚਲਾ ਅੰਤਰ, ਪੰਜਾਬੀ ਉਪਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ ਚਿੰਨ੍ਹ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨਿਕਾਸ ਤੇ ਵਿਕਾਸ ਪੜ੍ਹਣ ਨਾਲ ਵਿਦਿਆਰਥੀ ਧੁਨੀਆਂ ਦੀ ਉਚਾਰਨ ਪ੍ਰਣਾਲੀ ਤੋਂ ਵਾਕਫ਼ ਹੋਣਗੇ।

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Semester-I

Session: 2025-26

Course Code - BBTL -1421

Course Title: Punjabi (Compulsory)

ਸਮਾਂ ਤਿੰਨ ਘੰਟੇ **Maximum Marks: 100**

L-T-P: 4-0-0 **Theory: 70**

CA: 30

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ (A-D) ਸੈਕਸ਼ਨ ਹੋਣਗੇ।ਸੈਕਸ਼ਨ A-D ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਕ੍ਰਮਵਾਰ ਯੂਨਿਟ I-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਯੂਨਿਟ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 14 ਅੰਕ ਹਨ।

4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਕਵਿਤਾ ਤੇ ਕਹਾਣੀ (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ) ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ। (ਕਵਿਤਾ ਭਾਗ)

(ਕਵਿਤਾ ਦੀ ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ/ਵਿਸ਼ੇਸ਼ਤਾ/ਸਾਰ)

ਯੂਨਿਟ-II

ਮੰਚ ਘਰ

ਡਾ. ਕੁਲਦੀਪ ਸਿੰਘ ਧੀਰ, ਡਾ. ਹਿਰਦੇਜੀਤ ਸਿੰਘ ਭੋਗਲ (ਸੰਪਾ.), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ,ਅੰਮ੍ਰਿਤਸਰ।

(ਵਿਸ਼ਾ ਵਸਤੂ,ਸਾਰ, ਪਾਤਰ ਚਿਤਰਨ)

ਯੂਨਿਟ-III

(ੳ) ਪੈਰ੍ਹਾ ਰਚਨਾ

(ਅ) ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉਤਰ।

ਯੂਨਿਟ-IV

(ੳ) ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ:ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ ਉਪਭਾਸ਼ਾ ਵਿਚਲਾ ਅੰਤਰ, ਪੰਜਾਬੀ ਉਪਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ ਚਿੰਨ੍ਹ

(ਅ) ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨਿਕਾਸ ਤੇ ਵਿਕਾਸ

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Semester-I

Session: 2025-26

Course Code - BBTL -1031

Course Title: Basic Punjabi

In lieu of Punjabi (Compulsory)

COURSE OUTCOMES:

CO1:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨੂੰ ਸਿਖਾਉਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਵਿਚ ਪਾ ਕੇ ਇਕ ਹੋਰ ਭਾਸ਼ਾ ਸਿੱਖਣ ਦਾ ਮੌਕਾ ਪ੍ਰਦਾਨ ਕਰਨਾ ਹੈ। ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੈਂਤੀ ਅੱਖਰੀ, ਅੱਖਰ ਕ੍ਰਮ, ਪੈਰ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ ਅਤੇ ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ ਅਤੇ ਮਾਤਰਾਵਾਂ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ) ਲਗਾਖ਼ਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) ਦੀ ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ ਤੋਂ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO2: ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ ਦੀ ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ (ਸਾਧਾਰਨ ਸ਼ਬਦ, ਸੰਯੁਕਤ ਸ਼ਬਦ, ਮਿਸ਼ਰਤ ਸ਼ਬਦ,ਮੂਲ ਸ਼ਬਦ,ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ) ਤੋਂ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO3: ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ : ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਰਿਸ਼ਤੇਨਾਤੇ, ਖੇਤੀ ਅਤੇ ਹੋਰ ਧੰਦਿਆਂ ਆਦਿ ਤੋਂ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO4: ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਵਿਚ ਹਫ਼ਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ, ਇਕ ਤੋਂ ਸੌ ਤੱਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿਚ ਸਿਖਾਉਣਾ ਹੈ।

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Semester-I

Session: 2025-26

Course Code - BBTL -1031

Course Title: Basic Punjabi

In lieu of Punjabi (Compulsory)

ਸਮਾਂ : 3 ਘੰਟੇ
L-T-P: 4-0-0

Maximum Marks: 100
Theory: 70
CA: 30

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ (A-D) ਸੈਕਸ਼ਨ ਹੋਣਗੇ।ਸੈਕਸ਼ਨ A-D ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਕ੍ਰਮਵਾਰ ਯੂਨਿਟ I-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਯੂਨਿਟ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 14 ਅੰਕ ਹਨ।

4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਪਾਠਕ੍ਰਮ

ਯੂਨਿਟ-I

ਪੈਂਤੀ ਅੱਖਰੀ, ਅੱਖਰ ਕ੍ਰਮ, ਪੈਰ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ ਅਤੇ ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ ਅਤੇ ਮਾਤ੍ਰਵਾਂ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ) ਲਗਾਖ਼ਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) : ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ ।

ਯੂਨਿਟ-II

ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ : ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ (ਸਾਧਾਰਨ ਸ਼ਬਦ, ਸੰਯੁਕਤ ਸ਼ਬਦ, ਮਿਸ਼ਰਤ ਸ਼ਬਦ, ਮੂਲ ਸ਼ਬਦ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ)

ਯੂਨਿਟ-III

ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ : ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਰਿਸ਼ਤੇ ਨਾਤੇ, ਖੇਤੀ ਅਤੇ ਹੋਰ ਧੰਦਿਆਂ ਆਦਿ ਨਾਲ ਸੰਬੰਧਤ।

ਯੂਨਿਟ-IV

ਹਫ਼ਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ, ਇਕ ਤੋਂ ਸੌ ਤਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿਚ ।

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-I

Session: 2025-26

Course Code: BBTL-1431

Course Title: Punjab History and Culture

(Special paper in lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

COURSE OUTCOMES:

After completing Semester I and course on Punjab History and Culture students of History will be able to identify and have a complete grasp on the sources & writings of Ancient Indian History of Punjab:

CO1: Identify and understand the sources and physical features of Punjab

CO 2: To study the earliest civilization (Indus Valley Civilization) and original home of Aryans

CO 3: To examine the Social, Religious and Economic life during Early and Later Vedic Age

CO 4: To comprehend the Buddhist, Jain and Hindu faith and their relevance in the modern times

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-I

Session: 2025-26

Course Code: BBTL-1431

Course Title: Punjab History and Culture

(Special paper in lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

Examination Time: 3 Hours **Max. Marks: 100**

L-T-P: 4-0-0 **Theory: 70**

CA: 30

Instructions for the Paper Setter:

1. Question paper shall consist of four Units
2. Examiner shall set 8 questions in all by selecting Two Questions of equal marks from each Unit.
3. Candidates shall attempt 5 questions in 800 words by at least selecting One Question from each Unit and the 5th question may be attempted from any of the four Units.
4. Each question will carry 14 marks.

Unit-I

1. Physical features of the Punjab
2. Sources of the ancient history of Punjab

Unit-II

3. Harappan Civilization: social, economic and religious life of the Indus Valley People.
4. The Indo-Aryans: Original home

Unit-III

5. Social, Religious and Economic life during Early Vedic Age.
6. Social, Religious and Economic life during Later Vedic Age.

Unit-IV

7. Teachings of Buddhism
8. Teachings of Jainism

Suggested Readings

- B.N. Sharma, Life in Northern India, Delhi. 1966.
- Budha Parkash, Glimpses of Ancient Punjab, Patiala, 1983.
- Chopra, P.N., Puri, B.N., & Das, M. N. (1974). A Social, Cultural & Economic History of India, Vol. I, New Delhi: Macmillan India.
- L. M Joshi (ed.), History and Culture of the Punjab, Art-I, Patiala, 1989 (3rd edition)
- L.M. Joshi and Fauja Singh (ed.), History of Punjab, Vol. I, Patiala 1977.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-I

Session: 2025-26

Course Code: BBTM -1102

Course Title: Communication Skills in English - I

(Theory)

COURSE OUTCOMES:

At the end of this course, the students will develop the following skills:

CO 1: Reading skills that will facilitate them to become an efficient reader

CO 2: Through reading skills, the students will have an ability to have a comprehensive understanding of the ideas in the text and enhance their critical thinking

CO 3: Writing skills of students which will make them proficient enough to express ideas in clear and grammatically correct English

CO 4: The skill to use an appropriate style and format in writing letters (formal and informal) and resume, memo, notices, agenda, minutes

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-I

Session: 2025-26

Course Code: BBTM -1102

Course Title: Communication Skills in English - I

(Theory)

Examination Time: 3 Hrs. **Max. Marks: 100**

L-T-P: 3-0-1 **Theory: 50**

Practical: 20

CA: 30

Instructions for the paper setter and distribution of marks:

The question paper will consist of four sections. The candidate will have to attempt five questions in all selecting one from each section and the fifth question from any of the four sections. Each question will carry 10 marks. Each question can be sub divided into two parts. (10 x 5 = 50)

Unit I

Reading Skills: Reading Tactics and strategies; Reading purposes–kinds of purposes and associated comprehension; Reading for direct meanings.

Unit II

Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/expressions.

Activities:

- Comprehension questions in multiple choice format
- Short comprehension questions based on content and development of ideas

Unit III

Writing Skills: Guidelines for effective writing; writing styles for application, personal letter, official/ business letter.

Activities:

- Formatting personal and business letters.
- Organizing the details in a sequential order

Unit IV

Resume, memo, notices, agenda, minutes, Tips for effective blog writing

Activities:

- Converting a biographical note into a sequenced resume or vice-versa
- Ordering and sub-dividing the contents while making notes.
- Writing notices for circulation/boards
- Writing blogs

Recommended Books:

1) Oxford Guide to Effective Writing and Speaking by John Seely.
2) Business Communication, by Sinha, K.K. Galgotia Publishers, 2003.
3) Business Communication by Sethi, A and Adhikari, B., McGraw Hill Education2009.
4) Communication Skills by Raman, M. & S. Sharma, OUP, New Delhi, India (2011).

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-I

Session: 2025-26

Course Code: BBTM -1102

Course Title: Communication Skills in English - I

Practical / Oral Testing

Time: 3 hours **Practical Marks: 20**

Course Contents:

1. Oral Presentation with/without audio visual aids (10 Marks)
2. Group Discussion (05 Marks)
3. Practical File form Syllabi (05 Marks)

Questions:

1. Oral Presentation will be of 5 to 7 minutes duration. (Topic can be given in advance or it can be of student's own choice). Use of audio-visual aids is desirable.
2. Group discussion comprising 8 to 10 students on a familiar topic. Time for each group will be 15 to 20 minutes.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-I
Session: 2025-26
Course Code: BBTM-1083
Course Title: Biochemistry-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Gain basic knowledge about the role of pH and the physiological properties of water in biological systems.

CO2: Acquire the knowledge of carbohydrates, classification, and their biological functions

CO3: Understand the definition, structure and biological functions of lipids and their subclasses.

CO4: Understand the definition, structure, biological functions, and classification of proteins.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-I
Session: 2025-26
Course Code: BBTM-1083
Course Title: Biochemistry-I
(Theory)

Time: 3 Hours **Max. Marks: 100**

L-T-P: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

Unit-I

Water and its properties: role of water in life, Structure of water molecules, Physico-chemical properties of water, Dissociation and association constants, pH and buffers. pI, pka, Hasselbach Hendersson equation and its implications.

Unit-II

Carbohydrates: Introduction, Monosaccharides: Families of monosaccharides: aldoses and ketoses, trioses, tetroses, pentoses, and hexoses, epimers, and anomers of glucose. Furanose and pyranose forms of glucose and fructose, Mutarotation, structure and functions of monosaccharide derivatives, Disaccharides; concept of reducing and non-reducing sugars, Haworth projections of maltose, lactose, and sucrose, Structural and functional properties of polysaccharides: storage polysaccharides - starch and glycogen; Structural polysaccharides - cellulose, and chitin; Heteropolysaccharides: Glycvosaminoglycans, Peptidoglycan, proteoglycan, glycoproteins

Unit-III

Lipids: Biological importance, Classification of lipids and fatty acids. General structure and function of major lipid subclasses, acylglycerols, phosphoglycerides, sphingolipids, glycosphingolipids and terpenes, sterols, steroids: Prostaglandins.

Unit-IV

Proteins: Biological importance, Structure of amino acids, non-protein and rare amino acids and their chemical reactions. Structural organization of proteins (Primary, Secondary, Tertiary, Quaternary and domain structure, protein classification and function. Forces stabilizing primary, secondary, and tertiary protein structures.

Books Recommended:

1. Voet, D.,Voet, J.G. and Prait, C.W. (2018). Principles of Biochemistry, 5th Edition, Wiley.

2. Stryer, L. (2015). Biochemistry, 8th Edition, W.H. Freeman and Company, New York

3. Berg, J.M., Tymoczko, J. L. And Stryer, L. (2019). Biochemistry, 9th Edition, Freeman.

4. Mathew, C.K., Van, K.E. and Anthern, K.G. (2012). Biochemistry 4th Edition, Addison Wesley.

5. Lehninger, A.L., Nelson, D.L. and Lox, M.M. (2017). Principles of Biochemistry, 7th Edition, CBS Publishers and Distributors, New Delhi.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-I
Session: 2025-26
Course Code: BBTM-1083
Course Title: Biochemistry-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Perform Beer Lamberts Law

CO2: Determine pKa value while performing practical

CO3: Estimate carbohydrates in the given sample

CO4: Estimate proteins and fats in the sample by different methods

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-I
Session: 2025-26
Course Code: BBTM-1083
Course Title: Biochemistry-I
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

Experiments:

1. Verification of Beer Lamberts Law for p-nitrophenol or cobalt chloride.
2. Determination of pKA value of p-nitrophenol.
3. Estimation of carbohydrate in given solution by anthrone method.
4. Study the presence of reducing/ non-reducing sugar in biological samples.
5. Protein estimation by Lowry's method.
6. Protein estimation by Bradford method.
7. Protein estimation by Biuret method.
8. The determination of acid value of a fat.
9. The determination of saponification value of a fat.

Books Recommended:

1.Plummer D.T. (2017). An Introduction to Practical Biochemistry, 3rd Edition Tata McGraw Hill Education.

2.Sawhney, S.K. and Singh, R. (2014). Introductory Practical Biochemistry, Narosa Publishing House.

3.Wilson, K. And Walker, J. (2018). Principles and Techniques of Biochemistry, 8th Edition, McGraw Hill Education.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-I

Session: 2025-26

Course Code: BBTM-1074

Course Title: Botany-I

(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the diversity of plants.

CO2: Understand the structure of meristems, permanent tissues, anatomy of root, stem and leaf in flowering plant.

CO3: Understand the reproduction and different aspects of pollination and self-incompatibility in flowering plants.

CO4: Understand the different plant classification systems, terminology related to floral descriptions and economic importance of various angiosperm families.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-I

Session: 2025-26

Course code: BBTM-1074

Course Title: Botany-I

(Theory)

Time: 3 Hours **Max. Marks: 100**

L-T-P: 4-0-1 **Theory: 50**

Practical: 20

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (10 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting atleast one question from each section. The fifth question may be attempted from any Section.

Unit –I

Diversity in plants: General characters of Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms. Concepts of species, hierarchical taxa and biological nomenclature.

Unit –II

Anatomy of flowering plants: Meristems, simple and complex permanent tissues, internal structure of stem, root and leaf, secondary growth in stem and root of *Helianthus*.

Unit –III

Reproduction in flowering plants: Structure and development of anther and male gametophyte, Structure and development of ovule and female gametophyte; Pollination (self and cross) and fertilization; structure and function of endosperm and embryo (dicot and monocot), polyembryony, self-incompatibility.

Unit –IV

Taxonomy of flowering plants: Artificial (Linnaeus), natural (Bentham & Hooker) and phylogenetic (Engler and Prantl) systems of classification; Terminology pertaining to floral description, General characteristics (including economic importance) of following families of angiosperms; giving examples of few important genera: Solanaceae: *Solanum/Petunia*, Rutaceae: *Citrus, Murraya,* Cruciferae- *Brassica*, Apiaceae (Umbelliferae)- Coriander, Asteraceae - *Helianthus,* Leguminosae –*Cassia/Acacia*/Sweet pea, Poaceae (Graminae)- *Triticum*.

Suggested Readings:

1. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, 4th revised and enlarged edition. Vikas Publishing House, Delhi.
2. Dickinson, W.C. (2009). Integrative Plant Anatomy. Harcourt Academic Press, USA.
3. Hopkins, W.G. and Huner, P.A. (2008). Introduction to Plant Physiology. John Wiley and Sons.
4. Taiz, L. and Zeiger, E. (2006). Plant Physiology, 4 th edition, Sinauer Associates Inc .MA, USA.
5. Vashistha, P.C., Sinha, A.K. and Kumar, A. Pteridophyta. New Delhi: S. Chand, 2010. Print.
6. Singh, G. Plant Systematics: Theory and Practice. 3rded. New Delhi: Oxford & IBH Pvt. Ltd., 2012.Print.
7. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A., Minorsky P.V. and Jackson R. B. Biology. 8thed. USA: Pearson Benjamin Cummings, 2008. Print.
8. Sharma, P. D. Plant Pathology. India: Rastogi Publication, 2011. Print.
9. Webster, J. and Weber, R. Introduction to Fungi. 3rded. Cambridge: Cambridge University Press, 2007. Print.
10. Sethi, I.K. and Walia, S. K. Text book of Fungi and Their Allies. India: Macmillan Publishers, 2011. Print.
11. Vanderpoorten, A. and Goffinet, B. Introduction to Bryophytes. Cambridge: Cambridge University Press, 2009. Print.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-I

Session: 2025-26

Course Code: BBTM-1074(P)

Course Title: Botany-I

(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the anatomy of dicot root, stem and leaf.

CO2: Understand structure and development of anther, male gametophyte, ovule, female gametophyte and endosperms.

CO3: Understand the description of flowers including floral diagram, floral formula, V.S. of flower of various angiosperm families.

CO4: Understand the morphology and economic importance of different angiosperm families.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-I

Session: 2025-26

Course Code: BBTM-1074

Course Title: Botany-I

(Practical)

Time: 3 Hrs. **Practical Marks: 20**

Instructions for the paper setter: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

Experiments:

Plant Anatomy:

Anatomical studies of stem, root and leaf in *Helianthus* and maize plant.

Embryology:

Study of the permanent slides pertaining to micro and megasporogenesis and female gametophytes and endosperms.

Taxonomy:

a) Description of flowers including floral diagram, floral formula, V.S. of flower of the representative genera of families mentioned in syllabus.

b) Identification and short morphological economic note on the specimens included in Unit IV of the theory paper.

Suggested Readings:

1. Bhojwani, S.S. and Bhatnagar, S.P. (2000). The Embryology of Angiosperms, 4th revised and enlarged edition. Vikas Publishing House, Delhi.
2. Peau, K. (1977). Anatomy of Seed Plants, 3rd edition. John Wiley & Sons, New York.
3. Pegeri, K. And Vander Pijl (1979). The Principles of Pollination Biology, Pergamon Press, Oxford.
4. Dickinson, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA.
5. Fahn, A. (1974). Plant Anatomy. Pergmon Press, USA and UK.
6. Hopkins, W.G. and Huner, P.A. (2008). Introduction to Plant Physiology. John Wiley and Sons.
7. Taiz, L. and Zeiger, E. (2006). Plant Physiology, 4 th edition, Sinauer Associates Inc .MA, USA.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-I
Session: 2025-26
Course Code: BBTM-1345
Course Title: General Microbiology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Know the contribution of microbiologists and general features of various microbes.

CO2: Study the structure of bacteria cell and bacterial classification

CO3: Study the microbial culture collection centers, microbial preservation and sterilization methods and understand the basic concepts of bacterial nutrition.

CO4: To learn different types of microscopy techniques.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-I
Session: 2025-26
Course Code: BBTM-1345
Course Title: General Microbiology-I
(Theory)

Time: 3 Hours **Max. Marks: 100**

L-T-P: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

Unit-I

Introduction to microbiology- Evolution and scope of microbiology, Historical perspective and important discoveries related to microbiology. Relationship between microbiology and biotechnology- The microbial biotechnology and its applications in various fields such as healthcare, agriculture, industry, and environment, offering diverse career opportunities. The morphology and fine structure of Bacteria, Fungi, Neurospora, Yeast, algae and Viruses (Bacteriophages). Microbes in extreme environments- the thermophiles, halophiles, acidophiles, psychrophiles and alkalophiles.

Unit-II

Gram-positive and Gram-negative bacteria: Introduction, structure and anatomy of bacterial cell walls and nature of the microbial cell surface. Types of bacterial flagella. Different types of bacterial staining. Bacterial classification: Bacterial classification and taxonomy based on Bergey's Manual of Determinative bacteriology– General outline only. An introduction to Bacterial Serotypes.

Unit-III

Microbial culture collection centers, Methods of microbial preservation: Refrigeration, cryopreservation, lyophilization, Paraffin method. Basic concept of microbial growth, physiology of micro organisms, culture media and its components, Sterilization-Basic concept, physical and

chemical methods of sterilization. Bacterial nutrition-Introduction, nutritional forms of bacteria, Basic concept of transport mechanisms of nutrients across microbial cell membranes: Facilitated diffusion, Active transport and group translocation.

Unit-IV

Principles and application of bright field, dark field, phase contrast, fluorescence and immunofluorescence, electron microscopy (Scanning electron microscopy and transmission electron microscopy).

Books Recommended:

1. Davis, B.D., Dulbecco. R., Eisen, H.N. and Ginsberg, H.S. (1990). Microbiology: 4th Edition, Harper & Row, Publishers, Singapore.
2. Stanier, R.Y. (1999). General microbiology, MacMillan Press, London.
3. Tortora, G.J., Funke, B.R. and Case, C.L. (2015). Microbiology: An introduction, 12th Edition, Pearson College Div.
4. Willey, J., Sherwood, L. And Wooverton, C. J. (2017). Prescott's Microbiology, 10th Edition, McGraw-Hill Education/ Asia
5. Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. (2010). Microbiology: An application-based approach, Tata McGraw Hill.
6. Purohit, S.S. (2006). Microbiology: Fundamentals and Applications, 7th Edition, Agrobios (India).

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-I
Session: 2025-26
Course Code: BBTM-1345
Course Title: General Microbiology-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand sterilization techniques of different types of materials.

CO2: Learn methods of isolation and identification of bacteria

CO3: Learn methods of detection of microbes.

CO4: Understand preservation methods of microbes.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-I
Session: 2025-26
Course Code: BBTM-1345
Course Title: General Microbiology-I
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

Experiments:

1. Introduction to microbiology laboratory and its equipments.
2. Cleaning of glassware.
3. Preparation of cotton plugs
4. Preparation of media, and aseptic techniques of sterilization.
5. Isolation of micro-organism from air, water and soil samples. Dilution, spread plating and pour plating, Colony purification.
6. Identification of bacteria by simple staining, negative staining, and Gram staining.
7. Detection of specific bacteria by Wet mount preparation method and Hanging drop mount method.
8. To preserve bacteria by short term preservation methods like direct transfer to subculture, Immersion in oil, cryopreservation.

Books Recommended:

1. Cappuccino, J.G. and Sherman, N. (2014). Microbiology: A Laboratory Manual 10th Edition, Pearson Education India.
2. Dubey R.C. and Maheshwari (2012). Practical Microbiology 5th edition: S. Chand and company ltd. New Delhi.
3. Leooffee, M.J. and Pierce, B.E. (2015). Microbiology: Laboratory Theory and Application, 3rd Edition, Morton Pub. Co.
4. Sastry, A.S. and Bhat, S. (2018). Essentials of Practical microbiology. Jaypee Brothers Medical Publishers.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-I
Session: 2025-26
Course Code: VACF-1491
Course Title: Foundation Course

Course Duration: 30 hours

Course Credits: 2

PURPOSE & AIM

This course has been designed to strengthen the intellectual foundation of all the new entrants in the college. One of the most common factors found in the students seeking admission in college after high school is the lack of an overall view of human history, knowledge of global issues, peaks of human intellect, social/political thinkers and inventors & discoverers who have impacted human life. For a student, the process of transition from school to college is full of apprehension and skepticism regarding adapting themselves to new system. The Foundation Programme intends to bridge the gap between high school and college education and develop an intellectual readiness and base for acquiring higher education.

INSTRUCTIONAL OBJECTIVES

• to enable the students to realize their position in the whole saga of time and space

• to inculcate in the man appreciation of life, cultures and people across the globe

• to promote, in the students, an awareness of human intellectual history

• to make them responsible and humane world citizen so that they can carry forward the rich legacy of humanity

LEARNING OUTCOMES:

After the completion of this Audit course, students will be able to:

- learn how past societies, systems, ideologies, governments, cultures and technologies were

built, how they operated, and how they have changed

- understandhowtherichhistoryoftheworldhelpsustopaintadetailedpictureofwherewestandto day
- understand the Vedic theism, Upanishads Philosophy and doctrines of Jainism, Buddhism and Sikhism
- acquire knowledge of women rights and courage to face day to day challenges
- acknowledge the changes in society, religion and literature in the renaissance period and the importance of empathy and compassion for humanity
- learn about the prominent Indians (Men and Women) who contributed significantly in freedom struggle, education, economic development and in the formation and evolution four nation
- understand meaning of race and how that concept has been used to justify exclusion, inequality, and violence throughout history and the origin of civil right movements to fight for equality, liberty and fraternity
- criticallyevaluatethesocio-politicalandeconomicissuesatgloballevelanditsimplications in the present
- upgradeandenhancelearningtechnologicalskillsandstrikingabalancebetweentechnologyand their well being
- take pride in learning the saga of Indian Past Culture and Heritage
- understand the rich legacy of KMV and its progressive endeavors

MODULE	TITLE	CONTACT HOURS
I	**Introduction and Initial Assessment**	**2**
II	**The Human Story**	**3**
III	***The Vedas* and the Indian Philosophy**	**2.5**
IV	**The Journey of Woman The Story and the Dream**	**2.5**
V	**Changing Paradigms in Society, R religion & Literature**	**2.5**
VI	**Makers of Modern India**	**2.5**
VII	**Racism: Story of the West**	**2.5**

VIII	**Modern World a t a Glance: Political & Economic Perspective**	**2.5**
IX	**Technology Visa Vis Human Life**	**2.5**
X	**My Nation My Pride**	**2.5**
XI	**The KMV Experience**	**2.5**
XII	**Final Assessment, Feedback and Closure**	**2.5**

EXAMINATION

- **Total Marks: 50 (Final Exam:35; Internal Assessment:15)**
- Final Exam: multiple-choice quiz**.** Marks–35; Time: 1hour
- Internal Assessment:15 (Assessment:5; Attendance: 10)

Comparative assessment questions (medium length) in the beginning and close of the programme. Marks:5; Time:0.5 hour each at the beginning and end.

- Total marks: 50convertedtogradeforfinal result
- Grading system: 90%marks&above: A grade

  80% - 89% marks: B grade

  70% - 79% marks: C grade

  60% - 69% marks: D grade

  50% - 59%marks: E grade

  Below 50%marks: F grade (Fail-must give the exam again)

SYLLABUS

Module I Being a Human: Introduction & Initial Assessment

- Introduction to the programme
- Initial Assessment of the students through written answers toa couple of questions

Module 2 The Human Story

- Comprehensiveoverviewofhumanintellectualgrowthrightfromthebirthofhumanhistory

- The wisdom of the Ancients
- Dark Middle Ages
- Revolutionary Renaissance
- Progressive modern times
- Most momentous turning points, inventions and discoveries

Module 3 The Vedas and the Indian Philosophy

- Origin, teachings and significance of *The Vedas*
- Upanishad sand Puranas
- Karma Theory of *The Bhagwad Gita*
- Maintenets of Buddhism & Jainism
- Teachings of Guru Granth Sahib

Module 4 Changing Paradigms in Society, Religion & Literature

- Renaissance: The Age of Rebirth
- Transformation in human thought
- Importance of humanism
- Geocentricism to heliocentrism
- Copernicus, Galileo, Columbus, Darwin and Saint Joan

Empathy and Compassion

Module 5 Woman: A journey through the Ages

- Status of women in pre-vedic times
- Women in ancient Greek and Roman civilizations
- Women in Vedic and ancient India
- Status of women in the Muslim world
- Women in the modern world
- Crimes against women
- Women labor work force participation
- Women in politics

- Status of women-our dream

Module 6 Makers of Modern India

- Early engagement of foreigners with India
- Education: The first step to modernization
- Railways: The lifeline f India
- Raja Ram Mohan Roy, Gandhi, Nehru, Vivekanand, Sardar Patel etc.
- Indira Gandhi, Mother Teresa, Homai Vyarawala etc.
- The Way Ahead

Module 7 Racism: Story of the West

- European beginnings of racism
- Racism in the USA -Jim Crow Laws
- Martin Luther King Jr. and the battle against racism
- Apartheid and Nelson Mandela
- Changing face of racism in the modern world

Module 8 Modern World at a Glance: Political & Economic Perspective

- Changing world order
- World War I&II
- UNO and The Common wealth
- Nuclear Powers; Terrorism
- Economic Scenario: IMF, World Bank
- International Regional Economic Integration

Module 9 Technology Visa Vis Human Life

- Impact of technology on modern life
- Technological gadgets and their olein outlives
- Technology and environment
- Consumerism and materialism
- Psychological and emotional consequences of technology

- Harmonizing technology with ethics and humaneness

Module 10 My Nation My Pride

- Indian Past Culture and Heritage
- Major Discoveries (Medicinal and Scientific)
- Vedic Age
- Prominent Achievements
- Art, Architecture and Literature

Module 11 The KMV Experience

- Rich Legacy of KMV
- Pioneer in grolein women emancipation and empowerment
- KMV Contribution in the Indian Freedom Struggle
- Moral, cultural and intellectual heritage of KMV
- Landmark achievements
- Innovative initiatives; international endeavors
- Vision, mission and focus
- Conduct guidelines for students

Module 12 Final Assessment, Feedback & Closure

- Final multiple-choice quiz
- Assessment through the same questions asked in the beginning
- Feedback about the programme from the students
- Closure of the programme

PRESCRIBED READING

- ***The Human Story*** published by Dawn Publications

Semester-II

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code - BBTL -2421

Course Title: Punjabi (Compulsory)

COURSE OUTCOMES

CO1: ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਕਵਿਤਾ ਤੇ ਕਹਾਣੀ ਪੁਸਤਕ ਦੇ ਕਹਾਣੀ ਭਾਗ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਹਾਣੀ ਨੂੰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਕਹਾਣੀ ਜਗਤ ਨਾਲ ਜੋੜਣਾ ਹੈ।

CO2: ਗੱਦ ਪ੍ਰਵਾਹ ਪੁਸਤਕ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਮੁੱਲਵਾਨ ਗਿਆਨ ਦੇਣਾ ਹੈ।

CO3: ਸ਼ਬਦ ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ, ਪਰਿਭਾਸ਼ਾ, ਮੁੱਢਲੇ ਸੰਕਲਪ, ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ -ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

CO4: ਦਫ਼ਤਰੀ ਚਿੱਠੀ ਪੱਤਰ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਸਮੇਂ ਅਤੇ ਮਿਹਨਤ ਦੀ ਬੱਚਤ ਕਰਨ ਬਾਰੇ ਦੱਸਣਾ ਹੈ। ਮੁਹਾਵਰੇ / ਅਖਾਣ ਦੀ ਵਰਤੋਂ ਨਾਲ ਗੱਲਬਾਤ ਵਿਚ ਪਰਪੱਕਤਾ ਆਉਂਦੀ ਹੈ।ਇਹ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਗੱਲਬਾਤ ਵਿਚ ਨਿਖਾਰ ਲਿਆਉਣ ਦਾ ਕੰਮ ਕਰਨਗੇ।

ਨਿਕਾਸ ਤੇ ਵਿਕਾਸ ਪੜ੍ਹਣ ਨਾਲ ਵਿਦਿਆਰਥੀ ਧੁਨੀਆਂ ਦੀ ਉਚਾਰਨ ਪ੍ਰਣਾਲੀ ਤੋਂ ਵਾਕਫ਼ ਹੋਣਗੇ।

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code - BBTL -2421

Course Title: Punjabi (Compulsory)

ਸਮਾਂ ਤਿੰਨ ਘੰਟੇ **Max. Marks: 100**
L-T-P **Theory: 70**
4-0-0 **CA: 30**

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ (A-D) ਸੈਕਸ਼ਨ ਹੋਣਗੇ।ਸੈਕਸ਼ਨ A-D ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਕ੍ਰਮਵਾਰ ਯੂਨਿਟ I-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਯੂਨਿਟ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 14 ਅੰਕ ਹਨ।

4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਕਵਿਤਾ ਤੇ ਕਹਾਣੀ (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ) ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ। (ਕਹਾਣੀ ਭਾਗ)

ਕਹਾਣੀ ਦਾ ਸਾਰ/ਵਿਸ਼ਾ੍ਵਸਤੂ

ਯੂਨਿਟ-II

ਗੱਦ ਪ੍ਰਵਾਹ (ਰੇਖਾ ਚਿਤਰ ਤੇ ਹਲਕੇ ਲੇਖ)

(ਸੰਪਾ. ਡਾ. ਬਿਕਰਮ ਸਿੰਘ ਘੁੰਮਣ ਅਤੇ ਜਸਪਾਲ ਸਿੰਘ),

ਗਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

(ਵਿਸ਼ਾ ਵਸਤੂ/ਸਾਰ)

ਯੂਨਿਟ-III

(ੳ) ਸ਼ਬਦ ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ, ਪਰਿਭਾਸ਼ਾ, ਮੁੱਢਲੇ ਸੰਕਲਪ
(ਅ) ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ

ਯੂਨਿਟ-IV

ਦਫ਼ਤਰੀ ਚਿੱਠੀ ਪੱਤਰ

ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ ਅਤੇ ਉਪਭਾਸ਼ਾ
ਵਿਚਲਾ ਅੰਤਰ, ਪੰਜਾਬੀ ਉਪਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ ਚਿੰਨ੍ਹ

(ਅ) ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨਿਕਾਸ ਤੇ ਵਿਕਾਸ

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTL -2031
Course Title: Basic Punjabi
In lieu of Punjabi (Compulsory)

COURSE OUTCOMES:

CO1: ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ (ਨਾਂਵ, ਪੜਨਾਂਵ, ਕਿਰਿਆ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ, ਸਬੰਧਕ, ਯੋਜਕ ਅਤੇ ਵਿਸਮਿਕ) ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ -ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

CO2: ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਵਾਕ ਬਣਤਰ (ਸਾਧਾਰਨ ਵਾਕ, ਸੰਯੁਕਤ ਵਾਕ, ਮਿਸ਼ਰਤ ਵਾਕ, ਬਿਆਨੀਆ ਵਾਕ, ਪ੍ਰਸ਼ਨ ਵਾਚਕ ਵਾਕ ਅਤੇ ਹੁਕਮੀ ਵਾਕ) ਦੀ ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਇਸ ਦੀ ਬਣਤਰ ਤੋਂ ਜਾਣੂ ਹੋਣਗੇ ਅਤੇ ਉਨ੍ਹਾਂ ਦੀ ਭਾਸ਼ਾ ਤੇ ਪਕੜ ਮਜਬੂਤ ਹੋਵੇਗੀ।

CO3: ਪੈਰ੍ਹਾ ਰਚਨਾ ਅਤੇ ਸੰਖੇਪ ਰਚਨਾ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ।

CO4: ਘਰੇਲੂ ਅਤੇ ਦਫ਼ਤਰੀ ਚਿੱਠੀ ਪੱਤਰ ਲਿਖਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਇਸ ਕਲਾ ਵਿਚ ਨਿਪੁੰਨ ਕਰਨਾ ਹੈ । ਅਖਾਣ ਅਤੇ ਮੁਹਾਵਰੇ ਦੀ ਵਰਤੋਂ ਨਾਲ ਗੱਲਬਾਤ ਵਿਚ ਪਰਪੱਕਤਾ ਆਉਂਦੀ ਹੈ।ਇਹ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਗੱਲਬਾਤ ਵਿਚ ਨਿਖਾਰ ਲਿਆਉਣ ਦਾ ਕੰਮ ਕਰਨਗੇ।

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTL -2031

Course Title: Basic Punjabi

In lieu of Punjabi (Compulsory)

ਸਮਾਂ : 3 ਘੰਟੇ **Max. Marks: 100**

L-T-P: 4-0-0 **Theory: 70**

CA: 30

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ (A-D) ਸੈਕਸ਼ਨ ਹੋਣਗੇ। ਸੈਕਸ਼ਨ A-D ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਕ੍ਰਮਵਾਰ ਯੂਨਿਟ I-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਯੂਨਿਟ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 14 ਅੰਕ ਹਨ।

4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਪਾਠ ਕ੍ਰਮ

ਯੂਨਿਟ-I

ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ (ਨਾਂਵ, ਪੜਨਾਂਵ, ਕਿਰਿਆ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ, ਸਬੰਧਕ, ਯੋਜਕ ਅਤੇ ਵਿਸਮਿਕ)

ਯੂਨਿਟ-II

ਪੰਜਾਬੀ ਵਾਕ ਬਣਤਰ : ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ

(ੳ) ਸਾਧਾਰਨ ਵਾਕ, ਸੰਯੁਕਤ ਵਾਕ ਅਤੇ ਮਿਸ਼ਰਤ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

(ਅ) ਬਿਆਨੀਆ ਵਾਕ, ਪ੍ਰਸ਼ਨ ਵਾਚਕ ਵਾਕ ਅਤੇ ਹੁਕਮੀ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

ਯੂਨਿਟ-III

ਪੈਰ੍ਹਾ ਰਚਨਾ

ਸੰਖੇਪ ਰਚਨਾ

ਯੂਨਿਟ-IV

ਚਿੱਠੀ ਪੱਤਰ (ਘਰੇਲੂ ਅਤੇ ਦਫ਼ਤਰੀ)

ਅਖਾਣ ਅਤੇ ਮੁਹਾਵਰੇ (ਲਿਸਟ ਨਾਲ ਨੱਥੀ ਹੈ)

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTL-2431

Course Title: Punjab History and Culture

(Special paper in lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

COURSE OUTCOMES:

After completing Semester II and course on Ancient History of Punjab students will be able to understand:

CO1: The reasons and impact of Alexander's invasions and to comprehend various factors leading to rise and fall of empires and emergence of new dynasties and their administration specifically of Maurya rule in general and Ashok in particular

CO2: Art and architecture of Gupta period and the Indo-Greek style of architecture under Gandhara School

CO3: To have an insight into the socio-cultural history under Harshvardhan and punjab under the stated period

CO4: To enable students to have thorough insight into the various forms/styles of Architecture and synthesis of Indo - Greek Art and Architecture in Punja

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTL-2431

Course Title: Punjab History and Culture (C. 320 to 1000 A.D.)

(Special paper in lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

Examination Time: 3 Hours **Max. Marks: 100**

L-T-P: 4-0-0 **Theory: 70**

C.A.: 30

Instructions for the Paper Setter:

1.Question paper shall consist of four Units

2.Examiner shall set 8 questions in all by selecting Two Questions of equal marks from each Unit.

3.Candidates shall attempt 5 questions in 800 words, by at least selecting One Question from each Unit and the 5th question may be attempted from any of the four Units.

4.Each question will carry 14 marks

Unit-I

1. Alexander's Invasion's and Impact
2. Administration of Chandragupta Maurya with special reference to reforms introduced by Ashok

Unit-II

3. The Kushans: Gandhar School of Art
4. Gupta Empire: Golden Period-Social and cultural life, Art and Architecture)

Unit-III

5. The Punjab under Harshvardhana-Society and Religion During the time of Harshvardhana
6. Socio-cultural History of Punjab from 7th to 1000 A.D.

Unit-IV

7. Development of Languages and Education with Special reference to Taxila
8. Development to Art and Architecture

Suggested Readings

- B.N. Sharma: *Life in Northern India*, Delhi. 1966
- Budha Parkash, *Glimpses of Ancient Punjab*, Patiala, 1983.
- L. M Joshi (ed), *History and Culture of the Punjab*, Art-I, Punjabi University, Patiala, 1989 (3rd edition)
- L.M. Joshi and Fauja Singh (ed.), *History of Punjab*, Vol.I, Punjabi University, Patiala, 1977.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTM-2102

Course Title: Communication Skills in English-II

COURSE OUTCOMES:

At the end of this course, the students will develop the following skills:

CO 1: Enhancement of listening skills with the help of listening exercises based on conversation, news and TV reports

CO 2: The ability of Note-Taking to be able to distinguish the main points from the supporting details and the irrelevant information from the relevant one

CO 3: Improvement of speaking skills enabling them to converse in a specific situation

CO 4: Acquisition of knowledge of phonetics which will help them in learning about correct pronunciation as well as effective speaking

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTM-2102

Course Title: Communication Skills in English-II

(Theory)

Time: 3 hours **Max. Marks: 100**

L-T-P: 3-0-1 **Theory: 50**

Practical: 20

CA: 30

Instructions for the paper setter and distribution of marks:

The question paper will consist of four sections. The candidate will have to attempt five questions in all selecting one from each section and the fifth question from any of the four sections. Each question will carry 10 marks. Each question can be sub divided into two parts. (10 x 5 = 50)

Unit-I

Listening Skills: Barriers to listening; effective listening skills; feedback skills.

Activities: Listening exercises – Listening to conversation, News and TV reports

Unit-II

Attending telephone calls; note taking and note making

Activities: Taking notes on a speech/lecture

Unit-III

Speaking and Conversational Skills: Components of a meaningful and easy conversation, understanding the cue and making appropriate responses, forms of polite speech, asking and providing information on general topics

Activities:1) Making conversation and taking turns

2) Oral description or explanation of a common object, situation or concept

Unit-IV

The study of sounds of English, Stress

Situation based Conversation in English Essentials of Spoken English

Activities: Giving Interviews

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.

2. *Business Communication* by Sethi, A and Adhikari, B., McGraw Hill Education 2009.

3. *Communication Skills* by Raman, M. & S. Sharma, OUP, New Delhi, India (2011).

4. *A Course in Phonetics and Spoken English* by J. Sethi and P.V. Dhamija, Phi Learning.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTM-2102

Course Title: Communication Skills in English-II

Practical / Oral Testing

Time: 3 hours **Practical Marks: 20**

Course Contents:

1. Oral Presentation with/without audio visual aids (10 Marks)

2. Group Discussion/ Mock Interview (05 Marks)

3. Listening to any recorded or live material and asking oral questions for listening comprehension (05 Marks)

Questions:

1. Oral Presentation will be of 5 to 7 minutes duration. (Topic can be given in advance or it can be of student's own choice). Use of audio-visual aids is desirable.

2. Group discussion comprising 8 to 10 students on a familiar topic. Time for each group will be 15 to 20 minutes.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2063
Course Title: Genetics
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand Mendelian and Neo-mendelian genetics along with the study of phenomenon of dominance, laws of segregation, independent assortment of genes.

CO2: Develop an understanding of the principles and mechanisms of linkage and crossing over.

CO3: To learn various types of mutations their significance and practical applications along with basic microbial genetics.

CO4: Understand the organization of chromosomes and concept of human genetics.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2063
Course Title: Genetics
(Theory)

Time: 3 Hours **Max. Marks: 100**
L-T-P: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

Unit - I

Mendel's Laws of Inheritance: Principle of segregation and independent assortment, Monohybrid, dihybrid, and trihybrid crosses, back cross and test cross, concept of probability

Interaction of Genes: Incomplete inheritance and co-dominance, pleiotropism, modification of F2 ratios: epistasis, complementary genes, supplementary genes, inhibitory genes, duplicate genes, lethality, and collaborators genes. Multiple allelism.

Unit – II

Linkage: Coupling and repulsion hypothesis, chromosomal theory of linkage, complete and incomplete linkage, linkage groups and significance of linkage.

Crossing Over: Introduction, mechanism of meiotic crossing over, types of crossing over, factors affecting it and its significance.

Mutation: Spontaneous versus induced mutations, types of mutations, mutations rate and frequency, Mutagens: Physical and chemical, the molecular basis of mutations. Significance and practical applications of mutation.

Unit – III

Basic Microbial Genetics: Conjugation, transduction, transformation

Extra Chromosomal (Cytoplasmic) Inheritance: features; inheritance of mitochondrial DNA, chloroplast DNA, kappa articles in Paramecium, Sigma factor in Drosophila, cytoplasmic male sterility (CMS) in maize.

Chromosomal aberrations: Structural: deletion, duplication, inversion, translocation; Numerical: polyploidy, aneuploidy; significance of chromosomal aberrations.

Unit – IV

Organization of Chromosomes: The structure of prokaryotic and eukaryotic chromosome, centromere, and telomere structure, euchromatin and heterochromatin, Special chromosomes: Polytene chromosomes and lampbrush chromosomes, satellite DNA, supercoiling of DNA.

Human Genetics: Population genetics, Hardy Weinberg law, Pedigree analysis, Karyotyping, genetic disorders.

Books Recommended:

1. Gupta, P.K. (2018). Genetics, 5th Revised Edition, Rastogi Publications.
2. Hartl, D.L., Cochrane, B. (2017). Genetics: Analysis of Genes & Genomes 9th Edition. Jones & Bartlett Publishers.
3. Brooker, R.J. (2017). Genetics: Analysis and Principles, McGraw-Hill Education.
4. Pierce, B. (2016). Genetics: A conceptual approach, 6th Edition, WH Freeman.
5. Snustad and Simmons (2015). Principles of Genetics, 7th Edition, John Wiley & Sons

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2063
Course Title: Genetics
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand Mendelian laws.

CO2: Solve paternity disputes.

CO3: Demonstrate segregation in preserved material.

CO4: Study polytene chromosomes and dermatoglyphics.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2063
Course Title: Genetics
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

Experiments:

1. Demonstration of Law of segregation and independent assortment (use of colored beads, capsules etc.).

2. Numerical problems on Mendelism and on modified F2 ratios.

3. Numerical problems on paternity disputes (Blood groups)

4. Segregation demonstration in preserved material

5. Study of polytene chromosomes from permanent slides.

6. Dermatographics: Palm print taking and fingertip patterns.

7. Preparation and study of mitosis slides from onion root tips by squash method.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTM-2484

Course Title: Cell Biology

(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understanding the basic unit of life – cell and broad classification of cell types.

CO2: Understanding the structure and functions of cell organelles.

CO3: Understand Cell Division and Cell Cycle.

CO4: Understanding the biological membranes along with membrane transport mechanism.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTM- 2484

Course Title: Cell Biology

(Theory)

Time: 3 Hrs. **Max. Marks: 100**

Credits: 4-0-1 **Theory: 50**

Practical: 20

CA: 30

Instructions for the Paper Setter: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

Unit-I

Cell as a basic unit of living systems. The cell theory Broad Classification of Cell Types: PPLO's, bacteria, eukaryotic microbes, plant and animal cells. A detailed classification of cell types within an organism. Cell, tissue, organ and organism as different levels of organizations of otherwise genetically similar cells.

Unit-II

Structure and function of cell organelles, ultrastructure of cell membrane, cytosol, Golgi bodies, endoplasmic reticulum (rough and smooth), ribosomes, cytoskeletal structures (actin, microtubules etc.), Mitochondria, chloroplasts, lysosomes, peroxysomes, nucleus (nuclear membrane, nucleoplasm, nucleolus, chromatin).

Unit-III

Cell Division and Cell Cycle: mitosis, meiosis, stages of cell cycle, binary fission, amitosis and its regulation. Cell-cell interaction, Cell locomotion (amoeboid, flagellar and ciliar).

Unit-IV

Biological Membranes: Supramolecular architecture of membranes; Solute transport across membranes; Model membranes and Liposomes.

Books Recommended:

1. De-Robertis, F.D.P. and De-Robertis Jr. E.M.F. (2017) Cell and Molecular Biology, Saunders, Philadelphia.

2. Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh and Matsudaira (2007) Molecular Cell Biology 6th Edition, W.H.Freemen& Co Ltd.

3. Geoffrey, M. Cooper & Robert E. Hausman (2013) The Cell: A molecular approach 6th Edition, Sinauer Associates.

4. Alberts, Johnson, Lewis, Raff, Roberts and Walter (2008) Molecular Biology of the Cell, 5th Edition, Garland Science.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTM-2484

Course Title: Cell Biology

(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Perform a variety of molecular and cellular biology techniques.

CO2: Describe cellular membrane structure and function, fine structure and function of cell organelles.

CO3: Understand Microtomy, staining and histology of different tissues.

CO4: Study about electron micrographs of different organelles

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-II

Session: 2025-26

Course Code: BBTM-2484

Course Title: Cell Biology

(Practical)

Time: 2 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1. Study of Cells:

(a) Prokaryotic cells: Lactobacillus, E. coli. Blue green algae.

(b) Eukaryotic cells: Testicular material (for studies of spermatogenesis)

2. Study of electron micrographs of various cell organelles-plasma membrane, Mitochondria, Golgi complex, Lysosomes, Endoplasmic Reticulum (smooth and granular), Cilia, Centrioles, inclusions like glycogen, lipids, etc.

3. Preparation of Permanent Slides: Principles and procedures- Section cutting of tissues and staining of tissues with Haematoxylin/ eosin method.

4. Study of permanent slides of various tissues (gut region, liver, lung, spleen, kidney, pancreas, testis, ovary, tongue, skin etc.).

5. Preparation of Buccal Smear for microscopic examination.

6. Barr body observation in human squamous epithelial cells.

7. Microtomy of Plant Tissue specimens (Stem & Root)

Books Recommended:

1. 2. Shah, V.C., Bhatavdekar, J., Chinoy, N.J. and Murthy, S.K. (1988). Essential techniques in Cell Biology. Anand Book Depot, Ahemadabad.

Celis, J.E. (1998) Cell Biology: A Laboratory handbook. Vol. 1-3. Academic Press, UK.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2065
Course Title: Fundamentals of Biotechnology
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

CO1: Know the basic concept of biotechnology and recombinant technology.

CO2: Understand applications of biotechnology in health care and agriculture.

CO3: Know the bio business and intellectual property rights in biotechnology.

CO4: Know different ethical issues pertaining to biotechnology.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2065
Course Title: Fundamentals of Biotechnology
(Theory)

Time: 3 Hours **Max. Marks: 100**
L-T-P: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

UNIT-I

Emergence, scope and basics of biotechnology

Historical perspective, Appraise the interplay of science and technology in the development of biotechnology, Definition and areas of biotechnology, Overview - DNA, gene, gene expression, Recombinant DNA technology. Role of Bacteria (*E. coli*), Yeast, Viruses (bacteriophages), *Drosophila melanogaster*, *Caenorhabditis elegans*, *Arabidopsis thaliana* as workhorses of biotechnology. Biotechnology research in India. biotechnology institutions in India (Public and private Sector), Biotech success stories, Biotech policy initiatives. careers and employment opportunities in biotechnology.

UNIT-II

Applications of Biotechnology: An Overview

Applying biotechnology to modern life styles: Healthcare – Biopharma : Recombinant human insulin, Recombinant hepatitis B vaccine; molecular diagnostics : PCR for infectious disease (viral / bacterial), blood screening and genetic testing, Gene therapy (for Alzheimer's disease), genetic counseling; Agriculture and food production (Genetically engineered food, seed banks, aquaculture); Green biotechnology (bioremediation, biofuels, conservation); Forensics and

biodefense; Evo Devo (The development of life and human family tree); careers and employment opportunities in biotechnology.

UNIT-III

Bio business and IPRs in Biotechnology

Commercialization of biotechnology: concerns and consequences, biotechnology industry practices and Government regulations, concept and market potential of Bio business, Requirements and objectives of patent, patentable and non-patentable inventions, process of writing and filing a patent, patenting genes/ gene fragments /SNPs/ proteins / stem cells. Patents related to bacteria, viruses, fungi and medicinal plants, plant breeder's right. IPR: introduction, types (trade secret, copyright, trademark)

UNIT-IV

Biotechnology and Society

Ethical Issues and Regulating the use of Biotechnology: Human cloning, GM microorganisms, Food and Food ingredients, stem cells; Public Perception of Biotechnology: Consuming GM foods, GMOs and environment, antibiotic resistance; The future of Biotechnology.

Books Recommended:

1. David P Clark & Nanette J. Pazdernik (2017) Biotechnology – Applying the Genetic Revolution, Elsevier Academic Press.

2. Bernard R Glick, Jack J Pasternak and Cheryl L Patten (2010) Molecular Biotechnology: Principles and applications of Recombinant DNA, ASM Press.

3. Singh, B.D. (2018). Biotechnology expanding horizons, Kalyani Publishers, New Delhi.

4. Singh, I. and Kaur, B (2010) Patent law and Entrepreneurship, 3rd Edition, Kalyani Publishers.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2065
Course Title: Fundamentals of Biotechnology
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Learn good lab practices in biotechnology laboratory.

CO2: Learn principle, working and applications of instruments.

CO3: Know the handling and disposal procedure regarding hazardous reagents.

CO4: Know different steps in patent writing.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2065
Course Title: Fundamentals of Biotechnology
(Practical)

Time: 3 hours **Practical marks: 20**

Instructions for the practical Examiner:

Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar.

Experiments:

1. Good laboratory practices followed in biotechnology laboratory
2. Introduction, use and maintenance of basic equipments in a biotechnology laboratory (Auto-pipettes, weighing balance, pH meter, water bath, dry bath, spectrophotometer, centrifuges, light microscope, electrophoretic apparatus, vortex mixer, magnetic stirrer, rocker, laminar hoods, autoclave, sonicator, UV transilluminator, hot air oven, BOD incubator)
3. Handling and disposal of hazardous reagents (acids, carcinogenic chemicals like acrylamide, ethidium bromide) and concept of chemical hoods.
4. Different steps for patent with the help of example.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2060
Course Title: Industrial Biotechnology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the basics of microbial industrial processes.

CO2: Understand the isolation, maintenance, and preservation of industrially important microbes

CO3: Understand different strain improvement method required for industrial important microbes.

CO4: Understand industrial production of primary and secondary metabolite and fermentation of dairy products, fermented foods, and enzymes.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2060
Course Title: Industrial Biotechnology-I
(Theory)

Time: 3 Hours **Max. Marks: 100**
L-T-P: 2-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

Unit-I

Introduction: Basic concept of agriculture and food processing as industry, methods and principles of food processing, differences between microbial industrial processes and chemical industrial processes. Scope for entrepreneurship in food processing, agri-based industries, and biotechnology sectors.

Unit-II

General study and characterization of Industrially important microbes. Methods of isolation, screening (primary and secondary methods), selection and identification, maintenance, and preservation of industrially important microbial cultures.

Unit-III

Strain improvement of industrial important microbes: by using mutational programme and recombination systems (parasexual cycle, protoplast fusion and recombinant DNA techniques), isolation of mutants (induced, auxotrophic, resistant and revertant mutants), inoculums development, media formulation and process optimization of industrial and agro industrial microbes.

Unit-IV

Introduction to primary and secondary metabolites production. Production of Tetracycline and penicillin, Dairy products like curd, yoghurt, cheese, bread. Fermented foods-Pickles, Sauerkraut, Enzyme Production-Amylases, cellulases, proteases in leather industries.

Books Recommended:

1. Wittmann, C. and Liao, J. (2017). Industrial Biotechnology: Products and Processes (Advanced Biotechnology), Vol. 4 Wiley-VCH.
2. Singh B.D. (2016). Biotechnology: Expanding horizons, Kalyani Publishers / Lyall Bk Depot
3. Chakraborty, P.K. (2013). Agro and Industrial Biotechnology, Black Prints
4. Tyagi, N. (2012). Industrial Microbiology and Biotechnology, Agrotech Press.
5. Casida, L.E.J.R. (2007). Industrial Microbiology, New Age International Publishers
6. Okafor N, Okeke B.C. (2018). Modern Industrial Microbiology and Biotechnology, 2nd edition, CRC Press.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2060
Course Title: Industrial Biotechnology-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Isolate milk protein and determine fat content in milk.

CO2: Learn the process of cheese making.

CO3: Isolate microbes from soil.

CO4: Screen industrially important enzyme producing microbes.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Code: BBTM-2060
Course Title: Industrial Biotechnology-I
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

Experiments

1. Isolation of microbial cells by serial dilution-spread plate method.

2. Measurement of bacterial size.

3. Metabolic Characterization by IMVIC test

4. Alcoholic and Mixed–Acid Fermentation.

5. Starter culture preparation, evaluation and application.

6. Determination of nitrate reduction by bacteria.

Books Recommended:

1. Cappuccino J.G., Sherman N. (2007). Microbiology: A laboratory (Pearson Benjamin Cummings).
2. Plummer D.T. (2004). An introduction to practical biochemistry (Tata McGraw Hill Publishers Co. Ltd., New Delhi).
3. Bansal, D.D., K Hardori, R., Gupta, M.M. (1985). Practical biochemistry (Standard Publication Chandigarh).
4. Dubey R.C. and Maheshwari (2012) Practical Microbiology 5th edition: S. Chand and company ltd. New Delhi.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-II
Session: 2025-26
Course Title: Drug Abuse and Ethical Education
Course Code: VACD-2161

Course Duration: 30 hours

Course Credits: 4

Course Description:

Drug Abuse and Ethical Education Programme has been introduced as part of the curriculum of second Semester of all streams of undergraduate degree programs. It has been added as a compulsory subject, the awards of which will not be incorporated in the total marks but will earn the student 4 credits.

Expectations:

This academic input has been taken up to sensitize the students to the need of a morally upright character in the present times when youth is being misled into consumption/ abuse of drugs, thereby ruining their present and future.

By studying Drug Abuse the students will have a better understanding of the concept. They will be able to analyze the physical, psychological, and social consequences on individuals and develop strategy for prevention and management to promote healthy life style and community well being

EXAMINATION

- **Total Marks: 100 (Final Exam: 70; Internal Assessment: 30)**
- Final Exam: multiple choice Questions Marks-70; Time: 3 hours
- Internal Assessment: 30
- Total marks: 100 converted to grade for final result
- Grading system for Audit Course

Letter Grade	Percentage Score
O	90.1-100 %
A+	80.1-90 %
A	70.1-80 %
B+	60.1-70 %
B	50.1- 60 %
C	45-50 %
P	35-44.9 %
F	Below 35
Ab	Absent

Syllabus:

Module I: Challenges before youth:

- Drug Abuse: Meaning; Nature and Types and Extent of Drug Abuse in India and Punjab
- Consequences of Drug Abuse: Individual; Education; Employment; Income

Family; Violence; Society; Crime and Social Disorganization

Module II: Solving the problem:

- Prevention of Drug abuse: Role of family and Educational Institutions; Parent child relationship; Family support and Supervision; Counseling and Teacher as role-model.
- Management of Drug Abuse: Medical and Psychiatric management; Medication and withdrawal effects; Counseling; Behavioral and Cognitive therapy; Legislation: NDPs act; Statutory warnings and Strict enforcement of laws

Module III: Understanding the Self:

- Character building: Self awareness; Self growth; Self Control; Self Discipline; Character and Destiny
- Generation gap: Relation with peer group; siblings and elders

Module IV: Social Responsibility:

- Opposite Sex Relations
- Globalization and IT Boom- Advantages and Disadvantages

Semester-III

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3061
Couse Title: Gene Structure and Function
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the structure of DNA, RNA, gene organization, genome complexity, and repetitive DNA elements.

CO2: Understand the types, characteristics, and applications of transposable elements.

CO3: Understand the regulation of gene expression in prokaryotes through operon models.

CO4: Understand the genetic basis of cancer and the key outcomes of the Human Genome Project.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3061
Couse Title: Gene Structure and Function
(Theory)

Time: 3 Hours **Max. Marks: 100**
L-T-P: 3-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks**.**

UNIT-I

Molecular basis of life: DNA and RNA. ultra structure of prokaryotic and Eukaryotic gene and their regulatory elements (promoter, operator, silencer, enhancer, 5' and 3' UTR's), Genome size and Genome complexity: C value and C value paradox, pseudogenes, intergenic sequences, satellite and repetitive, DNA.

UNIT-II

Transposable elements (TEs): characteristic of transposable elements, Types of transposable elements: Insertion sequences and transposons- Cless I- retrotransposons, LINE and SINE and Class II-DNA Transposons, Autonomous and non-autonomous transposons, Bacterial transposons- composite and non-composite mobile genetic elements, applications of transposable elements.

UNIT-III

Regulation of gene expression in prokaryotes: Lac operon, Repressible model- Negative regulation of lac operon by lactose, Inducible- positive regulation of lac operon: Induction and catabolite activator, mechanism and control of Tryptophan and Histidine operon.

UNIT-IV

Genes playing role in cancer development: protooncogenes, activation of oncogenes, inactivation of tumor suppressor genes (function and mechanism of action of p53) and DNA repair genes, , Human Genome Project (HGP): Phases, Principle and goals of Human Genome project, and outcome of HGP

Books recommended:

1. Damal. J, Lodish, H. and Baltimore, D. (2007). Molecular Cell Biology, 6th edition, Scientific American Books, Distributed by W.H. Freeman and Co., New York.
2. Bolsover, S.R., Hyams, J.S., S. Shephard, E.A. and White H.A. (1997) From Genes to Cells, John Wiley and Sons.
3. Lewin, B. (2007). Gene IX, 9th edition, Jones and Bartlett Publishers.
4. Nelson, D. L. & Cox, M. M. (2005). Lehninger Principles of Biochemistry, 4th ed., Worth Publishers, New York
5. Freifelder, D. (2000). Microbial Genetics, Narosa Publishing House.
6. Research Papers

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3061
Couse Title: Gene Structure and Function
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Perform isolation of DNA and proteins.

CO2: Analyze DNA through different methods.

CO3: Study proteins through SDS-PAGE.

CO4: Analyze enzyme activity.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3061
Couse Title: Gene Structure and Function
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1. Isolation of DNA from plant samples
2. Spectrophotometric analysis of DNA.
3. Analysis of DNA by PAGE
4. To study enzyme activity by Native – PAGE
5. To study proteins by SDS-PAGE.

Books recommended:

1. Damal. J, Lodish, H. and Baltimore, D. (2007). Molecular Cell Biology, 6th edition,Scientific American Books, Distributed by W.H. Freeman and Co., New York.
2. Bolsover, S.R., Hyams, J.S., S. Shephard, E.A. and White H.A. (1997) From Genes to Cells,John Wiley and Sons.
3. Lewin, B. (2007). Gene IX, 9th edition, Jones and Bartlett Publishers.
4. Nelson, D. L. & Cox, M. M. (2005). Lehninger Principles of Biochemistry, 4th ed., Worth Publishers, New York.
5. Freifelder, D. (2000). Microbial Genetics, Narosa Publishing House.
6. Research Papers

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3332
Course Title: Biomathematics and Biostatistics

COURSE OUTCOMES:

Upon completion of this course, students should be able to:

CO 1: Calculate Significant digits, differentiation and integration and to understand the concept of population and samples, Random sampling.

CO 2: Calculate summary statistics (mean, median, mode, range, standard deviation and variance) from the data.

CO 3: Familiar with the graphical representation of data, concepts of correlation and regression, Binomial, Poisson and Normal Distribution.

CO 4: State the null hypothesis and alternative hypothesis (both one way and two ways) for the application of t-test, F test, Chi Square test and ANOVA.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3332
Course Title: Biomathematics and Biostatistics
(Theory)

Time: 3+3 Hours **Max. Marks: 100**
L-T-P: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the paper setters: Eight questions of equal marks (10 marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

Unit-I

Scientific notation, Significant digits, Rounding off, Log, Indices. Differentiation and Integration of Standard Functions, derivative & integration of trigonometric functions, inverse trigonometric functions, logarithmic functions and exponential functions, logarithmic differentiation & integration, results relating to the sum, difference, product and quotient of functions (without proofs).

Unit-II

Measurement of Central tendency, mean, geometric mean, harmonic mean, Median, Mode, Quartile mean, decile, percentile, Dispersion, Mean Deviation, Standard Deviation, Geometrical Standard Deviation, Coefficient of variation, Variance, Coefficient of determinant, moments, skewness and kurtosis.

Unit-III

Graphical representation of data, scattered diagram, Straight line, Least square test, Correlation coefficient, Regression Coefficient. Normal distribution, Poisson distribution, Binomial distribution.

Unit-IV

Sampling Data Collection, Testing of hypothesis, null and alternate hypothesis, level of significance, Standard error, Type- I, Type-II error, Student ‘t’ test as a test of single mean and

difference of mean and 'F' test as a test of equality of variances, Chi-square test (Goodness of fit & Association of Attributes), Wilcoxon Test, Analysis of variance (one way ANOVA).

Text Book:

P.N. Arora, P.K. Malhan, Biostatistics, Himalaya Publishing House, thoroughly revised edition, 2020.

Reference Books:

1. Mathematics Textbook for class XI, NCERT

2. Mathematics Textbook for class XII, NCERT

3. Robert R. Sokal and F. James Rohlf, Introduction to Biostatistics, Dover Publications, INC, Mincola, New York, 2nd Edition 2009

Practical:

- Graphical representation of data (bar charts, line graphs)
- Computation of Descriptive Statistics
- Paired samples t test, and One Way ANOVA
- Computation of Correlation coefficient (Pearson, Spearman)
- Computation of Linear Regression model
- Performs unpaired t test and paired t test using Graph PA

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3483
Course Title: Zoology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the general classification of Kingdom Animalia.

CO2: Understand the digestive system, respiratory system of man.

CO3: Understand the excretory and circulatory system of man.

CO4: Understand the skeletal system, neural integration and endocrine system of man.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3483
Course Title: Zoology-I
(Theory)

Time: 3 Hrs. **Max. Marks: 100**
Credit: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Unit-1

Introduction to Animal Kingdom and its diversification: Overview and General classification of Kingdom Animalia, General Characteristics of each group upto class level with an example.

Unit-II

Digestive System: The alimentary canal and associated glands of Man. Digestion of dietary constituents, regulation of digestive processes and absorption. Extra and intracellular digestion, enzymatic digestion and symbiotic digestion. Respiratory System: Respiratory system of man, Transport of O2 and CO2, Oxygen dissociation curve of haemoglobin, Bohr effect, chloride shift, Haldane effect and control of breathing.

Unit-III

Circulatory System: General plan of circulation in Man, structure of human heart. Origin and regulation of heart beat, Electrocardiogram, Cardiac output and Blood pressure, Composition and functions of blood and lymph, Blood clotting, blood groups including Rh factor. Excretory system: Structure of Kidney and nephron. Urine formation and osmoregulation.

Unit-IV

Skeletal system: Ultrastructure, chemical and physical basis of skeletal muscle contraction. Neural Integration: Structure and functions of brain, Structure of neuron, resting membrane potential, Origin and propagation of impulse along the axon, synapse and myoneural junction. Endocrine

System: Structure and physiology of thyroid, parathyroid, adrenal, hypothalamus, pituitary, pancreas and gonads of man.

Suggested Readings:

1. Sobti, R.C. & Nigam, S.K. (2002). Structural & function biology of chordates, Vishal Publishers, Jalandhar.

2. Sobti, R.C. & Sharma, V.L. (2005). Basics of Biotechnology: Introduction of Life Sciences. Vishal Publishers, Jalandhar.

3. Sobti, R.C. (2005). Introduction to Biotechnology, Part-2, Concepts Tools and Application, Vishal Publishers.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-III

Session: 2025-26

Course Code: BBTM-3483 (P)

Course Title: Zoology-I

(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the estimation of blood haemoglobin

CO2: Familiarize with the various systems of mammals such as digestive, arterial, venous and urinogenital systems.

CO3: The students will be able to record blood pressure and blood groups.

CO4: Analyze the food stuff for the presence of starch, protein and fats.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3483 (P)
Course Title: Zoology-I
(Practical)

Time: 3 Hours **Practical Marks: 20**

Note: The question paper will be set by the examiner based on the syllabus.

1. Study the following system of mammals with the help of charts / models /videos: Digestive, Arterial, Venous and Urinogenital systems.
2. Analysis of food stuff for the presence of starch, protein and fats.
3. Determination of blood groups of human blood samples.
4. Recording of blood pressure of man.
5. Estimation of hemoglobin content.
6. Make a temporary preparation of the following: Blood smear of mammals.
7. Visit to clinical laboratory / hospital for demonstration of ECG, ECHO, X-ray, ultrasound, CT-scan and MRI.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM -3064
Couse Title: Immunology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Familiarize with the types and features of immune system

CO2: Understand the roles of various immune cells and organs involved in immune responses

CO3: Inculcate knowledge of antigen-antibody interactions, immunogenicity, immunoglobulin structure and classes, and the complement system.

CO4: Understand the structure and function of MHC class I and II molecules, and their role in T and B cell-mediated immune response.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3064
Couse Title: Immunology-I
(Theory)

Time: 3 Hours **Max. Marks: 100**
L-T-P: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setter: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

UNIT-I

Types of immunity-innate and adaptive; Features of immune response-memory; Specificity and recognition of self and non-self; Terminology used in the study of immune system.

UNIT-II

Lymphoid cells, heterogeneity of lymphoid cells; T-cells, B-cells, Null cells; Monocytes, Polymorphs, primary and secondary lymphoid organs-thymus, Bursa of fabricius, spleen, lymph nodes, lymphatic system, Mucosa Associated Lymphoid Tissue (MALT), Lymphocyte traffic.

UNIT-III

Antigen, Epitope (B cell and T Cell epitioe), Immunogen, Factors influencing immunogenicity, Immunoglobulins, classes and structure; affinity and avidity; Complement fixing antibodies and complement cascade.

UNIT-IV

MHC class I and class II molecules, structure T and B Cells and function of class I and class II MHC molecules, structure of T-cell antigen receptors.

Books Recommended:

1. Roitt, I.M. Brostoff, J. and Male, D.K. (2012), Immunology, 8th Edition, Elsevier, New York
2. Judy Owen, Jenni Punt, Sharon Stranford, Patricia Jone. (2018), Immunology, 7th Edition. W.H. Freeman and Company, New York
3. Abul K. Abbas, Andrew H. H. Lichtman, Shiv Pillai (2011) Cellular and Molecular

Immunology; 7th Edition, Saunders
4. Doan (2012) Lippincott's Illustrated Reviews Immunology; 2nd Edition, Wolters Kluwer India Pvt.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3064
Couse Title: Immunology-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Perform total and differential leucocyte counts to assess immune status.

CO2: Accurately estimate total red blood cell (RBC) count using standard laboratory techniques.

CO3: Demonstrate the ability to collect blood samples through different methods and separate plasma effectively.

CO4: Conduct haemagglutination and haemagglutination inhibition assays to study antigen-antibody interactions.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3064
Couse Title: Immunology-I
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1. Collection of blood sample by different method.
2. Blood group testing
3. Differential leucocytes count
4. Total Leucocytes count
5. Total RBC count
6. Separation of Plasma from blood
7. Isolation of mononuclear cells from peripheral blood and to check their viability by dye exclusion method.
8. Separation and purification of Ig G antibodies from serum using protein A column

Books Recommended:

1. Stevans, C.D. (1996). Clinical Immunology and Serology: A Laboratory Perspective F.A. Davis Company, Philadelphia
2. Celis, K.E. (1998). Cell Biology: A laboratory handbook. Vol-I Academic Press, U.K.
3. Hay, F.C. Westwood O.M.R. (2002). Practical Immunology, 4th Ed., Blackwell Science, U.K.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3085
Course Title: Chemistry-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Explain the fundamental concepts of coordination chemistry, including Werner's theory, nomenclature, coordination numbers, stereochemistry, and isomerism in coordination compounds.

CO2: Apply valence bond theory to analyze the bonding in coordination complexes, distinguish between inner and outer orbital complexes, and evaluate its limitations.

CO3: Assess the stability of metal-ligand complexes and explain the role of macrocyclic ligands, crown ethers, and cryptands in coordination chemistry.

CO4: Apply crystal field theory to predict d-orbital splitting patterns, calculate crystal field stabilization energies (CFSE), and interpret spectroscopic properties of d-block metal complexes.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3085
Course Title: Chemistry-I
(Theory)

Exam Time: 3Hrs.
L-T-P: 3-0-1

Max. Marks: 100
Theory: 50
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks (ten marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

Introduction, Werner's coordination theory, naming of co-ordinate complexes.

Co-ordination numbers 1-12. Factors affecting co-ordination numbers and stereo-chemistry, Isomerism in coordination compounds.

Unit-II

Valence bond theory for co-ordinate complexes, inner and outer orbital complexes, electro-neutrality and back bonding, limitations of V.B. theory.

Unit-III

Stability of co-ordination compounds

Introduction Factors affecting the stability of metal ion complexes with general ligands

Alkali metal and alkaline earth metal chelators: Definition and few examples of macrocyclic ligands, macrocyclic effect, crown ethers & cryptands.

Unit-IV

Crystal field theory-Spliting of d-orbitals in octahedral, tetrahedral, cubic and square planer fields of ligands, calculations of C.F.S.E. in high spin and low spin octahedral and high spin tetrahedral complexes, factors affecting the 10 Dq value.

Spectroscopic terms for d1-d 2 electronic configurations.

Books Recommended:

1. G.L. Eichorn, Inorganic Biochemistry, Vol. I Elsevier,
2. J.E. Huheey, E.A. Keiter, R.L. Keiter, Inorganic Chemistry, 4th ed. Pearson Education, Singapore, 1999.
3. D.F.C Shriver, P.W. Atkins and C.H. Langford, Inorganic Chemistry, ELBS Oxford, 1991.
4. Cowan, J.A. (1997) – Inorganic Biochemistry – An Introduction, Wiley- VCH

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3085
Course Title: Chemistry-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Perform iodimetric and iodometric redox titrations and accurately determine the concentration of oxidizing and reducing agents.

CO2: Conduct redox titrations using potassium dichromate ($K_2Cr_2O_7$) and potassium permanganate ($KMnO_4$) and interpret titration results in terms of reaction stoichiometry.

CO3: Apply complexometric titration techniques using EDTA for quantitative estimation of Ca^{2+} and Mg^{2+} ions and analyze water hardness.

CO4: Identify inorganic cations and anions using systematic qualitative analysis including preliminary and confirmatory tests based on classical inorganic methods.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: BBTM-3085 (P)
Course Title: Chemistry-I
(Practical)

Time: 3 Hours **Practical Marks: 20**

Volumetric Analysis:

Iodimetry, Iodometry, Redox titrations using $K_2Cr_2O_7$ and $KMnO_4$.

Complexometric titration using EDTA $Ca^{2+,}$ Mg^{2+}: in context with study of hardness of water. Inorganic qualitative analysis:

Four ions (Two cations two anions).

A. Preliminary tests: Physical examination, Dry heating test, charcoal cavity test, Co $(NO_3)_2$ test, flame test, borax bead test.

B. Acid radical analysis: metal ions

Books Recommended:

1. G.L. Eichorn, Inorganic Biochemistry, Vol. I Elsevier,
2. J.E. Huheey, E.A. Keiter, R.L. Keiter, Inorganic Chemistry, 4th ed. Pearson Education, Singapore, 1999.
3. D.F.C Shriver, P.W. Atkins and C.H. Langford, Inorganic Chemistry, ELBS Oxford, 1991.
4. Cowan, J.A. (1997) – Inorganic Biochemistry – An Introduction, Wiley- VCH.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: VACE-3221
Course Title: Environmental Studies (Compulsory)
(Theory)

COURSE OUTCOMES:

After passing this course, students will be able to:

CO1: Understand the concept and need of environmental education and role of an individual in conservation of natural resources.

CO2: Learn about role of major Eco system and their conservation and development of desirable attitude, value and respect for protection of Biodiversity.

CO3: Learn about the control measure of pollution and solid waste management and climate change and global warming.

CO4: Knowledge regarding welfare programmes and Human rights and understand the role of different agencies in the protection of environment

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: VACE-3221
Course Title: Environmental Studies (Compulsory)
(Theory)

Time: 3 Hrs. **Max. Marks: 50**
Credit: 2-0-0 **Theory: 35**
CA: 15

Instructions for the Paper Setter:

Eight questions of equal marks (7 marks) are to be set, two in each out of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Unit I

1. The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

2. Natural resources and associated problems.

(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.

- Equitable use of resources for sustainable lifestyles.

Unit II

3. Ecosystems

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

4. Biodiversity and its conservation

- Introduction – Definition: genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: *In-situ* and *Ex-situ* conservation of biodiversity

Unit III

5. Environmental Pollution

- Definition, causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

6. Social Issues and the Environment

- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Public awareness

Unit IV

7. Human Population and the Environment

- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health

8. Introduction to Environmental Laws, Environmental Audit and Impact Assessment

- Constitutional provisions- Article 48A
- Article 51A(g) and other derived environmental rights
- Environmental Protection Act, 1986
- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and control of Pollution) Act, 1974
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Environmental risk assessment Pollution control and management
- Waste Management- Concept of 3R (Reduce, Recycle and Reuse)
- Ecolabeling / Ecomark scheme

References:

1. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
2. Down to Earth, Centre for Science and Environment, New Delhi.
3. Heywood, V.H. & Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.
4. Joseph, K. & Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
5. Kaushik, A. & Kaushik, C.P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
6. Rajagopalan, R. 2011. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.
7. Sharma, J. P., Sharma. N.K. & Yadav, N.S. 2005. Comprehensive Environmental Studies, Laxmi Publications, New Delhi.
8. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publications, Meerut.
9. State of India's Environment 2018 by Centre for Sciences and Environment, New Delhi
10. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-III
Session: 2025-26
Course Code: VACG-3532
Course Title: Gender Sensitization

Course Duration: 30 hours
Course Credit: 02
Total Marks: 50 (Final Exam: 35; Internal Assessment: 15)

The program has been designed to instill the value of gender equality among students, enabling them to identify areas of gender discrimination, raise their voices against it, and work towards creating a gender-neutral society.

Objectives of the Course:

1.To sensitize students about gender rights, gender roles and relations.

2.To make students aware and capable of realizing their true potential.

3.To ensure equal participation of men and women in all economic, social and political processes.

4.To develop a gender perspective to transform the mindset of society.

Learning Outcomes:

On successful completion of this course, students will be able to

- develop ways to address gender inequalities and promote gender justice
- understand the difference between sex and gender and cultural norms ascribed to boys/men and girls/women.
- evaluate the impact of socially defined gender roles on economic and political participation.
- analyze social problems using a gender lens.
- learn the constitutional provisions and laws relating to gender rights.
- understand the importance of comprehensive access to healthcare for all women
- defend themselves against potential attacks and adversities using self-defense techniques.
- engage themselves in critical self-reflection and work for social transformation.

CURRICULUM

Course Code: VACG 3532 **Total contact hours: 30**

MODULE	TITLE	HOURS
1	Introduction to Gender Sensitization	4 Hrs.
2	Workshop in Self-Defense Techniques	12 Hrs.
3 I	Cultural Roles and Gender Sensitivity	2 Hrs.
3 II	Gender Dimensions in Economic Participation and Wage Gap	2 Hrs.
3 III	Gender Rights: Constitutional Rights & Legal Rights	2 Hrs.
3 IV	Social Problems and Issues: Gender Perspective with focus on Indian Society	2 Hrs.
3 V	Gender Issues and the Health Care System	2 Hrs.
3 VI	Gender and Political Participation	2 Hrs.
4	Final Assessment Feedback and Closure	2 Hrs.

Semester-IV

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4061
Couse Title: Molecular Biology
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the structure of DNA, experimental evidence supporting DNA as genetic material, and the mechanism of DNA replication in prokaryotes and eukaryotes.

CO2: Explain the structure and functions of various RNAs, the transcription process in prokaryotes and eukaryotes, and post-transcriptional modifications.

CO3: Describe the genetic code, the process of protein synthesis and post-translational modifications, and the action of translation inhibitors.

CO4: Understand DNA recombination mechanisms, types and causes of mutations, and their significance and applications in genetics.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4061
Couse Title: Molecular Biology
(Theory)

Time: 3 Hours **Max. Marks: 100**
L-T-P: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

UNIT-I

DNA as genetic material, structure of DNA, experimental evidence for DNA as genetic material (Griffith's transformation experiment, Avery and Macleod experiment and Hershey and Chase experiment) DNA replication: Types of replications (conservative, semiconservative and dispersive) Meselson and Stahl experiment of replication. Mechanism of replication in Prokaryotes and eukaryotes

UNIT-II

Structure of different types of RNA and their function, Transcription process in prokaryotes and eukaryotes (Transcription factors, RNA polymerases, formation of initiation, complex, elongation and termination), post transcriptional modifications (capping, polyadenylation, and RNA splicing) inhibitors of transcription

UNIT-III

Genetic code, Protein synthesis and processing: Ribosome, initiation factors aminoacylation of tRNA, aminoacyl tRNA synthetase, formation of initiation complex, elongation and elongation factors, termination and termination factors, and post translational modifications, inhibitors of translation.

UNIT-IV

DNA recombination: general overview of types of DNA recombination- homologous, non-homologous, site specific and replicative recombination) Holliday model of recombination. Mutation: Spontaneous versus induced mutations, types of mutations, mutations rate and

frequency, Mutagens: Physical and Chemical, the molecular basis of mutations. Significance and Practical applications of Mutation.

Books Recommended:

1. George M Malacinski (2015) Freifelders Essentials Of Molecular Biology, 4Th/Ed, Jones & Bartlett
2. David P. Clark, Nanette J. Pazdernik, Michelle R. McGehee (2018), 3rd edition, Molecular Biology, Academic Cell
3. Pk Gupta (2018) Molecular biology , 2nd Edition, Rastogi Publications
4. James D. Watson, A. Baker Tania, P. Bell Stephen , Gann Alexander, Levine Michael, Losick Richard(2017) Molecular Biology of the Gene, 7th Ed, Pearson Education

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4061
Couse Title: Molecular Biology
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Acquire skills in preparing stock solutions for molecular biology experiments.

CO2: Demonstrate the ability to isolate genomic DNA from plant tissues using standard protocols.

CO3: Set up agarose gel electrophoresis apparatus and prepare gels for DNA separation.

CO4: Analyze DNA concentration and purity using spectrophotometric and fluorometric methods.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4061
Couse Title: Molecular Biology
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1. Preparation of stock solutions.

2. Isolation of genomic DNA from plants.

3. RNA isolation from plants.

4. Spectrophotometric determination of concentration and purity of DNA and RNA.

5. Quantification of DNA by spectrophotometric and fluorometric (Ethidium bromide) analysis

6. Gel casting and setting up of gel apparatus.

7. Preparation of Agarose gel for agarose gel electrophoresis

Books Recommended:

1. S.B. Primrose and R.M. Twyman; Principles of Gene Manipulation. 2006.
2. J. Sambrook and Michael R. Green; Molecular Cloning: A Laboratory Manual, (Fourth Edition), CSHL, 2012.
3. Brown TA, Genomes, 3rd ed. Garland Science 2006

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4062
Couse Title: Biochemical and Biophysical Techniques-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the principles, types, and applications of centrifugation techniques.

CO2: Explain the theory and principles of basic chromatographic methods.

CO3: Illustrate the principles and applications of advanced chromatographic techniques.

CO4: Understand the principles of spectroscopy.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4062
Couse Title: Biochemical and Biophysical Techniques-I
(Theory)

Time: 3 Hours **Max. Marks: 100**
L-T-P: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

UNIT-I

Centrifugation: Basic principles of sedimentation, theory and applications of preparative and analytical centrifugation, Differential and density gradient centrifugation, Types of centrifugation machines and rotors, Sedimentation co-efficient, Factors affecting sedimentation coefficient, care of rotors.

UNIT-II

Chromatography: Partition Coefficient, Theory and Principle of Paper and column chromatography, Two-dimensional chromatography, gel exclusion chromatography, Principle and applications of paper, thin layer, ion-exchange, and affinity chromatography.

Section-C

Gas Liquid Chromatography, High Performance Liquid chromatography, Fast Protein Liquid chromatography

Section-D

Spectroscopy: Basic Principle, Lambert Beer's law, Absorption spectrum, theory and principles of single and double beam UV/Visible spectroscopy, Basic Principle and instrumentation of NMR and ES.

Books Recommended:

1. Upadhyay, A., Upadhyay, K. and Nath N. (2005) Biophysical chemistry: Principles and

Techniques. Himalaya Publishing House, India.
2. Sheehan, D. (2000). Physical Biochemistry: Principles and Applications, John Wiley and Sons Ltd., Chichester, England.
3. Freifelder, D. (1999). Physical Biochemistry - Application of Biochemistry and Molecular Biology, 2nd Edition, W.H. Freeman, and Co.
4. Plummer D (2006) An Introduction to Practical Biochemistry, Tata McGraw Hill Publishing Co., New Delhi.
5. Wilson K and Walker J (2010) Principles and Techniques of Practical Biochemistry, Cambridge University Press, UK
6. Boye R (2006) Modern Experimental Biochemistry, Pearson Education, Asia, New
7. Sawhney, S.K. and Singh, R. (2001). Introductory Practical Biochemistry. Narosa Pub. House, New Delhi.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4062
Couse Title: Biochemical and Biophysical Techniques-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the concept of centrifugation.

CO2: Perform separation of biomolecules using paper and thin layer chromatography techniques.

CO3: Apply ion-exchange chromatography for effective separation and purification of proteins.

CO4: Utilize affinity chromatography for specific protein separation based on molecular interactions.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4062
Couse Title: Biochemical and Biophysical Techniques-I
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1. To study sedimentation using swing out rotor and angle rotor.
2. To study differential centrifugation
3. To study separation of bio-molecules by paper chromatography.
4. To study separation of bio-molecules by thin layer chromatography.
5. Separation of proteins by ion-exchange column chromatography
6. Separation of proteins by affinity column chromatography

Books Recommended:

1. Upadhyay, A., Upadhyay, K. and Nath N. (2005) Biophysical chemistry: Principles and Techniques. Himalaya Publishing House, India.
2. Sheehan, D. (2000). Physical Biochemistry: Principles and Applications, John Wiley and Sons Ltd., Chichester, England.
3. Friefelder, D. (1999). Physical Biochemistry - Application of Biochemistry and Molecular Biology, 2nd Edition, W.H. Freeman and Co.
4. Plummer D (2006) An Introduction to Practical Biochemistry, Tata McGraw Hill Publishing Co., New Delhi.
5. Wilson K and Walker J (2010) Principles and Techniques of Practical Biochemistry, Cambridge University Press, UK
6. Boye R (2006) Modern Experimental Biochemistry, Pearson Education, Asia, New
7. Sawhney, S.K. and Singh, R. (2001). Introductory Practical Biochemistry. Narosa Pub. House, New Delhi.

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course code: BBTM-4073
Course Title: Botany-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the stages of plant development and the physiological mechanisms regulating growth and differentiation.

CO2: Explain the mechanisms of photosynthesis, including light harvesting, electron transport, and CO_2 fixation pathways.

CO3: Analyze how various environmental factors influence plant physiology and metabolism.

CO4: Recognize the structure, function, importance, and applications of plant cells in biological and environmental contexts.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4073
Course Title: Botany-II
(Theory)

Time: 3 Hrs. **Max. Marks: 100**
L-T-P: 3-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (10 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

Nutrition, Transport and Stress responses in plants: Macronutrients and micronutrients and their deficiency symptoms; Water relations, osmosis, transpiration, water potential & its components, ascent of sap and transport of organic solutes. Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses.

Unit-II

Photosynthesis: Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO2 fixation-C3, C4 and CAM pathways.

Unit-III

Plant Pathology & epidemiology: Definitions, classification, mode of transmission & control measures of plant diseases; host-pathogen interaction, Disease resistance, phytoalexins, PR proteins. A brief account of the following plant diseases with respect to casual agents, symptoms, epidemiology and their control measures: Black stem rust of wheat, Loose smut of wheat, Late and early blight of potato, Red rot of sugarcane, TMV of potato, Yellow vein mosaic of bhindi.

Unit-IV

Biodiversity: Physical environment; biotic environment; biotic and abiotic interactions. Concept of habitat and niche; Characteristics of a population; population growth curves; population regulation; Major terrestrial biomes; biogeographical zones of India.

Suggested Readings:

1.Sharma, P.D. Plant Pathology. India: Rastogi Publication, 2011. Print.

2.Sharma, P.D. Ecology and Environment. 8th ed. India: Rastogi Publications, 2010. Print.

3.Taiz, L., Zeiger, E., Moller, I.M. and Murphy, A. Plant Physiology and Development. 6th ed. USA: Sinauer Associates Inc., 2015. Print.

4.Hopkins, W.G. and Huner, A. Introduction to Plant Physiology. 4th ed. USA: John Wiley and Sons, 2008. Print.

5.Shibu, J., Singh, H.P., Batish, D.R. and Kohli, R.K. Invasiv

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4073
Course Title: Botany-II
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Estimate relative water content and osmotic potential in plant tissues using standard physiological methods.

CO2: Demonstrate key processes in plant water relations, including transpiration pull and oxygen evolution during photosynthesis.

CO3: Separate and identify plant pigments using chromatography techniques such as paper chromatography and TLC.

CO4: Identify major plant diseases by observing symptoms and morbid anatomy caused by fungal, bacterial, and viral pathogens.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4073
Course Title: Botany-II
(Practical)

Time: 3 Hrs. **Practical Marks: 20**

Instructions for the paper setter: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1.Estimation of relative water content of leaf.

2.Measurement of osmotic potential of different tissues by Chardokov method.

3.Demonstrate the transpiration pull by mercury method.

4.Demonstration that 02 is evolved during photosynthesis.

5.Separation of pigments by paper chromatography/TLC method

6.Study of Plant pathogens (a) Symptoms of the diseases (b) Morbid anatomy of the plants infected with following diseases. Black stem rust of wheat, Loose smut of wheat, Late and early blight of potato, Red rot of sugarcane, TMV of potato, Yellow vein mosaic of bhindi.

Suggested Readings:

1. Sharma, P.D. Plant Pathology. India: Rastogi Publication, 2011. Print.

2. Sharma, P.D. Ecology and Environment. 8th ed. India: Rastogi Publications, 2010. Print.

3. Taiz, L., Zeiger, E., Moller, I.M. and Murphy, A. Plant Physiology and Development. 6th ed. USA: Sinauer Associates Inc., 2015. Print.

4. Hopkins, W.G. and Huner, A. Introduction to Plant Physiology. 4th ed. USA: John Wiley and Sons, 2008. Print.

5. Shibu, J., Singh, H.P., Batish, D.R. and Kohli, R.K. Invasive

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4084
Couse Title: Biochemistry-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand basic metabolic pathways and energy flow in biological systems.

CO2: Explain the role of ATP and biological oxidation in metabolism.

CO3: Describe enzyme structure, function, and catalytic mechanisms.

CO4: Interpret enzyme kinetics and types of enzyme inhibition.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4084
Couse Title: Biochemistry-II
(Theory)

Time: 3 Hours **Max. Marks: 100**
L-T-P: 4-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

UNIT-I

Introduction to metabolism, catabolism, anabolism, Laws of Thermodynamics and living system, Free energy change and direction of metabolism, Characteristics of Metabolic pathways, Compartmentation, and Interorgan metabolism

UNIT-II

ATP: Structure, Free energy change, energy coupling with ATP (Creatinine phosphokinase, Adenylate kinase), metabolic roles of ATP; Energy rich metabolites, biological oxidation – Reduction reactions electron transport chain, calculation of ATP during metabolic processes

UNIT-III

Introduction to Enzymes: Nomenclature, Classification and Characteristics of enzymes, Cofactors, Co-enzyme and Prosthetic group, Mechanism of Enzyme Action: Nature of active site, enzyme substrate complex, Factors responsible for catalytic efficiency of enzymes. Effect of temperature and pH on enzyme activity. Covalent catalysis, Acid base catalysis, Strain and distortion theory, Induced fit hypothesis. Estimation of enzymes such as α-amylase, acid phosphatase, and catalase to demonstrate enzyme function and their response to temperature and pH.

UNIT-IV

Enzyme Kinetics: A brief overview of enzyme energetics, Michaelis Menten equation. Derivation of Michaelis Menten equation and determination of Km and Vmax values. Enzyme inhibition: Reversible and Irreversible inhibition, Competitive and non-competitive inhibition, Regulation of enzyme activity.

Books Recommended:

1. David L. Nelson and Michael Cox (2017) Lehninger Principles of Biochemistry, 7th ed, WH Freeman
2. Jeremy M. Berg, Lubert Stryer, John Tymoczko , Gregory Gatto (2019) Biochemistry, 9th Ed., WH Freeman
3. Ferrier (2017) Lippincott's Illustrated Reviews Biochemistry, 7th Ed, Wolters Kluwer India Pvt. Ltd.
4. J L Jain, Sunjay Jain, Nitin Jain (2016) Fundamentals of Biochemistry, 7th Ed, S Chand
5. Satyanarayana (2020) Biochemistry, 5th Ed, Elsevier

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4084
Couse Title: Biochemistry-II
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Estimate the activity of enzymes like alpha-amylase and acid phosphatase from biological samples.

CO2: Study the effect of temperature and pH on enzyme activity.

CO3: Perform quantitative estimation of catalase activity in plant tissues.

CO4: Develop practical skills in enzyme assay techniques and data interpretation.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4084
Couse Title: Biochemistry-II
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1. Estimation of Alpha-amylase activity from saliva.
2. Assay of acid phosphatase activity.
3. Effect of temperature on enzyme activity.
4. Effect of pH on enzyme activity
5. Quantitative estimation of catalase activity in mung beans
6. Determination of Km for acid phosphatase
7. Competitive and non-competitive inhibition

Books Recommended:

1. David L. Nelson and Michael Cox (2017) Lehninger Principles of Biochemistry, 7th ed, WH Freeman
2. Jeremy M. Berg, Lubert Stryer, John Tymoczko , Gregory Gatto (2019) Biochemistry, 9th Ed., WH Freeman
3. Ferrier (2017) Lippincott's Illustrated Reviews Biochemistry, 7th Ed, Wolters Kluwer India Pvt. Ltd.
4. J L Jain, Sunjay Jain, Nitin Jain (2016) Fundamentals of Biochemistry, 7th Ed, S Chand Satyanarayana (2020) Biochemistry, 5th Ed, Elsevier.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4085
Course Title: Chemistry-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Identify and explain the structure, stability, and reactivity of organic reactive intermediates and analyze bonding concepts including resonance, hybridization, and electronic effects.

CO2: Apply the concept of aromaticity and reaction mechanisms to predict outcomes of electrophilic substitution reactions and side-chain transformations in aromatic compounds.

CO3: Understand molecular chirality and apply stereochemical principles to distinguish between enantiomers and diastereomers, assign configurations, and analyze stereochemical outcomes of reactions.

CO4: Differentiate between SN1 and SN2 mechanisms based on kinetics, stereochemistry, and reaction conditions, and evaluate competing substitution and elimination pathways.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4085
Course Title: Chemistry-II
(Theory)

Exam Time: 3Hrs. **Max. Marks: 100**
L-T-P: 3-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks (ten marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

Reactive intermediates

Carbocations, carbanions, free radicals, carbenes, arenes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species

Bonding

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, Van der Waals interactions, resonance, hyperconjugation, hydrogen bonding and Inductive and electrometric effects.

Unit-II

Aromaticity

Aromatic electrophilic substitution–general pattern of the mechanism, role of σ and π complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Methods of formation and chemical reactions of alkylbenzenes.

Unit-III

Stereochemistry:

Molecular chirality, enantiomers/symmetry in achiaral structures, chiral centres in chiral molecules, properties of chiral molecules-optical activity, absolute and relative configuration, the Cahn-Ingold Prelog R-S notional system physical properties of enantiomers. Stereochemistry of chemical reactions that produce chiral centres, chemical reactions that produce stereoisomers, Resolution of enantionmers, chiral centres other than carbon, prochirality.

Unit-IV

Functional group transformation by nucleophilic substitution, the biomolecular (SN2), mechanism of nucleophilic substitution , stereochemistry of SN2 reactions, how SN2 reactions occur, steric effect in SN2reactions, nucleophiles and nucleophilicity, the unimolecular (SN1) mechanism of nucleophilies substitution, carbocation stability and the rate of substitution, by the SN1 mechanism sterochemistry of SN1reactions, carbocation real arrangements in SN1 reactions, solvent effects, subtitution and elimination as competing reactions.

Books Recommended:

1. R.T. Morison and R.N. Boyd, Organic chemistry
2. I. L. Finar, Organic Chemistry, Vol.I, IV ed. J. March, Advanced Organic Chemistry, Reactions Mechanisms and Structure.
3. Schaum's Outlines Series, Theory and Problems of Organic chemistry.
4. I.L. Finar, Problems and their solution in Organic chemistry.
5. J. D. Robert and M. C. Caserio, Modern Organic Chemistry.
6. D. J. Cram and G. S. Hammond, Organic chemistry.
7. J. E. Banks, Naming Organic Compounds - Programmed Introduction to Organic Chemistry
8. E.L. Eliel, Stereochemistry of carbon compounds.
9. W. Camp, Organic Spectroscopy.
10. F. A. Carey, Organic chemistry

Bachelor of Science (Bio-Technology) Three Year Degree Programme

Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme

Semester-IV

Session: 2025-26

Course Code: BBTM-4085

Course Title: Chemistry-II

(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the basics of Qualitative analysis

CO2: Detect of elements (N, S and halogens) in organic compounds.

CO3: Detect of functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and anilide) in simple organic compounds

CO4: Prepare the derivatives of organic compounds

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4085
Course Title: Chemistry-II
(Practical)

Time: 3 Hours **Practical Marks: 20**

Organic qualitative analysis:

Complete identification including derivation of following organic compounds:

- Amides
- Amines
- Carboxylic acids and phenols.

Organic qualitative analysis:

Complete identification including derivation of following organic compounds:

- Aromatic hydrocarbons
- Aldehydes
- Ketones
- Carbohydrates

Books Recommended:

1. R.T. Morison and R.N. Boyd, Organic chemistry
2. I. L. Finar, Organic Chemistry, Vol. I, IV ed. J. March, Advanced Organic Chemistry, Reactions Mechanisms and Structure.
3. Schaum's Outlines Series, Theory and Problems of Organic chemistry.
4. I.L. Finar, Problems and their solution in Organic chemistry.
5. J. D. Robert and M. C. Caserio, Modern Organic Chemistry.
6. J. Cram and G. S. Hammond, Organic chemistry.
7. J. E. Banks, Naming Organic Compounds - Programmed Introduction to Organic Chemistry
8. E.L. Eliel, Stereochemistry of carbon compounds.
9. W. Camp, Organic Spectroscopy.
10. F. A. Carey, Organic chemistry.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4060
Couse Title: Skill Development in Biotechnology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the types, role, and production techniques of biofertilizers and biological nitrogen fixation.

CO2: Gain knowledge of medicinal plants, phytochemicals, essential oils, and their applications.

CO3: Learn the basics of nutraceuticals, functional foods, and their health benefits and regulations.

CO4: Develop entrepreneurial insight into bioindustries, including business planning, funding, and market strategies.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4060
Couse Title: Skill Development in Biotechnology-I
(Theory)

Time: 3 Hours **Max. Marks: 100**
L-T-P: 2-0-1 **Theory: 50**
Practical: 20
CA: 30

Instructions for the Paper Setters: Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 10 marks.

UNIT-I

Biofertilizers: Introduction and types and importance of biofertilizers, Microorganisms used in biofertilizers production, Biological Nitrogen fixation VIZ: Rhizobium: Process of nodule formation, Role of Nif and Nod gene in, Enzyme nitrogenase and its component, Different methods of application of biofertilizers, Strategies of Mass production and packing, Registration of biofertilizers.

UNIT-II

Herbal Biotechnology: Introduction to medicinal plants and their medicinal value, Phytochemicals, Essential oil: definition, extraction and applications in domestic life, industry and other purposes (Eucalyptus, Levender, Rosa grass, Tulsi)

UNIT-III

Nutraceuticals and Functional Foods: Introduction to Nutraceuticals as Science, Properties, structure and functions of various Nutraceuticals, Food as remedies, Anti-nutritional Factors present in Foods, Nutraceuticals and Functional, Functional Foods, Nutritional Genomics, Quality Control, Quality Assurance

UNIT-IV

Bioentrepreneurship
Overview of bioindustries, public/private funding opportunities; Innovation-focused thinking. Preparation of a business plan: socio-economic cost benefit analysis; Statutory and legal aspects. Business and market strategy: pricing, financing, market linkages, branding.

Books Recommended:

1. Fundamentals of Foods, Nutrition and Diet Therapy, (English, Mudambi Sumati R.), New Age
International publication,
2. Clinical Dietetics and Nutrition, by Antia F P (Author), Oxoford publication.
3. Alpers.D.H. , Stenson W.F.and Bier.D.M., (2002). Manual of Nutritional Therapeutics, 4th edition, Lippincott Williams & Wilkins, Philadelphia, USA.
4. Research pare and e notes.
5. F. Bakkali, S. Averbeck , D. Averbeck, M. Idaomar. (2008). Biological effects of essential oils– A review. Food and Chemical Toxicology 46: 446–475.
6. R. Amorati,M. C. Foti, L. Valgimigli. (2013). Antioxidant Activity of Essential Oils. Journal of Agriculture and Food Chemistry. 61:10835−10847.
7. A Sharma, D.S. Cannoo. (2016). Comparative evaluation of extraction solvents/techniques for
antioxidant potential and phytochemical composition from roots of Nepeta leucophylla and
quantification of polyphenolic constituents by RP-HPLC-DAD. Food Measure. Doi 10.1007/s11694- 016-9349-5
8. Sharma and D. S. Cannoo. (2013). Phytochemical composition of essential oils isolated from
different species of genus NEPETAof Labiatae family: a review. Pharmacophore, 4 (6): 181-211.
9. Sarikurkcu, B. Tepe, D. Daferera, M. Polissiou, Mansur Harmandar. (2008). Studies on the
antioxidant activity of the essential oil and methanol extract of Marrubium globosum subsp.
globosum (lamiaceae) by three different chemical assays. Bioresource Technology, 99: 4239–4246.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM-4060
Couse Title: Skill Development in Biotechnology-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Isolate and culture *Rhizobium* for biofertilizer production.

CO2: Extract and analyze essential oils using distillation and chemical assays.

CO3: Evaluate antioxidant potential and phytochemical content of essential oils.

CO4: Assess the antimicrobial activity of essential oils against microbial strains.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: BBTM 4060
Couse Title: Skill Development in Biotechnology-I
(Practical)

Time: 3 Hours **Practical Marks: 20**

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1. Isolation of Rhizobium from root nodules
2. Production of commercial biofertilizers using Rhizobium.
3. Extraction of essential oils through oil distillation apparatus.
4. To measure total polyphenolic content of the essential oil.
5. Total flavonoid content of the essential oil.
6. Investigating the antioxidant potential of the oils by DPPH assay.
7. Antimicrobial activity of essential oils.

Books Recommended:

1. Fundamentals of Foods, Nutrition and Diet Therapy, (English, Mudambi Sumati R.), New Age
International publication,
2. Clinical Dietetics and Nutrition, by Antia F P (Author), Oxford publication.
3. Alpers.D. H., Stenson W.F.and Bier.D. M., (2002). Manual of Nutritional Therapeutics, 4th edition,
Lippincott Williams & Wilkins, Philadelphia, USA.
4. Research pare and e notes.
5. F. Bakkali, S. Averbeck, D. Averbeck, M. Idaomar. (2008). Biological effects of essential oils – A review. Food and Chemical Toxicology 46: 446–475.

Bachelor of Science (Bio-Technology) Three Year Degree Programme
Bachelor of Science (Honours) Bio-Technology Four Year Degree Programme
Semester-IV
Session: 2025-26
Course Code: VACM-4502
Course Title: Moral Education

Course Duration: 30 hours

Course Credits: 2

Course Description:

The Moral Education Course has been introduced as part of the curriculum of second semester of all streams of undergraduate degree programmes. Moral education has been added as a compulsory subject, the awards of which will not be incorporated in the total marks but will earn the student two credits.

Course Objectives:

- To sensitize students about the role and importance of human values and ethics in personal, social and professional life
- To enable students to understand and appreciate ethical concerns relevant to modern lives
- To prepare a foundation for appearing in various competitive examinations
- To sensitize students the students about the current issues and events of national and international importance
- To highlight plausible implications of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with nature

Course Methodology:

- The methodology of this course is aimed at perceptional transformation
- It is free from any dogma or value prescriptions
- It is an initiation into the process of self- investigation and self- exploration
- It aims at encouraging a dialogue between the teacher and the taught, paving the way for a continuous self- evolution
- The self-exploration will enable the students to evaluate their personal beliefs and their

pre conceived notions while marching on the path of truth and righteousness.

Curriculum:

MODULE	TITLE	CONTACT HOURS
I	Introduction to Moral Education, need, content and purpose	6
II	The Self and You	6
III	The Family and You	6
IV & V	The Society and You	6
VI	The Nation and You	6

EXAMINATION

- **Total Marks: 50 (Final Exam: 35; Internal Assessment: 15)**
- Final Exam: Multiple choice Questions Marks-35; Time: 1 hour
- Internal Assessment: 15
- Total marks: 50 converted to credits for final result
- Grading system **Letter Grades for Moral Education**

Letter Grade	Percentage Score
O	90.1-100
A+	80.1-90
A	70.1-80
B+	60.1-70
B	50.1-60
C	45-50
P	35-44.9
F	Below 35
Ab	Absent

SYLLABUS

Module I: Introduction

- What is Moral Education
- Need, content and purpose
- Vedic values
- Character building

Module II: The Self and You

- Understanding the Self- Self awareness, fighting the five evils (lust, anger, attachment, ego and greed), Self growth.
- Personal ethics
- Aspiration v/s ambition, self- seeking v/s selflessness
- Self-Discipline

Module III: The Family and You

- Importance of family - the basic unit of human interaction.
- Generation gap
- Relation with peer group, sibling, elders,

Module IV &V: The Society and You

- Social responsibility
- Civic sense
- Opposite sex relations
- Globalization and IT boom - Cell phone menace
- Drug abuse
- Sex abuse

Module VI: The Nation and You

- International peace and brotherhood
- Saving the environment
- Rights and duties – Human Rights & Fundamental Rights