FACULTY OF LIFE SCIENCES

Syllabus

for the award of the Degree in

Bachelor of Science (Medical)

(Three- year UG Degree Programme)

(Credit Based Continuous Evaluation Grading System)

(SEMESTER: V-VI)

Session: 2025-26

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

The Heritage Institution

Bachelor of Science (Medical) (Honours) (Session 2025-26)

Programme Specific Outcomes:

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

PSO1. Acquire knowledge on basic, important concepts in the field of biology such as diversity, physiology, Evolution, Genetics and Comparative Anatomy and can be applied to various fields of Biotechnology.

PSO 2. Describe the diversity, ecological and evolutionary importance of animal life ranging from the single celled protozoan to the highly complex vertebrates. They will also learn to describe the various aspects of morphology, physiology and embryology in nonchordate and chordate life forms.

PSO3. Apply appropriate techniques and modern instruments for animal physiology, biochemical estimations, cellular activities of animals and other medical laboratory technologies with an understanding of the application.

PSO4. Acquaint the students about the Botany, importance of nature, classification, morphology, biology, structure, life cycle and economic importance of microorganisms and Plants.

PSO5. Understand Botanical Nomenclature, Classification, plant diversity, conservation, phylogenetic, relationships and development.

PSO6. Understand role of plant sciences in the pursuit of many applied sciences like Agriculture, Horticulture, Sericulture, Forestry, Biotechnology and many more.

PSO7. Demonstrate knowledge to help acquire, articulate, retain, and employ practical skills relevant to Food Chemistry and Nutrition, Food Plant Hygiene and Sanitation, Food Processing and Packaging, Quality Assurance, Food analysis, Food Plant Layout and Management. Students will demonstrate engagement in the Food Science discipline through involvement in research or internship activities.

PSO8. Demonstrate knowledge to help acquire, articulate, retain, and employ practical skills relevant to Fundamentals of Microbiology, Basics of Food Microbiology, Microbial Nutrition and Metabolism, Microbial Ecology, Applied Microbiology. Students will demonstrate engagement in the Microbiology discipline through involvement in research or internship activities.

PSO9. Demonstrate knowledge of chemistry and apply this knowledge toanalyse a variety of chemical phenomena and will be able to interpret and analyse quantitative data.

PSO10. Understand theoretical concepts of instruments that are commonly used in most chemistry fields as well as interpret and use data generated in instrumental physical and chemical analyses.

PSO11. To train students in multidisciplinary and interdisciplinary areas in chemical sciences. They will also be able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at a level suitable to succeed at an entry-level position in industry or a chemistry postgraduate program.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

Scheme and Curriculum of Examinations of Three-Year Degree Programme

Session 2025-26

Bachelor of Science (Medical) Semester - V										
Course Code		**Course Name**	**Course Type**	**Credits**	**Total Credits**	**Marks**				**Examination Time**
						Total	**L**	**P**	**CA**	
BSML-5421		Punjabi (Compulsory)	C	4-0-0	4	100	80	-	20	3
BSML-5031		[1]Basic Punjabi								
BSML- 5431		[2]Punjab History and Culture (From 1849-1947 A.D.)								
BSML- 5212		English (Compulsory)	C	4-0-0	4	100	80	-	20	3
BSMM-5483	(I)	Zoology (Developmental Biology)	E	3-0-0	7	75	60	-	15	3
	(II)	Zoology (Genetics)		2-0-0		50	40	-	10	3
	(P)	Zoology (Practical- V- Related to Developmental Biology and Genetics)		0-0-2		50	-	40	10	3
BSMM-5343	(I)	Microbiology (Applied Microbiology-I)	E	4-0-0	5	100	60	-	20	3
	(P)	Microbiology (Applied Microbiology-I)		0-0-1			-	20		3
BSMM-5084	(I)	Chemistry (Inorganic Chemistry)	C	2-0-0	7	50	40	-	10	3
	(II)	Chemistry (Physical Chemistry)		3-0-0		75	60	-	15	3
	(P)	Chemistry (Practical)		0-0-2		50	-	40	10	3
BSMM-5075	(I)	Botany (Plant Physiology)	E	2-0-0	7	50	40	-	10	3
	(II)	Botany (Biochemistry and Biotechnology)		3-0-0		75	60	-	15	3
	(P)	Botany (Practical based on Paper I and II)		0-0-2		50	-	40	10	3
BSMM-5255	(I)	Food Science and Quality Control (Vocational) (Food Analysis)	E	4-0-0	5	100	60	-	20	3
	(P)	Food Science and Quality Control (Vocational) (Food Analysis)		0-0-1			-	20		3
SECI- 5541		*Innovation, Entrepreneurship and Creative Thinking	AC	2-0-0	2	50	40	-	10	3

[1]Special paper in lieu of Punjabi (Compulsory) for those who have not studied Punjabi upto 8th-10th Class.

[2]Special paper in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab.

*Credits grade points of these courses will not be added in SGPA/CGPA of the semester Program and only grades will be provided.

C-Compulsory

E- Elective

AC- Audit Course

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

Scheme and Curriculum of Examinations of Three-Year Degree Program

Session 2025-26

Bachelor of Science (Medical) Semester - VI										
Course Code		**Course Name**	**Course Type**	**Credits**	**Total Credits**	**Marks**				**Examination Time**
						Total	**L**	**P**	**CA**	
BSML-6421		Punjabi (Compulsory)	C	4-0-0	4	100	80	-	20	3
BSML-6031		[1]Basic Punjabi								
BSML- 6431		[2]Punjab History and Culture (1947- 2000 A.D.)								
BSML- 6212		English (Compulsory)	C	4-0-0	4	100	80	-	20	3
BSMM-6483	(I)	Zoology (Medical Zoology)	E	3-0-0	7	75	60	-	15	3
	(II)	Zoology (Medical Laboratory Technology)		2-0-0		50	40	-	10	3
	(P)	Zoology (Practical- V- Related to Medical Zoology and Medical Laboratory Technology)		0-0-2		50	-	40	10	3
BSMM-6343	(I)	Microbiology (Applied Microbiology-II)	E	4-0-0	5	100	60	-	20	3
	(P)	Microbiology (Applied Microbiology-II)		0-0-1			-	20		3
BSMM-6084	(I)	Chemistry (Molecular Spectroscopy)	C	3-0-0	7	75	60	-	15	3
	(II)	Chemistry (Physical Chemistry)		2-0-0		50	40	-	10	3
	(P)	Chemistry (Practical)		0-0-2		50	-	40	10	3
BSMM-6075	(I)	Botany (Ecology)	E	2-0-0	7	50	40	-	10	3
	(II)	Botany (Economic Botany)		3-0-0		75	60	-	15	3
	(P)	Botany (Based on Paper I and II)		0-0-2		50	-	40	10	3
BSMM-6255	(I)	Food Science and Quality Control (Vocational) (Food Plant Layout and Management)	E	4-0-0	5	100	60	-	20	3
	(P)	Food Science and Quality Control (Vocational) (Food Plant Layout and Management)		0-0-1			-	20		3

[1]Special paper in lieu of Punjabi (Compulsory) for those who have not studied Punjabi upto 8th-10th Class.

[2]Special paper in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab.

*Credits grade points of these courses will not be added in SGPA/CGPA of the semester Program and only grades will be provided.

C-Compulsory

E- Elective

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Punjabi (Compulsory)
Course Code: BSML-5421
(THEORY)

COURSE OUTCOMES

CO1: ਚੋਣਵੀਆਂ ਪੰਜਾਬੀ ਕਹਾਣੀਆਂ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਹਾਣੀਆਂ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ।

CO2: ਨਾਵਲ 'ਏਹੁ ਹਮਾਰਾ ਜੀਵਣਾ' (ਦਲੀਪ ਕੌਰ ਟਿਵਾਣਾ) ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਨਾਵਲ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਇਸ ਸਾਹਿਤ ਰੂਪ ਨਾਲ ਜੋੜਣਾ ਹੈ।

CO3: ਪੈਰ੍ਹਾ ਰਚਨਾ ਕਰਨ ਨਾਲ ਵਿਦਿਆਰਥੀ ਆਪਣੀ ਗੱਲ ਨੂੰ ਕਹਿਣ ਦੀ ਜਾਚ ਸਿੱਖਣਗੇ ਅਤੇ ਇਹ ਦਿਮਾਗੀ ਕਸਰਤ ਵਿਚ ਸਹਾਈ ਹੋਵੇਗੀ।ਸਰਲ ਅੰਗਰੇਜ਼ੀ ਪੈਰ੍ਹੇ ਦਾ ਪੰਜਾਬੀ ਵਿਚ ਅਨੁਵਾਦ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ।

CO4: ਵਾਕਾਤਮਕ ਜੁਗਤਾਂ : ਮੇਲ ਤੇ ਅਧਿਕਾਰ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ -ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Punjabi (Compulsory)

Course Code: BSML-5421

(THEORY)

ਸਮਾਂ : 3 ਘੰਟੇ | **Maximum Marks: 100**

L-T-P: 4-0-0 | **Theory: 80**

CA: 20

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 16 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 ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਚੋਣਵੀਆਂ ਪੰਜਾਬੀ ਕਹਾਣੀਆਂ

(ਸੰਪਾ.ਡਾ.ਰਮਿੰਦਰ ਕੌਰ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ, 2018)

ਲੇਖਕ	ਕਹਾਣੀ	ਕਹਾਣੀ ਸੰਗ੍ਰਹਿ
ਅਜੀਤ ਕੌਰ	ਨਿਊ ਯੀਅਰ	ਮੌਤ ਅਲੀ ਬਾਬੇ ਦੀ
ਜਿੰਦਰ	ਸੌਰੀ	ਜਖ਼ਮ
ਸੁਖਜੀਤ	ਹਜ਼ਾਰ ਕਹਾਣੀਆਂ ਦਾ ਬਾਪ	ਮੈ ਇੰਜੁਆਏ ਕਰਦੀ ਹਾਂ
ਜਤਿੰਦਰ ਹਾਂਸ	ਰਾਹੂ ਕੇਤੂ	ਈਸ਼ਵਰ ਦਾ ਜਨਮ
ਪ੍ਰੇਮ ਪ੍ਰਕਾਸ਼	ਅਰਜਨ ਛੇੜ ਗਡੀਰਨਾ	ਕੁਝ ਅਣਕਿਹਾ ਵੀ
ਚੰਦਨ ਨੇਗੀ	ਹਰਖ ਸੋਗ	ਹਰਖ ਸੋਗ
ਜਸਵਿੰਦਰ ਸਿੰਘ	ਖੂਹ ਖਾਤੇ	ਖੂਹ ਖਾਤੇ
ਗੁਰਦੇਵ ਸਿੰਘ ਰੁਪਾਣਾ	ਸ਼ੀਸ਼ਾ	ਸ਼ੀਸ਼ਾ ਅਤੇ ਹੋਰ ਕਹਾਣੀਆਂ

(ਵਿਸ਼ਾ-ਵਸਤੂ/ਸਾਰ / ਪਾਤਰ ਚਿਤਰਨ)

ਯੂਨਿਟ-II

ਨਾਵਲ : ਏਹੁ ਹਮਾਰਾ ਜੀਵਣਾ(ਦਲੀਪ ਕੌਰ ਟਿਵਾਣਾ)

(ਵਿਸ਼ਾ-ਵਸਤੂ/ਸਾਰ / ਬਿਰਤਾਂਤਕ ਜੁਗਤਾਂ)

ਯੂਨਿਟ-III

ਲਗਪਗ 200 ਸ਼ਬਦਾਂ ਵਿਚ ਪੈਰ੍ਹਾ ਰਚਨਾ

ਸਰਲ ਅੰਗਰੇਜ਼ੀ ਪੈਰ੍ਹੇ ਦਾ ਪੰਜਾਬੀ ਵਿਚ ਅਨੁਵਾਦ

ਯੂਨਿਟ-IV

ਵਿਆਕਰਣ :

(ੳ) ਨਾਂਵ ਵਾਕੰਸ਼

(ਅ) ਮੇਲ ਤੇ ਅਧਿਕਾਰ

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Basic Punjabi (In lieu of Punjabi Compulsory)
Course Code: BSML-5031
(THEORY)

COURSE OUTCOMES

CO1: ਵਿਦਿਆਰਥੀ ਸਾਹਿਤ ਅਤੇ ਲੋਕ ਸਾਹਿਤ,ਲੋਕ ਕਾਵਿ,ਲੋਕ ਵਾਰਤਕ ਬਿਰਤਾਂਤ ਦੀ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ) ਬਾਰੇ ਜਾਣ ਸਕਣਗੇ।

CO2: ਵਿਦਿਆਰਥੀ ਸੁਹਾਗ,ਘੋੜੀਆਂ, ਸਿੱਠਣੀਆਂ ਦੀ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ) ਬਾਰੇ ਜਾਣ ਸਕਣਗੇ।

CO3: ਵਿਦਿਆਰਥੀ ਗਿੱਧਾ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ),ਭੰਗੜਾ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ),ਝੂਮਰ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ) ਬਾਰੇ ਜਾਣ ਸਕਣਗੇ।

CO4: ਵਿਦਿਆਰਥੀ ਲੋਕ ਖੇਡਾਂ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ),ਲੋਕ ਤਮਾਸ਼ੇ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ),ਲੋਕ ਕਲਾਵਾਂ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ) ਦਾ ਵਿਹਾਰਕ ਅਧਿਐਨ ਕਰ ਸਕਣ ਦੇ ਸਮਰੱਥ ਹੋ ਸਕਣਗੇ।

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Basic Punjabi (In lieu of Punjabi Compulsory)
Course Code: BSML-5031
(THEORY)

ਸਮਾਂ : 3 ਘੰਟੇ | **Maximum Marks: 100**
L-T-P: 4-0-0 | **Theory: 80**
CA: 20

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 16 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

ਸਾਹਿਤ ਅਤੇ ਲੋਕ ਸਾਹਿਤ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)
ਲੋਕ ਕਾਵਿ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)
ਲੋਕ ਵਾਰਤਕ ਬਿਰਤਾਂਤ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)

ਯੂਨਿਟ-II

ਸੁਹਾਗ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)
ਘੋੜੀਆਂ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)
ਸਿੱਠਣੀਆਂ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)

ਯੂਨਿਟ-III

ਗਿੱਧਾ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)
ਭੰਗੜਾ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)
ਝੂਮਰ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)

ਯੂਨਿਟ-IV

ਲੋਕ ਖੇਡਾਂ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)
ਲੋਕ ਤਮਾਸ਼ੇ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)
ਲੋਕ ਕਲਾਵਾਂ (ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ)

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Punjab History and Culture (From 1849- 1947 A.D.)

(In lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

Course Code: BSML-5431

(THEORY)

COURSE OUTCOMES:

After completing the course students will be able to understand:

CO1: The causes that led to war between the British and Sikhs that led to the annexation of the Punjab and how the region was put under the control of Board of Administration

CO2: Various agrarian, industrial and educational policies introduced by the British in Punjab.

CO3: Analyse and evaluate the socio-religious reforms movements of Punjab

CO4: Factors that led to Gurudwara reform movement and various other freedom struggle movements in which the Punjab played a prominent role

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Punjab History and Culture (From 1849- 1947 A.D.)

(In lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

Course Code: BSML-5431

(THEORY)

Time : 3 Hours **Maximum Marks: 100**

L-T-P: 4-0-0 **Theory: 80**

CA: 20

Instructions for the Paper Setters

1. Question paper shall consist of four Units
2. Examiner shall set 8 questions in 800 words by selecting Two Questions of equal marks from each Unit.
3. Candidates shall attempt 5 questions in all, 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 16 marks

Unit- I

1. First Anglo-Sikh War.
2. Annexation of Punjab and Board of Administration

Unit-II

3. British Policy towards agriculture and industry
4. Spread of modern education

Unit-III

5. Socio- religious reform movements: Namdhari, Singh Sabha, AryaSamaj and Ad Dharm
6. Gadhar Movement

Unit-IV

7. Gurdwara Reform Movement
8. Contribution to freedom struggle: Jallianwala Bagh tragedy; Non-cooperation and Quit India Movement.

Suggested Readings

- Chopra, P.N.& Das, M.N. (1974), *A Social, Cultural & Economic History of India.*Vol.III, Macmillan India, 1974.
- Grewal, J.S., *The Sikhs of the Punjab*, New Cambridge House, New Delhi, 2005.
- Mittal, S.C, *Freedom Movement in the Punjab (1905-29),* Concept Publishing Company Delhi, 1977.
- Rai, Satya. M (1978), *Heroic Tradition in the Punjab (1900-1947*). Punjabi University, Patiala, 1978.
- Saini B. S, *The Social & Economic History of the Punjab 1901-1939,* EssEss Publications, Delhi, 1975.

- Singh, Fauja, *Freedom Struggle in the Punjab*, Publication Bureau, Punjabi University, Patiala, 1974.
- Singh, Fauja, *History and Culture of the Punjab*, Part II, Publication Bureau, Punjabi University, Patiala, 1987.
- Singh, Kushwant, *A History of the Sikhs*. Vol. II (1839-1998), Oxford University Press, Delhi, 1991.

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: English (Compulsory)
Course Code: BSML-5212
(THEORY)

COURSE OUTCOMES

After passing this course, the students will be able to:

CO 1: analyze and appreciate the dramatic technique, plot development and art of characterisation in the prescribed play, "All My Sons" by Arthur Miller

CO 2: widen their knowledge about various literary devices used in poetry such as tone, style, imagery, figures of speech, symbolism etc. thorough the study of prescribed poems from the text "Poems of Nature and Culture"

CO 3: develop the knowledge, skills and capabilities for effective business writing such as formal letter writing, job application and resume writing

CO 4: will develop skills for writing job application and suitable resume along with.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: English (Compulsory)

Course Code: BSML-5212

(THEORY)

Time : 3 Hours **Maximum Marks: 100**

L-T-P: 4-0-0 **Theory: 80**

CA: 20

Instructions for the Examiner:

Section A: Three questions from the play *All My Sons* from Unit I and three questions from *Poems of Nature and Culture* from Unit II will be set. The students will be required to answer any five, each carrying four marks (100 words each). **(5×4=20)**

Section B: Four questions based on character, tone, plot and theme(s) from the play *All My Sons* from Unit I will be set and the students will be required to attempt any two, each carrying ten marks (400 words each). **(2×10= 20)**

Section C: Four questions based on the central idea, theme, tone or style etc. of the prescribed poems from the textbook, *Poems of Nature and Culture* from Unit II will be set. The students will have to attempt any two of these, each carrying ten marks (400 words each). The questions can also be set based on stanzas with reference to context. **(2×10= 20)**

Section D: Two questions with internal choice will be set from Unit III (formal letter) and Unit IV (Job application and Resume Writing) each carrying ten marks. **(2×10=20)**

Unit I

All My Sons by Arthur Miller

Unit II

Poems of Nature and Culture:

William Wordsworth: The World is Too Much with Us
Gordon Lord Byron: She Walks in Beauty
P.B. Shelly: Ozymandias
Alfred Lord Tennyson: In Memoriam
Mathew Arnold: Dover Beach
Wilfred Owen: Strange Meeting
Robert Graves: The Portrait
W.H. Auden: The Unknown Citizen
Ted Hughes: The Thought-Fox
Sylvia Plath: Mirror
Rabindranath Tagore: False Religion
Nissim Ezekiel: Night of Scorpion

Unit III

Formal letter

Unit IV

Job Application and Resume Writing

Texts Prescribed:

1. *All My Sons* by Arthur Miller
2. *Poems of Nature and Culture,* Guru Nanak Dev University, Amritsar
3. *Oxford Guide to Effective Writing and Speaking* by John Seely.

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Zoology (Developmental Biology)
Course Code: BSMM- 5483 (I)
(THEORY)

COURSE OUTCOME

After successfully completing this course, students will be able to:

CO1: Understand the key events in early embryological development like gametogenesis, fertilization and parthenogenesis.

CO2: Explain the process of cleavage, gastrulation, determination and differentiation.

CO3: Elaborate the development of frog, its metamorphosis and chick up to three germ layers.

CO4: Describe the development of rabbit, formation of foetal membranes and placenta.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Zoology (Developmental Biology)

Course Code: BSMM- 5483 (I)

(THEORY)

Time : 3 Hours **Maximum Marks: 75**

L-T-P: 3-0-0 **Theory: 60**

CA: 15

Instructions for the Paper Setter

Eight questions of equal marks (12 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

Gametogenesis with particular reference to differentiation of spermatozoa, vitellogenesis; role of follicle/sub testicular cells in gametogenesis

Egg maturation; egg membranes; polarity of egg

Parthenogenesis

Fertilization

UNIT-II

Cleavage and its patterns

Gastrulation

Determination and differentiation

Tissue interactions, basic concepts of organizers and inductors and their role

Embryonic development of Herdmania

UNIT-III

Development upto three germinal layers and their fate in frog and

chick Fate maps of chick and frog embryos

Metamorphosis in Frog

UNIT-IV

Embryonic development of Rabbit Fetal membranes, their formation and role Mammalian placenta– its formation, types, and functions.

Suggested Readings:

1. Balinsky, B.I. (2007), An Introduction to Embryology, Saunders, Philadelphia.
2. Bellairs, R. (1971), Development Processes in Higher Vertebrates, University of Miami Press, Miami.
3. Berrill. N.J. (1971), Developmental Biology. McGraw Hill, New Delhi.

4. Gilbert, F. (2017), Developmental Biology, Sinaur.
5. Goel, S.C. (1984), Principles and Animal Developmental Biology, Himalaya, Bombay.
6. Karp. G. &Berrill, M.J. (1981), Development. McGraw Hill, New Delhi.
7. Pritchard, D.J. (1986), Foundation of Development Genetics, Taylor and Francis, London.
8. Saunders, J.W. (1982), Developmental Biology, Patterns, Principles, Problems, MacMillan, New York.
9. Waddigton CH. (1966), Principles of Development and Differentiation, MacMillan, NewYork.
10. Miller, W.A. (1997), Developmental Biology Springer Verlag, New York.

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Zoology (Genetics)
Course Code: BSMM- 5483 (II)
(THEORY)

COURSE OUTCOMES

After passing this course the student will be able to:

CO1: Comprehensive and detailed understanding of genetic methodology and how quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms. Understanding the role of genetic mechanisms like linkage, crossing over and multiple alleles.

CO2: Understand structure of nucleic acid, process of replication and translation, genetic code.

CO3: Understanding of how genetic concepts of mutations, regulation of gene expression and extranuclear inheritance.

CO4: Evolutionary and quantitative genetics including: the basis of genetic variation; heritability; Hardy-Weinberg Equilibrium and key concepts in population and how it affects broad societal issues including health and disease, food and natural resources, environmental sustainability, etc.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Zoology (Genetics)

Course Code: BSMM- 5483 (II)

(THEORY)

Time : 3 Hours **Maximum Marks: 50**

L-T-P: 2-0-0 **Theory: 40**

CA: 10

Instructions for the Paper Setter

Eight questions of equal marks (8 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

Modification of Mendelian Ratios: Non-allelic gene interaction, Modified F2 ratios. (9:7; 9:3:4; 12:3:1; 13:3; 15:1; 9:6:1), Gene modifications due to incomplete dominance; lethal Factors (2:1); Pleiotropic genes.

Multiple Alleles: Blood group inheritance, eye colour in *Drosophila*, pseudoallelism.

Multiple Factors: Qualitative and quantitative characters, inheritance of quantitative traits (skin colour in man).

Linkage: Linkage, sex-linked characters

Crossing Over and Recombination: crossing over, frequency of crossing over, cytological basis of crossing over, synaptonemal complex. Recombination in Fungi (Tetrad analysis).

UNIT-II

Gene and Genetic Code: Structure of nucleic acids **(DNA & RNA).**

Replication & transcription of DNA

Expression of gene (Protein synthesis in Prokaryotes and Eukaryotes).

Genetic code: Properties of genetic code, codon assignment, wobble hypothesis, split and overlapping Genes.

UNIT-III

Mutations: Spontaneous and induced mutations, physical and chemical mutagen. Detection of mutations in Maize and *Drosophila.* Inborn errors of metabolism in man (Phenylketonuria, Alcaptonuria, Albinism). Somatic mutations and carcinogenesis.

Regulation of gene expressions in prokaryotes (Operon model) in eukaryotes. **Extranuclear inheritance:** Chloroplast with special reference to *Mirabilis jalapa* and kappa particles in *Paramecium.*

UNIT-IV

Population genetics: Equilibrium of gene frequencies and Hardy-Weinberg law. **Genetic recombination** in bacteria (conjugation, transduction and transformation) and in plasmids. **Applied Genetics:** Recombination DNA, Genetic cloning and its applications in medicine and agriculture, DNA finger printing.

Suggested Readings:

1. Klug, Cummings, Spencer, Palladino, Killian (Twelth edition), Concepts of Genetics
2. Gardener, E.J., Simmons, M.J. & Sunstad, Principles of Genetics, (8th ed), D.P. John Wiley & Sons, New York.
3. Benjamin A. Pierce, Genetics: a conceptual approach (6^{th} edition)
4. P.S Verma and V.K Aggarwal, Genetics (9^{th} edition) S. Chand publications.
5. Veer BalaRastogi, Genetics (4^{th} edition), Knrn publications.
6. Prof P. K. Gupta (5^{th} revised edition 2018-19), Genetics Rastogi publications.
7. C. B. Powar (2018), Cell Biology Himalayan publishing house.
8. Miglani, G.S(2000), Basic Genetics, Narosa publishing house, New Delhi.
9. Weaver, R.F. and Hedrick, P.W. (1992), Genetics, Wm. C. Brown Publishers Dubuque.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Zoology (Practical V (Related to Developmental Biology and Genetics))

Course Code: BSMM- 5483 (P)

(PRACTICAL)

Course Outcomes

CO1: Understanding of development patterns of frog, chick and Larva of *Herdmania*.

CO2: Knowledge of process of gametogenesis.

CO3: Understanding of pedigree analysis and preparation of family charts.

CO4: Understanding of inheritance of morphogenetic human characters and finger tip patterns.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Zoology (Practical V (Related to Developmental Biology and Genetics))

Course Code: BSMM- 5483 (P)

(PRACTICAL)

Time : 3 Hours **Maximum Marks: 50**

L-T-P: 0-0-2 **Theory: 40**

CA: 10

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

Guidelines for Conduct of Practical Examination:-

1.	Two Numericals based on Mendel/Hardy Weinberg Law.	12
2.	Perform the experiment for Dermatoglyphics/ Random mating/ Pod Length.	**6**
3.	Identification of given spots/slides.	**6**
4.	Make a pedigree chart from the given data.	**4**
5.	Chart/Assignment.	**4**
6.	Viva-voce and practical file.	**8**

1. Demonstrate the Law of segregation and independent assortment (use of coloured beads capsules etc.).
2. Numericals for Segregation, Independent assortment, Epistasis & Hardy-Weinberg Law.
3. Demonstration of segregation in preserved material (Maize).
4. Demonstration of cytoplasmic inheritance in snails.
5. Inheritance of human characteristics.
6. Comparison of variance in respect of pod length and number of seeds/pods.
7. Calculation of gene frequencies and random mating (Coloured beads, capsules).
8. Pedigree analysis
9. Dermatoglyphics: Palm print and Finger tip patterns.
10. Study of the following permanent slides :

- Polytene Chromosomes of *Chironomus.*
- Stages of gametogenesis, structure of egg and sperm of a mammal.
- Larva of *Herdmania.*

- Developmental stages offrog-upto tadpole, chick-upto 96 hr.

11. Preparation of slide for Barr body from cheek cells.
12. **Assignment**: Preparation of charts showing developmental stages of any vertebrate.

Note:- Some changes can be made in the practicals depending on the availability of material.

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Microbiology (Applied Microbiology-I)
Course Code: BSMM- 5343 (L)
(THEORY)

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand the history and scope of industrial microbiology and preservation of stock cultures.

CO2: Understand the screening of microorganisms and composition and characteristics of fermentation media.

CO3: Learn about the fermenter, types of industrial fermentation and fermentation economics.

CO4: Understand the downstream processing and patent.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Microbiology (Applied Microbiology-I)

Course Code: BSMM- 5343 (L)

(THEORY)

Time : 3 Hours **Maximum Marks: 100**

L-T-P: 4-0-0 **Theory: 60**

Practical: 20

CA: 20

Instructions for the Paper Setter: Eight questions of equal marks (12 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

Microorganisms in Industry: Historical development, definition and scope of industrial microbiology; contribution of Louis Pasteur in fermentation; sources of industrial microorganisms and their essential characteristics, natural habitats, cultural collections and preservation of stock cultures.

UNIT- II

Screening of Microorganisms: Isolation of industrially important microorganisms, primary and secondary screening methods for isolating useful Yeast, Bacteria and Fungi. Fermentation media, composition of production media, characteristics of ideal production medium, raw materials.

UNIT- III

Fermentation and Fermentation processes: Fermentation as biological activity, Types of industrial fermentations (submerged, solid state and continuous fermentation). Design of fermenter (body construction, aeration, agitation and control of aseptic conditions), Basics of batch culture, fedbatch culture and continuous culture. Fermentation economics; planning, fermentation designing, process designing, market potential and recovery costs for the industrial set up.

UNIT- IV

Downstream Processing: Recovery and Purification of Fermentation Products; General principles of separation of fermentation products, solid particles, foam separation, separation by filtration, centrifugation, cell disruption, liquid - liquid chromatography, ion exchange chromatography. Patent: Introduction, composition, subject matter, characteristics, protection of rights of inventor, cost).

Books Recommended:

1. Casida, L.E. 2016, 2nd Edition.*Industrial Microbiology*. Wiley Eastern Ltd., New Delhi.
2. Stanbury, P.F. Whittaker, A. and Hall S.J. 2016, 3rd Edition. Principles of Fermentation Technology. Elsevier Science Ltd., U.K.
3. Patel, A.H. 2011, 2nd Edition. *Industrial Microbiology*,Macmillan India Ltd., Delhi.
4. Trevan M.D., Saffey, S., Goulding, K.H. and Stanberry, P. 2007. *Biotechnology: The Biological Principles*, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
5. Freifelder, D. 2006, 2nd Edition. Microbial Genetics. Jones and Barttett Publishers Inc., Boston.
6. Applied Microbiology by Corinne Whitby and Torben Lund Skovhus. **(Online available)**
7. Applied Microbiology by Perlman. **(Online available)**

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Microbiology (Applied Microbiology-I)
Course Code: BSMM- 5343 (P)
(PRACTICAL)

COURSE OUTCOMES

After passing the course student will be able to:

CO1: Isolation of microorganisms from different samples

CO2: Demonstrate the isolation of amylase and protease producing microorganisms

CO3: Understand the protein estimation by Lowery method

CO4: Knowledge about the different methods for preservation of microorganisms

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Microbiology (Applied Microbiology-I)

Course Code: BSMM- 5343 (P)

(PRACTICAL)

Time : 3 Hours **Practical: 20**

L-T-P: 0-0-1

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

List of Practical:

1. Isolation of microorganisms from (a) soil (b) fruits.
2. Screening and characterization of industrially important Amylase producing microorganisms.
3. Screening and characterization of industrially important Protease producing microorganisms
4. Protein estimation by Lowry method.
5. Preservation of industrially important microorganisms by various methods
   (a) Storage in 10% glycerol
   (b) Storage in mineral oil.
6. Determination of % viability of yeast cells by haemocytometer.

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Chemistry (Inorganic Chemistry)
Course Code: BSMM- 5084 (I)
(THEORY)

Course Outcomes

Students will be able to

CO1: Explain the crystal field theory and associated concepts such as orbital splitting, crystal field stabilization energy (CFSE), spectrochemical series, and Jahn-Teller distortion in coordination complexes.

CO2: Analyze the magnetic properties and thermodynamic stability of transition metal complexes using magnetic susceptibility methods and substitution reaction mechanisms, including the trans-effect.

CO3: Interpret electronic spectra of transition metal complexes using term symbols, Orgel diagrams, and LS coupling, and apply these concepts to real metal ion systems such as Cr^{3+}, Co^{2+}, Mn^{2+}, and Ni^{2+}.

CO4: Describe the structure, bonding, classification, and applications of organometallic compounds including alkyllithium, organoaluminium, metal-olefin, and metal carbonyl complexes.

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Chemistry (Inorganic Chemistry)
Course Code: BSMM- 5084 (I)
(THEORY)

Time : 3 Hours **Maximum Marks: 50**
L-T-P: 2-0-0 **Theory: 40**
CA: 10

Instructions for the Paper Setter

Eight questions of equal marks (8 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

1. Metal-ligand Bonding in Transition Metal Complexes **(8 Hrs)** Limitations of valence bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, crystal field stabilization energy for d-orbital electrons in tetrahedral and octahedral complexes, Spectrochemical series, factors affecting the crystalfield parameters, Structural and Thermodynamic effects of inner orbital splittings, Jahn-Teller effects.

Unit II

2. Magnetic Properties of Transition Metal Complexes **(8 Hrs)**
Types of magnetic behaviour, methods of determining magnetic susceptibility by Gouy's and Faraday method. Variation of magnetic susceptibility with temperature, ferromagnetic and antiferromagnetic substances, spin-only formula. L-S coupling, correlation of μ_S and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for characterization of 3d-metal complexes. Temperature independent paramagnetism, anomalous magnetic moment, paramagnetic and diamagnetic equilibrium.

3. Thermodynamic and Kinetic Aspects of Metal Complexes
A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, Nucleophilic Substitution reactions in square planar complexes: rate law, Trans- effect, Mechanism of nucleophilic substitution in square planar complexes.

Unit III

4. Electronic Spectra of Transition Metal Complexes **(7 Hrs)**
Term symbols and coupling scheme, LS coupling, calculation of ground term state, microstates, Types of electronic transitions, selection rules and relaxations, splitting of Russel-Saunder states in octahedral and tetrahedral, spectrochemical series, Orgel diagram of one electron-one hole system (d^1, d^4, d^6 & d^9) and two electron-two hole system (d^2, d^3, d^7 & d^8) in octahedral and tetrahedral complexes.
Study of electronic transition in Cr^{3+} (octahedral), Co^{2+} (octahedral & tetrahedral), Mn^{2+} (octahedral), Ni^{2+} (octahedral) complexes. Limitation of Orgel diagram.

Unit IV

5. Organometallic Compounds: **(7 Hrs)**
Definition, nomenclature and classification of organometallic compounds. σ and π complexes, types of organoligands, EAN rule, bonding in organometals,

Preparation, properties, bonding and applications of alkyllithium and organoaluminium compounds (AlR_3). Metal olefin complexes, bonding in metal-ethylenic complexes, Mechanism of homogeneous hydrogenation reactions of alkene. Metal carbonyls: examples and bonding.

Books Suggested:

1. Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; 3rd edition, Pubs: John Wiley Sons. 1995.
2. Lee, J.D., Concise Inorganic Chemistry; 4th edition, Pubs: Chapman Hall Ltd., 1991.
3. Shriver, D.E., Alkins, P.W., Langford, C.H., Inorganic Chemistry; 4th edition, Oxford Publisher: Oxford University Press, 2006.
4. Douglas, B. McDamiel, D., Alexander, J., Concepts and Models of Inorganic Chemistry; 3rd edition, Pubs: John Wiley and Sons Inc., 1994.
5. Porterfield, W.W., Wesley, A., Inorganic Chemistry; Pubs: Addison-Wesley Publishing Company, 1984.
6. Miessler, G.L., Larr, D.A., Inorganic Chemistry; 3rd edition, Pubs: Pearson Education Inc., 2004.
7. Jolly, W.L., Modern Inorganic Chemistry; 2nd edition, Pubs: McGraw-Hill Publishing Company Limited, 1991.
8. Purcell, K.F., Kotz, J.C., Inorganic Chemistry; Pubs: W.B. Saunders Company, 1977.
9. Puri, B.R., Sharma, L.R., Kalia, K.C., Principles of Inorganic Chemistry; 30th edition, Pubs: Milestones Publisher, 2006-07.
10. Inorganic Chemistry, W.W. Porterfield Addison-Wesley.
11. Inorganic Chemistry, A.G. Sharpe, ELBS.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Chemistry (Physical Chemistry)

Course Code: BSMM- 5084 (II)

(THEORY)

Course outcomes:

Students will be able to

CO1: Understand and apply the principles of ionic conductivity, ion transport, and electrochemical cell operations to analyze and calculate electrochemical parameters such as EMF, transport number, and thermodynamic quantities.

CO2: Explain electrochemical phenomena such as polarization and concentration cells, and demonstrate understanding of nuclear properties, radioactive decay, and their applications in nuclear reactions and radioactivity detection.

CO3: Analyze rotational spectra of diatomic molecules using rigid and non-rigid rotor models to determine molecular parameters like bond length and isotope effects.

CO4: Interpret vibrational, Raman, and electronic spectra based on quantum mechanical models to deduce structural and bonding information of molecules.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Chemistry (Physical Chemistry)

Course Code: BSMM- 5084 (II)

(THEORY)

Time : 3 Hours **Maximum Marks: 75**

L-T-P: 3-0-0 **Theory: 60**

CA: 15

Instructions for the Paper Setter

Eight questions of equal marks (12 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

Electrochemistry – I **(12 hrs.)**

Conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of equivalent and specific conductance with dilution, Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Migration of ions, Transport number: definition and determination by Hittorf method and moving boundary method, factors affecting transport number. Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids, determination of solubility product of sparingly soluble salt, conductometric titrations.

Electrolytic and Galvanic cells-reversible and irreversible cells, conventional representation of electrochemical cells.Standard electrode potential, standard hydrogen electrode, reference electrodes, sign conventions, electrochemical series and its significance. Nernst equation,

derivation of cell E.M.F. and single electrode potential. EMF of a cell and its measurements. Calculation of thermodynamic quantities of cell reactions (ΔG,ΔH and K). Types of reversible electrodes: gas- metal ion, metal ion, metal insoluble salt-anion and redox electrodes. Electrode reactions. EMF of reversible electrodes.

Unit–II

Electrochemistry – II **(11 Hrs.)**

Polarization, over potential, hydrogen overvoltage and its application. Concept of activities and activity coefficient. Concentration cells with and without transference, liquid junction potential, application of concentration cells, valency of ions, solubility product and pH determination, potentiometric

Titrations.

Nuclear Chemistry

Introduction: Radioactivity, Nuclear Structure, Size of Nucleus, Mass Defects and Binding Energy, Nuclear Stability, Nuclear Forces, Nuclear Spin and Moments of Nuclei, Nuclear Models, Nuclear Decay Processes, The Laws of Radioactive Decay, Soddy-Fajans Group Displacement Law, Rate of Nuclear Decay and Half Life Time (Kinetics of Radioactive Decay), Induced Nuclear Reactions, Types of Nuclear Processes, High Energy Nuclear Reactions, Nuclear Reaction Cross-Section, Artificial radioactivity, Detection and Measurement of Radioactivity, Nuclear Fission, Nuclear Fusion, Applications of Radioactivity.

Unit–III

Spectroscopy **(11 Hrs.)**

Introduction: Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, degrees of freedom.

Rotational Spectrum

Diatomic molecules. Energy levels of a rigid rotor (semi classical principles), selection rules, spectral intensity and position of lines, distribution using population distribution (Maxwell- Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.

Unit–IV

Vibrational Spectrum **(11 Hrs.)**

Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of an harmonic motion and isotope on the spectrum, vibration-rotation spectra, P, Q and R branches, structural information from IR spectra, idea of vibrational frequencies of different functional groups.

Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules, O, Q and S branches. Comparison with IR spectra.

Electronic Spectrum

Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of σ, π, and n M.O., their energy levels and the respective transitions.

Books suggested:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.
2. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.
3. Albert, R.A., Silbey, R.J., Physical Chemistry; 1st edition, Pubs: John Wiley & Sons Inc., 1992.
4. Levine, I.N., Physical Chemistry; 5th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd, 2002.
5. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd, 1983.
6. Metz, C.R., Theory and problems of Physical Chemistry; Schaum's outline series, 2nd edition, Pubs: McGraw-Hall Book Company, 1989.
7. W. Kemp, "Organic Spectroscopy".
8. C.N. Banwell "Fundamentals of Molecular Spectroscopy".
9. D.L. Pavia, G.M. Lampan and G. S. Kriz, Introduction to Spectroscopy" Hartcourt College Publishers, 2001

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Chemistry (Practical)

Course Code: BSMM- 5084 (P)

(PRACTICAL)

Course outcomes:

Students will be able to:

CO1: Develop skills in synthesizing coordination compounds such as sodium trioxalatoferrate(III), Ni-DMG, and transition metal complexes, and understand their structural features and ligand interactions.

CO2: Perform conductometric and pH-metric titrations to determine acid-base properties, mixture composition, and dissociation constants, interpreting the data to identify end points and reaction behaviors.

CO3: Determine molecular weights using Rast's method and analyze phase equilibria by calculating distribution coefficients, gaining insights into colligative properties and solute-solvent interactions.

CO4: Measure refractive indices using Abbe refractometry and calculate specific and molar refraction to identify compositions of liquid mixtures, linking optical properties to molecular structure.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Chemistry (Practical)

Course Code: BSMM- 5084 (P)

(PRACTICAL)

Time : 3 Hours **Maximum Marks: 50**

L-T-P: 0-0-2 **Theory: 40**

CA: 10

Instruction for practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE office, Kanya Maha Vidyalaya, Jalandhar.

(I) Synthesis and Analysis

(a) Preparation of Sodium trioxalatoferrate (III)

(b) Preparation of Ni-DMG Complex

(c) Preparation of Copper tetrammine complex

(d) Preparation of cis-bisoxalatodiaquachromate (III) ion

(II) Physical Chemistry

(a) Conductometric Titrations

(i) Determine the end point of the following titrations by the conductometric methods.

Strong acid-Strong base

Weak acid-Strong base

(ii) Determine the composition of a mixture of acetic acid and the hydrochloric acid by conductometric titration.

(b) Molecular Weight Determination of acetanilide, napthalane, using camphor as solvent **(Rast's methods).**

(c) pH metric titration :

(i) strong acid with strong base,

(ii) weak acid with strong base and determination of dissociation constant of a weak acid.

(d) Phase Equilibria to determine the distribution coefficient of iodine between CCI_4 and water.

(e) **Refractometry**

(i) Determination of refractive index of a liquid by Abbe refractometer, and hence the specific and molar refraction.

(ii) To determine the composition of unknown mixture of two liquids by refractive index measurements.

Books suggested:

1. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge.

2. Handbook of preparative Inorganic Chemistry, Vol. I & II, Brauer, Academic Press.
3. Inorganic Synthesis, McGraw Hill.
4. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.
5. Experiments in Physical Chemistry, R.C. Das and B. Behra, Tata McGraw Hill.
6. Advanced Practical Physical Chemistry, J.B. Yadav, Goel Publishing House.
7. Advanced Experimental Chemistry, Vol. I, Physical, J.N. Guru and R. Kapoor, S. Chand & Co.
8. Selected Experiments in Physical Chemistry, N.G. Mukherjee, J.N. Ghosh & Sons.
9. Experiments Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Botany (Plant Physiology)
Course Code: BSMM- 5075 (I)
(THEORY)

Course outcome: -

After passing this course the student will be able to:

CO1: Understand the plant cells in relation to water and mineral nutrition.

CO2: Learn about the movement of sap & absorption of water and growth in plant.

CO3: Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways.

CO4: Understand the growth regulator in higher plants.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Botany (Plant Physiology)

Course Code: BSMM- 5075 (I)

(THEORY)

Time : 3 Hours | **Maximum Marks: 50**

L-T-P: 2-0-0 | **Theory: 40**

CA: 10

Instructions for the Paper Setters:

Eight questions of equal marks (8 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

Plant-Water Relation: Importance of water to plant life, physical properties of water, (imbibition) diffusion and osmosis, absorption, transport of water and transpiration, physiology of stomata.

Mineral Nutrition: Essential macro-and micro-elements and their role, mineral uptake, deficiency and toxicity symptoms (hydroponics).

Unit-II

Transport of Organic Substances: Mechanism of phloem transport, source-sink relationship, factors affecting translocation.

Growth and Development: Definitions, phases of growth and development, kinetics of growth, seed dormancy, seed germination and factors of their regulation, plant movements, the concept of photoperiodism, physiology of flowering, florigen concept, biological clocks, physiology of senescence, fruit ripening.

Unit-III

Photosynthesis: Significance, historical aspects, photosynthetic pigments, action and absorption spectra and enhancement effects, concept of two photosystems, z-scheme, photophosphorylation, Calvin cycle, C4 pathway, CAM plants, photorespiration.

Unit-IV

Plant growth regulators - auxins, gibberellins, cytokinin's, abscisic acid and ethylene, history of their discovery, biosynthesis and mechanism of action, general account of salicylic acid, jasmonates and brassinosteroids, photomorphogenesis, phytochromes and cryptochromes, their discovery, physiological role and mechanism of action.

Suggested Readings: -

1. Bhatia, K.N. (2019). Plant Physiology I and II. Trueman Book Company. New Delhi
2. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology (4th Edition). John Wiley and Sons. U.S.A.
3. Jain, V.K. (2017). Fundamentals of Plant Physiology. S. Chand Publishing. New Delhi.
4. Mandavia, C., Patel, S. V., Mandavia, M. K., Golakiya, B. A. and Chovatia, V. P. (2009). Glimpses in Plant Physiology. International Book Distributing Co., Lucknow, India.
5. Mohr, H. and Schopfer, P. (1995). Plant Physiology. Springer-Verlag, Berlin, Germany.
6. Pandey, S.N. and Sinha, B. K. (2005). Plant Physiology. Vikas Publishing. New Delhi.
7. Salisbury, F.B. and Ross, C.W. 2006. Plant Physiology (4th Edition). Wadsworth Publishing., California, USA.

8. Srivastava, H. N. (2019). Plant Physiology, Biochemistry and Biotechnology. Pradeep Publications, Jalandhar.
9. Taiz, L. and Zeiger, E. (2010). Plant Physiology (5th Edition). Sinauer Associates Inc. USA.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Botany (Biochemistry & Biotechnology)

Course Code: BSMM- 5075 (II)

(THEORY)

Course outcomes:

After passing this course the student will be able to:

CO1: Understand the properties and function of enzymes, and process of carbohydrate metabolism.

CO2: Understand the Properties of nitrogen metabolism & lipid metabolism and its significance in plants

CO3: Understand the fundamentals of Recombinant DNA Technology. Know about the Genetic Engineering.

CO4: Understand the principle and basic protocols for Plant Tissue Culture

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Botany (Biochemistry & Biotechnology)

Course Code: BSMM- 5075 (II)

(THEORY)

Time : 3 Hours | **Maximum Marks: 75**

L-T-P: 3-0-0 | **Theory: 60**

CA: 15

Instructions for the Paper Setters:

Eight questions of equal marks (12 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

Basics of Enzymology: Discovery and nomenclature, characteristics of enzymes, concept of holoenzyme, apoenzyme, coenzymes and cofactors regulation of enzyme activity, mechanism of action.

Respiration: ATP-the biological energy currency, aerobic and anaerobic respiration, Kreb's cycle, electron transport mechanism (chemiosmotic theory), redox potential, oxidative phosphorylation, pentose phosphate pathway.

Unit-II

Nitrogen and Lipid Metabolism: Biology of nitrogen fixation, importance of nitrate reductase and its regulation, ammonium assimilation, structure and function of lipids, fatty acid biosynthesis, β-oxidation, saturated and unsaturated fatty acids, storage, and mobilization of fatty acids.

Unit-III

Genetic Engineering: Tools and techniques of recombinant DNA technology, cloning vectors, genomic and cDNA library, transposable elements, techniques of gene mapping.

Unit-IV

Biotechnology: Functional definition, basic aspects of plant tissue culture, cellular totipotency, differentiation and morphogenesis, biology of Agrobacterium, vectors for gene delivery and marker genes, salient achievements in crop biotechnology.

Suggested Readings: -

1. Bhojwani, S.S. (1996). Plant Tissue Culture: Applications and Limitations. Elsevier Science Publishers, New York, USA.
2. Dennis, D.T., Turpin, D.H. Lefebvre, D.D. and Layzell (eds.) (1997**).** Plant Metabolism (2nd Edition). Longman, Essex, England.
3. Gallstone, A.W. (1994). Life Processes in Plants. Scientific American Library, Springer-Verlag, New York, USA.
4. Glick, B.R., Pasternak, J.J. (2010). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
5. Lea, P.J. and Lee good, R.C. (1999). Plant Biochemistry and Molecular Biology. John Wiley Sons, Chichester, England.
6. Old, R.W. and Primrose, S.B. (2006). Principles of Gene Manipulation, Blackwell Scientific Publishers, Oxford, UK.

7. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics (5th Edition). John Wiley and Sons Inc., U.S.A.
8. Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques And Applications. John Wiley & Sons Inc. U.S.A.
9. Vasil, I.K. and Thorpe, T.A. (2012). Plant Cell and Tissue Culture. Kluwer Academic Publishers, The Netherlands

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Botany (Practical on Paper I and II)

Course Code: BSMM- 5075 (P)

(PRACTICAL)

Time : 3 Hours **Maximum Marks: 50**

L-T-P: 0-0-2 **Theory: 40**

CA: 10

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.

Suggested Laboratory Exercises

1. To study the permeability of plasma membrane using different**:** concentrations of organic solvents.
2. To study the effects of temperature on permeability of plasma membrane.
3. To prepare the standard curve of protein and determine the protein content in unknown samples.
4. To study the enzyme activity of catalase and peroxidase as influenced by pH and temperature.
5. Separation of chloroplast pigments by solvent method.
6. Determining the osmotic potential of vacuolar sap by plasmolytic method.
7. Determining the water potential of any tuber.
8. Separation of amino acids in a mixture by paper chromatography and their identification by comparison with standards.
9. Bioassay of auxin, cytokinin, GA, ABA and ethylene using appropriate plant material.
10. Demonstration of the technique of micropropagation by using different explants, e.g. axillary buds, shoot meristems.
11. Demonstration of the technique of another pollen culture.
12. Demonstrate the ascent of sap using a dye.
13. Demonstration of root and shoot formation from the apical and basal portion of stem segments in liquid medium containing different hormones.
14. Demonstrate the transpiration pull by mercury method.
15. Demonstration of osmosis by potato Osmos cope.
16. Comparison of loss of water from two surfaces of leaf by $CoCl_2$ method/four leaf method.
17. Demonstration of imbibition by plaster of peris method.
18. Demonstration that O2 is evolved during photosynthesis.
19. Separation of pigments by paper chromatography/TLC method.
20. Demonstration of phototropism movements.
21. Demonstration the measurements of growth by arc auxanometer.
22. Requirements for setting up the tissue culture laboratory.
23. Preparation of nutrient medium.
24. Sterilization of glassware and plant material.
25. Preparation of explant for aseptic manipulation.

Suggested Readings (For Laboratory Exercises)

1. Bajracharya D. (1999). Experiments in Plant Physiology-A Laboratory Manual. Narosa Publishing House, New Delhi.
2. Devi, P. 2000. Principles and Methods of Plant Molecular Biology, Biochemistry and Genetics. Agrobios, Jodhpur, India.
3. Dixon, R.A. (Ed.) 1994. Plant Cell Culture: A Practical Approach, IRL Press, Oxford.
4. Kochhar, S. L. and Gujral, S. K. (2016). Comprehensive Practical Plant Physiology. Macmillan Publishers India Ltd., Delhi.
5. Moore, T.C. 2012. Research Experiences in Plant Physiology: A Laboratory annual. Springer-Verlag. Berlin.
6. Plummer, D.T. (2001). An Introduction to Practical Biochemistry (3rd Edition). Tata McGraw-Hill Publishing Co. Ltd. New Delhi.
7. Roberts, J. and Tuckar, G.A. (Eds.) 2000. Plant Hormone Protocols.Human Press, New Jersey, USA.
8. Scott, R.P.W. 1995. Techniques and Practices of Chromotography. Marcel Dekker, Inc., NewYork.
9. Smith, R.H. 2000. Plant Tissue Culture: Techniques and Experiments. Academic Press, NewYork.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Food Science and Quality Control (Vocational) (Food Analysis)

Course Code: BSMM- 5255 (L)

(THEORY)

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand the food composition and proximate analysis of food components.

CO2: Learn the analysis of micronutrients.

CO3: Understand the physical methods of food analysis including food rheology, refractometry and polarimetry.

CO4: Learn different chromatography techniques.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Food Science and Quality Control (Vocational) (Food Analysis)

Course Code: BSMM- 5255 (L)

(THEORY)

Time : 3 Hours
L-T-P: 4-0-0

Maximum Marks: 100
Theory: 60
Practical: 20
CA: 20

Instructions for the Paper Setter: Eight questions of equal marks (12 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

Food composition and factors effecting food composition.
Proximate composition analysis of food.

UNIT-II

Analysis of Micronutrients and minerals.

UNIT-III

General physical methods of analysis of foods: Refractometry & Polarimetry.
Introduction and principles of Food rheology, types of viscosity, equipments used to check the viscosity.

UNIT-IV

Basic principles and working of Column chromatography, Gas chromatography and High Pressure Liquid Chromatography.

Reference Books:

1. Manuals of Food Quality Control additions contaminants techniques, 1980.
2. The Chemical Analysis of Food and Food Products by Morries B Jacob, 3rd Edition., Roberte, Krieger.
3. Food Analysis, 2019, 4th Edition, S. Suzanne Nielsen. (Online available)
4. Analysis and Quality Control for Fruit and Vegetable Products, S Ranganna, McGraw Hill Education (India) Private Limited, Chennai, India.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Food Science and Quality Control (Vocational) (Food Analysis)

Course Code: BSMM- 5255 (P)

(PRACTICAL)

Time : 3 Hours **Practical: 20**

L-T-P: 0-0-1

Course Outcomes:

CO1: Understanding of compositional analysis of food.

CO2: Familiarity with various instruments crucial for evaluating food product quality.

CO3: Ability to perform specific chemical tests to estimate the concentration of vitamins and minerals in food samples.

CO4: Analysis and assessment of various parameters critical for ensuring food product quality, safety and shelf life.

Bachelor of Science (Medical) Semester–V (Session 2025-26)

Course Title: Food Science and Quality Control (Vocational) (Food Analysis)

Course Code: BSMM- 5255 (P)

(PRACTICAL)

Time : 3 Hours **Practical: 20**

L-T-P: 0-0-1

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

List of Practicals:

1. Determination of milk quality by lactometer.
2. To find out the TSS of food sample by refractometer.
3. Determination of surface tension of food sample by using drop number method.
4. Determination of viscosity index of food sample.
5. Proximate composition of different types of food.
6. Estimation of different minerals in food.
7. Estimation of vitamins in food.
8. Determination of dry and wet gluten content in wheat flour.
9. Determination of Chlorophyll content in food sample.
10. Estimation of percent loss in weight after drying and dehydration.

Bachelor of Science (Medical) Semester–V (Session 2025-26)
Course Title: Innovation, Entrepreneurship and Creative Thinking
Course Code: SECI- 5541

Nature of Course: Audit Course (Value-added)

Course Duration: 30 hours

Course intended for: Semester V students of undergraduate degree programme of-

Course Credits: 2 (For credit based continuous evaluation grading system)

Objectives of the Course:

It is a distinctive and innovative programme structured to prepare the students professionally for meaningful social engagement by setting new patterns and possibilities for employment generation through innovations and entrepreneurship. The purpose of the course is to help students acquire the necessary knowledge and skills required for carrying out innovative and entrepreneurial activities, and to develop the ability to analyze and understand business situations.

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

- assess and analyze entrepreneurship as a career choice,
- develop creative and innovative skills,
- Analyse the business environment to identify business opportunities,
- consider the legal and financial conditions for starting a business venture,
- explain the importance of marketing and management in small businesses venture,
- develop a business idea into a comprehensive and highly scalable business model,
- design a successful business plan and launch their product or service in the market
- understand personal creativity, identify what are the creative tools and improve their creative problem-solving skills.

CURRICULUM

Course Code: SECI-5541 CourseCredits:2 Total contact hours: 30

MODULE	TITLE	HOURS
I	Introduction to Entrepreneurship	3 Hrs.
II	Creativity &Innovation	3 Hrs.
III	Entrepreneurial Competencies	3 Hrs.
IV	Management Skills & Functions	3 Hrs.
V	Business Opportunity Identification & Market Analysis	3 Hrs.
VI	Business Plan Preparation	3 Hrs.
VII	Business Model Canvas	3 Hrs.
VIII	Start-Up Financing & Launching	3 Hrs.
IX	Workshop on Design Thinking	4 Hrs.

X	Final Assessment Feedback and Closure	2 Hrs.

EXAMINATION

- **Total Marks:** 50 (Final Exam: 40; Internal Assessment:10)
- **Final Exam:** Multiple Choice Questions: Marks- 40; Time: 1hour
- **Internal Assessment:** 10(Assessment: 6; Attendance:4)

Total marks: 50 converted to grade for final result

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Punjabi (Compulsory)
Course Code: BSML-6421
(THEORY)

COURSE OUTCOMES

CO1: ‘ਕਾਵਿ ਗੌਰਵ’ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਵਿਤਾਵਾਂ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ।

CO2: ‘ਧਰਤੀਆਂ ਦੇ ਗੀਤ’ (ਸਫ਼ਰਨਾਮਾ) ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਸਫ਼ਰਨਾਮਾ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਇਸ ਸਾਹਿਤ ਰੂਪ ਨਾਲ ਨਾਲ ਜੋੜਣਾ ਹੈ।

CO3: ਲੇਖ ਰਚਨਾ ਕਰਨ ਨਾਲ ਵਿਦਿਆਰਥੀ ਆਪਣੀ ਗੱਲ ਨੂੰ ਕਹਿਣ ਦੀ ਜਾਚ ਸਿੱਖਣਗੇ ਅਤੇ ਇਹ ਦਿਮਾਗੀ ਕਸਰਤ ਵਿਚ ਸਹਾਈ ਹੋਵੇਗੀ। ਸਾਹਿਤ ਰੂਪਾਂ ਕਵਿਤਾ, ਕਹਾਣੀ, ਨਾਵਲ, ਨਾਟਕ, ਇਕਾਂਗੀ ਦੀ ਪਰਿਭਾਸ਼ਾ,ਪ੍ਰਕਾਰ ਤੇ ਤੱਤ ਨਾਲ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।ਸਾਹਿਤ ਰੂਪਾਂ ਨੂੰ ਸਿਲੇਬਸ ਵਿੱਚ ਸ਼ਾਮਲ ਕਰਨ ਦਾ ਮਕਸਦ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਇਨ੍ਹਾਂ ਸਾਹਿਤ ਰੂਪਾਂ ਦੀ ਪਰਿਭਾਸ਼ਾ,ਪ੍ਰਕਿਰਤੀ ਅਤੇ ਤੱਤਾਂ ਤੋਂ ਬਾਰੀਕੀ ਨਾਲ ਜਾਣੂ ਕਰਵਾਉਣਾ ਹੈ।

CO4: ਵਿਆਕਰਨਕ ਸ਼੍ਰੇਣੀਆਂ : ਲਿੰਗ, ਵਚਨ,ਕਾਰਕ ਕਿਰਿਆ ਵਾਕੰਸ਼ ਦੀ ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਤੇ ਪ੍ਰਕਾਰ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ - ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

Bachelor of Science (Medical) Semester– VI (Session 2025-26)
Course Title: Punjabi (Compulsory)
Course Code: BSML-6421
(THEORY)

ਸਮਾਂ : 3 ਘੰਟੇ **Maximum Marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

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 16 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

ਕਾਵਿ ਗੌਰਵ(ਪਹਿਲੇ ਛੇ ਕਵੀ)(ਸੰਪਾ.ਬਿਕਰਮ ਸਿੰਘ ਘੁੰਮਣ, ਕਰਮਜੀਤ ਕੌਰ),ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ,
(ਸ਼ੇਖ ਫ਼ਰੀਦ, ਸ਼ਾਹ ਹੁਸੈਨ, ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਜੀ, ਗੁਰੂ ਅਰਜਨ ਦੇਵ ਜੀ,ਵਾਰਿਸ ਸ਼ਾਹ, ਸ਼ਾਹ ਮੁਹੰਮਦ)
(ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ/ਵਿਸ਼ਾ ਵਸਤੂ/ਸਾਰ)

ਯੂਨਿਟ-II

ਧਰਤੀਆਂ ਦੇ ਗੀਤ(ਸਫ਼ਰਨਾਮਾ), ਬਰਜਿੰਦਰ ਸਿੰਘ ਹਮਦਰਦ,ਨਾਨਕ ਸਿੰਘ ਪੁਸਤਕਮਾਲਾ, ਅੰਮ੍ਰਿਤਸਰ
(ਸਮਾਜ ਸਭਿਆਚਾਰ ਪਰਿਪੇਖ/ਸਫਰਨਾਮੇ ਦੇ ਤੌਰ ਤੇ ਪਰਖ)

ਯੂਨਿਟ-III

(ੳ) ਲੇਖ ਰਚਨਾ(ਵਿਗਿਆਨ, ਤਕਨਾਲੋਜੀ ਅਤੇ ਚਲੰਤ ਮਸਲਿਆਂ ਸਬੰਧੀ)
(ਅ) ਆਧੁਨਿਕ ਸਾਹਿਤ ਰੂਪ : ਕਵਿਤਾ, ਕਹਾਣੀ, ਨਾਵਲ, ਨਾਟਕ, ਇਕਾਂਗੀ

ਯੂਨਿਟ-IV

ਵਿਆਕਰਣ :
(ੳ) ਵਿਆਕਰਨਕ ਸ਼੍ਰੇਣੀਆਂ : ਲਿੰਗ, ਵਚਨ,ਕਾਰਕ
(ਅ) ਕਿਰਿਆ ਵਾਕੰਸ਼ : ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਤੇ ਪ੍ਰਕਾਰ

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Basic Punjabi (In lieu of Punjabi Compulsory)
Course Code: BSML-6031
(THEORY)

COURSE OUTCOMES

CO1: ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਦਾ ਪਿਛੋਕੜ,ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਦੀ ਭੂਗੋਲਿਕ ਸਥਿਤੀ,ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਦੇ ਨਿਖੜਵੇ ਲੱਛਣ ਦਾ ਅਧਿਐਨ ਕਰਨਗੇ।

CO2: ਪੰਜਾਬ ਦੇ ਮੇਲੇ,ਪੰਜਾਬ ਦੇ ਤਿਉਹਾਰ,ਪੰਜਾਬ ਦੇ ਪ੍ਰਮੁੱਖ ਧਾਰਮਿਕ ਸਥਾਨ ਬਾਰੇ ਜਾਣ ਸਕਣਗੇ।

CO3: ਜਨਮ ਨਾਲ ਸੰਬੰਧਿਤ ਰੀਤਾਂ ਰਸਮਾਂ,ਵਿਆਹ ਨਾਲ ਸੰਬੰਧਿਤ ਰੀਤਾਂ ਰਸਮਾਂ,ਮੌਤ ਨਾਲ ਸੰਬੰਧਿਤ ਰੀਤਾਂ ਰਸਮਾਂ ਬਾਰੇ ਜਾਣ ਸਕਣਗੇ।

CO4: ਪੰਜਾਬ ਦਾ ਖਾਣ ਪੀਣ,ਪੰਜਾਬ ਦਾ ਪਹਿਰਾਵਾ,ਪੰਜਾਬ ਦੇ ਲੋਕ ਵਿਸ਼ਵਾਸ ਦਾ ਅਧਿਐਨ ਕਰਨਗੇ।

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Basic Punjabi (In lieu of Punjabi Compulsory)

Course Code: BSML-6031

(THEORY)

ਸਮਾਂ : 3 ਘੰਟੇ **Maximum Marks: 100**

L-T-P: 4-0-0 **Theory: 80**

CA: 20

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 16 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

ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਦਾ ਪਿਛੋਕੜ
ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਦੀ ਭੂਗੋਲਿਕ ਸਥਿਤੀ
ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਦੇ ਨਿਖੱੜਵੇਂ ਲੱਛਣ

ਯੂਨਿਟ-II

ਪੰਜਾਬ ਦੇ ਮੇਲੇ
ਪੰਜਾਬ ਦੇ ਤਿਉਹਾਰ
ਪੰਜਾਬ ਦੇ ਪ੍ਰਮੁੱਖ ਧਾਰਮਿਕ ਸਥਾਨ

ਯੂਨਿਟ-III

ਜਨਮ ਨਾਲ ਸੰਬੰਧਿਤ ਰੀਤਾਂ ਰਸਮਾਂ
ਵਿਆਹ ਨਾਲ ਸੰਬੰਧਿਤ ਰੀਤਾਂ ਰਸਮਾਂ
ਮੌਤ ਨਾਲ ਸੰਬੰਧਿਤ ਰੀਤਾਂ ਰਸਮਾਂ

ਯੂਨਿਟ-IV

ਪੰਜਾਬ ਦਾ ਖਾਣ ਪੀਣ
ਪੰਜਾਬ ਦਾ ਪਹਿਰਾਵਾ
ਪੰਜਾਬ ਦੇ ਲੋਕ ਵਿਸ਼ਵਾਸ

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Punjab History and Culture (1947- 2000 A.D.)

(In lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

Course Code: BSML-6431

(THEORY)

COURSE OUTCOMES:

After completing this paper the students will be able to

CO1: Comprehend Punjab's contribution in the freedom struggle, the exodus and Rehabilitation and its impact on state with special reference to partition

CO2: Comprehend the causes that led to the formation of New Punjab in 1966 and outcomes of Green Revolution in the Punjab

CO3: Understand nature and reasons of diaspora, female foeticide and growth of education in Punjab and its impact on youth

CO4: Comprehend the growth of Punjabi literature and Drama in the Punjab after Independence and to understand the reasons of drug abuse in Punjab, its management and prevention in the Punjab

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Punjab History and Culture (1947- 2000 A.D.)

(In lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

Course Code: BSML-6431

(THEORY)

Time : 3 Hours **Maximum Marks: 100**

L-T-P: 4-0-0 **Theory: 80**

CA: 20

Instructions for the Paper Setters

10. Question paper shall consist of four Units.
11. Examiner shall set 8 questions in all by selecting Two Questions of equal marks from each unit.
12. 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.
13. Each question will carry16 marks

UNIT I

1. Partition and its Impact on Punjab
2. Rehabilitation.

UNIT II

3. Punjabi Suba Movement and Act of 1966.
4. Green Revolution.

UNIT III

5. Punjabi Diaspora (Canada)
6. Development of education in Punjab after Independence

UNIT IV

7. Development of Punjabi Literature and Drama. (With Special Reference to Bhai Veer Singh, Shiv Kumar Batalvi)
8. Emerging Concerns: Drug Addiction and Female Foeticide (In context to the Punjab)

Suggested Readings

- Chopra, P.N. & Das, M.N. (1974), *A Social, Cultural & Economic History of India.*Vol.III, Macmillan India, New Delhi, 1974.
- Grewal, J.S., *Social and Cultural History of Punjab: Prehistoric, Ancient and Early Medieval*. Foundation Books Pvt Ltd Cambridge House, New Delhi, 2004.
- Grewal, J.S., *The Sikhs of Punjab*. New Cambridge House, New Delhi, 2005
- Rai Satya M. ,*Heroic Tradition in Punjab(1900-1947)*. Publication Bureau, Punjabi University, Patiala, 1978
- Singh, Fauja., *Freedom Struggle in Punjab*. Publication Bureau, Punjabi University, Patiala, 1974
- Singh, Fauja, *History and Culture of the Punjab*. Part II, Publication Bureau, Punjabi University, Patiala, 1987.

- Singh, Kushwant, *A History of the Sikhs*. Vol. II (1839-1998), Oxford University Press, Delhi, 1991.
- Yadav, K.C., *Haryana AitihasikSimhavalokan* (Hindi). Haryana Sahitya Akademy, Chandigarh, 1991.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: English (Compulsory)
Course Code: BSML-6212
(THEORY)

COURSE OUTCOMES

After passing this course, the students will be able to:

CO1: Comprehend, appreciate and critically analyse a novel through the story of the novel *Train to Pakistan* by Khushwant Singh

CO2: Analyze and appreciate the dramatic technique, plot development and art of characterisation through the study of the prescribed plays from the book *Glimpses of Theatre*

CO3: Enhance their writing skills by writing essay on any given topics well as to write report on any incident witnessed

CO4: write appropriate reports on any incident witnessed.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: English (Compulsory)

Course Code: BSML-6212

(THEORY)

Time : 3 Hours **Maximum Marks: 100**

L-T-P: 4-0-0 **Theory: 80**

CA: 20

Instructions for the Examiner:

Section A: Three questions from the novel *Train to Pakistan* from Unit I and three questions from *Glimpses of Theatre* from Unit II will be set. The students will be required to answer any five, each carrying 4 marks (100 words each). **(5×4=20)**

Section B: Four questions based on character, plot and theme(s) from the novel *Train to Pakistan* from Unit I will be set and students will be required to attempt any two, each carrying 10 marks (400 words each). **(2×10=20)**

Section C: Four questions based on the central idea, theme, tone or style etc. of the prescribed plays from the textbook, *Glimpses of Theatre* from Unit II will be set. The students will have to attempt any two, each carrying 10 marks (400 words each). **(2×10=20)**

Section D: Two questions with internal choice will be set from Unit III (Essay Writing) and Unit IV (Report Writing) each carrying ten marks. **(2×10=20)**

Unit I

Train to Pakistan by Khushwant Singh

Unit II

Glimpses of Theatre:

i) The Will
ii) Villa for Sale
iii) Progress
iv) The Monkey's Paw

Unit III

Essay Writing

Unit IV

Report Writing

Texts Prescribed:

1. *Train to Pakistan* by Khushwant Singh
2. *Glimpses of Theatre*, Guru Nanak Dev University Amritsar

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Zoology (Medical Zoology)
Course Code: BSMM- 6483 (I)
(THEORY)

Course Outcome

After successfully completing this course, students will be able to:

CO1: Understand about various pathogenic microbes, life history of various pathogenic protozoans and helminths as well as diseases caused by them.

CO2: Know about life history, diseases and control measures of arthropod vectors and awareness about epidemic diseases.

CO3: Provide basics knowledge about immune responses, antigens, antibody structure and immunoglobulins.

CO4: Understand antigen-antibody interactions and gain knowledge about vaccines.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Zoology (Medical Zoology)

Course Code: BSMM- 6483 (I)

(THEORY)

Time : 3 Hours **Maximum Marks: 75**

L-T-P: 3-0-0 **Theory: 60**

CA: 15

Instructions for the Paper Setter

Eight questions of equal marks (12 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

1. Introduction of Parasitology (various terminologies in use).
2. Brief introduction to pathogenic microbes, viruses, Rickettsiae, spirochaetes and bacteria.
3. Brief accounts of life history, mode of infection and pathogenicity of the following with reference to man; prophylaxis and treatment:
   a) Pathogenic protozoa: *Entamoeba, Trypanosoma, Leishmania, Giardia, Trichomonas* and *Plasmodium.*
   b) Pathogenic helminthes: *Fasciola, Schistosoma, Echinococcus, Ancylostoma, Trichinella, Wuchereria, Dracunculus* and *Oxyuris.*

UNIT-II

4. Life cycle and control measures of arthropod vectors of human disease: Malaria *(Anopheles stephens, A.culicifaces,* Yellow fever, Dengue, Dengue haemorrhagic fever and Chickengunea. *(Aedes aegypti A. Albopicuts)*; Filariasis *(Culex pipien satigeans) Mansonia* sp. Japanese Encephalitis *(C. trinanelorhynchus);* Plague *(Stenophalide cheopis)* and Epidemic Typhus *(Pediculus spp).*
5. Epidemic diseases, such as Typhoid, Cholera, Small pox; their occurrence and eradication programs.

UNIT-III

6. Brief introduction to human defence mechanisms.
7. Humoral and cell mediated immune response. Physical & chemical properties of antigens. Antibody structure and function of M, G, A, E and D immunoglobulins.

UNIT-IV

8. Antigen and antibody interactions-Serodiagnostic assays (Precipitation, agglutination immunodiffusion, ELISA, RIA)
9. Vaccines

Suggested Readings:

1. Baker, F.J. and Silverton, R.E. (1985) Introduction to Medical Laboratory Technology, (6th ed), Butlerworth and Co.Ltd.
2. Chatterjee, K.D. (2019), Parasitology, Protozoology and Helminthology (13thed).
3. Cheesborough, M. (1991), Medical Laboratory Technology for Tropical countries, Butlerworth and Co., Ltd.
4. Garcia, L.S. (2001), Diagnostic Medical Parasitology, (4th ed), ASM Press Washington.
5. Kimball, J.W. (1987), Introduction of Immunology, (2nd ed), MacMillian Publishing Co., NewYork.
6. Kuby, J. (2013), Immunology, 7th Edition W.H. Freeman & Co., USA.
7. Roitt, I. (2017), Essential Immunology, 13th Edition, Blackwell Scientific Publications, Oxford.
8. Talib, V.H. (2019), Essential Laboratory Manual,2nd edition, Mehta Publishers, New Delhi.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Zoology (Medical Laboratory Technology)
Course Code: BSMM- 6483 (II)
(THEORY)

Course Outcome

After successfully completing this course, students will be able to:

CO1: Comply with safety regulations and universal precautions during lab investigations and perform basic laboratory techniques on biological specimens.

CO2: Know about routine clinical laboratory investigations including collection of different samples and perform other routine hematological procedures.

CO3: Describe basic scientific principles in learning new techniques and procedures in bacteriology and microbiology.

CO4: Apply knowledge and technical skills associated histopathology, staining techniques and biochemical estimations.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Zoology (Medical Laboratory Technology)
Course Code: BSMM- 6483 (II)
(THEORY)

Time : 3 Hours **Maximum Marks: 50**
L-T-P: 2-0-0 **Theory: 40**
CA: 10

Instructions for the Paper Setter

Eight questions of equal marks (8 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

Laboratory safety rules, hazards and precautions during sample collection and laboratory investigations.

Laboratory Techniques: Colorimetry, Microscopy, Autoclaving, Centrifugation and Spectrophotometry

UNIT-II

Collection, transportation and preservation of different clinical samples.

Haematology: collection of blood (venous and capillary), anticoagulants (merits and demerits), Romanowsky's stains, total RBC count, erythrocyte sedimentation rate, TLC, DLC, platelet count.

UNIT-III

Bacteriology: sterilization (dry heat, moist heat, autoclave, filtration), disinfection, staining techniques, (gram stain, AFB stain, etc), culture media (defined and synthetic media & routine laboratory media), bacterial culture (aerobic and anaerobic) and antibiotic sensitivity.

UNIT-IV

Histopathology: Common fixatives and staining techniques.

Biochemistry: Principal/theory and significance of estimation of urea, sugar, cholesterol, creatinine, enzymes (transaminase, phosphatase, amylase and lipase), uric acid in blood, estimation of proteins, sugar, bile salts, ketone bodies in urine and liver function test.

Suggested Readings:

1. Baker, F.J. and Silverton, R.E. (1985) Introduction to Medical Laboratory Technology, (6^{th} ed), Butlerworth and Co.Ltd.
2. Chatterjee, K.D. (2019), Parasitology, Protozoology and Helminthology (13^{th}ed).
3. Cheesborough, M. (1991), Medical Laboratory Technology for Tropical countries, Butlerworth and Co.,Ltd.
4. Garcia, L.S. (2001), Diagnostic Medical Parasitology, (4^{th} ed), ASM Press, Washington.

5. Kimball, J.W. (1987), Introduction of Immunology, (2nd ed), MacMillian Publishing Co., New York.
6. Kuby, J. (2013), Immunology, 7th Edition W.H. Freeman & Co., USA.
7. Roitt, I. (2017), Essential Immunology, 13th Edition, Blackwell Scientific Publications, Oxford.
8. Talib, V.H. (2019), Essential Laboratory Manual,2nd edition, Mehta Publishers, New Delhi.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Zoology (Practical–VI (Related to Medical Zoology & Medical Laboratory Technology))

Course Code: BSMM- 6483 (P)

(PRACTICAL)

Course Outcomes

CO1: Apply knowledge and technical skills associated with medical laboratory technology for delivering quality clinical investigations support.

CO2: Perform basic clinical laboratory procedures using appropriate laboratory techniques and instrumentation in accordance with current laboratory safety protocol and quality patient health care.

CO3: Understanding of sterilization techniques and will also learn about various histopathology techniques, handling and processing of tissue specimens as well as staining procedures.

CO4: Understanding of estimation of protein & sugar.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Zoology (Practical–VI (Related to Medical Zoology & Medical Laboratory Technology))

Course Code: BSMM- 6483 (P)

(PRACTICAL)

Time : 3 Hours **Maximum Marks: 50**

L-T-P: 0-0-2 **Theory: 40**

CA: 10

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

1. Demonstration of safety rules in laboratory like proper handling of patients, specimens and disposal of syringes, needles etc.
2. Demonstration of the use of autoclave, centrifuge and spectrophotometer.
3. Cleaning and sterilization of glass ware, using hot air oven, autoclave etc.
4. Physico-chemical examination of urine.
5. Preparation of thick and thin blood smear.
6. Counting of WBC, RBC and DLC.
7. Study of permanent slides and specimens of parasitic protozoans, helminthes and arthropods mentioned in the theory syllabus.
8. ESR and haematocrit.
9. Estimation of blood sugar, protein.
10. Demonstration of fixation, embedding, cutting of tissue sections, and their staining (routine haematoxylin and eosin).
11. Visit to a pathology Lab and preparation of report.

Guidelines for conduct of Practical Examination:

1.	Write down the principle and working of the given equipment.	8
2.	Write down the procedure, precautions and perform the experiment for physico-chemical examination of urine/ haematology.	8
3.	Identification, pathogenicity and host of parasitic organism.	8
4.	Estimation of blood sugar / protein in the given sample.	8
5.	Viva-voce and practical file	8

(Note: Some changes can be made in the practicals depending on the availability of material.)

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Microbiology (Applied Microbiology-II)
Course Code: BSMM- 6343 (L)
(THEORY)

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand the processing of fermented foods.

CO2: Understand the Microbial Cell as Fermentation Products and production of different industrial chemicals.

CO3: Understand the role of microorganisms in preparation of alcoholic beverages and industrial enzymes.

CO4: Understand the role of microorganisms in the production of vitamins, amino acids and antibiotics.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Microbiology (Applied Microbiology-II)

Course Code: BSMM- 6343 (L)

(THEORY)

Time : 3 Hours **Maximum Marks: 100**

L-T-P: 4-0-0 **Theory: 60**

Practical: 20

CA: 20

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, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT-I

Fermentation Process of Fermented Foods: Fermented cereal, legume and milk products. Microbiology of natural fermentation. Sauerkraut, Yoghurt, Soya sauce, Cheese.

UNIT-II

Microbial Cell as Fermentation Products: Baker's and brewer's yeast, single cell protein, mushroom farming. Production of industrial chemicals: Acetic acid, Citric acid, Acetone and Butanol.

UNIT-III

Production of alcoholic Beverages: Beer, wine and distilled beverages – Whisky, Brandy, Vodka, Gin production and applications of industrial enzymes: Amylases, Proteases, immobilization of enzymes.

UNIT-IV

Vitamins and Amino acids production by Microorganisms: Riboflavin (B2) and Cyanocobalamin (B12), Glutamic acid. Production of antibiotics: Penicillin and Streptomycin.

Books Recommended:

1. Prescott and Dunn 2004, 4th edition, *Industrial Microbiology.* CBS Publishers & Distributers, New Delhi.
2. Casida, L.E. 2004, 2nd edition, *Industrial Microbiology*. Wiley Eastern Ltd., New Delhi.
3. Patel, A.H. 2022, 2nd edition. *Industrial Microbiology*. Macmillan India Ltd., Delhi.
4. Trevan, M.D. Saffey, S., Goulding, K.H. and Stanberry, P. 1988. *Biotechnology: The Biological Principles*, Tata McGraw Hill Publishing Co. Ltd., New Delhi
5. Wiseman, A. 1995. *Handbook of Enzyme Biotechnology*. Ellis Harwood Ltd., London.
6. Wood, J.B.B., 2012, 2nd edition. *Microbiology of Fermented Foods*, Volumes 1 and 2, Blackie Academic and Professional, London

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Microbiology (Applied Microbiology-II)
Course Code: BSMM- 6343 (P)
(PRACTICAL)

COURSE OUTCOMES

After passing the course student will be able to:

CO1: Demonstrate the crude production of amylase and protease enzymes

CO2: Preparation of wine and vinegar

CO3: Understand the submerged and solid-state fermentation techniques for enzyme production

CO4: Knowledge about the kinetics of growth of yeast

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Microbiology (Applied Microbiology-II)

Course Code: BSMM- 6343 (P)

(PRACTICAL)

Time : 3 Hours **Practical: 20**

L-T-P: 0-0-1

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

LIST OF PRACTICALS

1. Production of amylases and proteases in liquid medium using the selected organisms.
2. Assay of crude enzyme preparation for Amylase.
3. Assay of crude enzyme preparation for Protease.
4. Production of alcohol from molasses and cereal grains.
5. Immobilization of microbial cells and enzyme preparations by calcium alginate entrapment method.
6. Comparison of submerged and solid state fermentation techniques for amylase production.
7. To study the production of wine and vinegar.
8. To study the kinetics of growth of yeast in batch/continuous culture.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Chemistry (Inorganic Chemistry)

Course Code: BSMM- 6084 (I)

(THEORY)

Course outcomes:

Students will be able to:

CO1: Understand the principle and applications of ultraviolet and apply Woodward Fisher Rule to calculate λ_{max}

CO2: Understand the concepts of Vibrational spectroscopy, Vibrational coupling overtones and Fermi resonance and its application in Organic Chemistry

CO3: Know about the Nuclear magnetic resonance spectroscopy. Proton chemical shift, spin-spin coupling, coupling constants and its applications to determine organic structures

CO4: To understand different cleavage patterns of organic compounds in Mass spectrometry and apply the knowledge for interpretation of the spectrum of an unknown compound.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Chemistry (Inorganic Chemistry)
Course Code: BSMM- 6084 (I)
(THEORY)

Time : 3 Hours **Maximum Marks: 75**
L-T-P: 3-0-0 **Theory: 60**
CA: 15

Energy and Electromagnetic Spectrum (10 Hrs)

Introduction, electromagnetic spectrum and Units, Regions of the spectrum, Statement of Born-Oppenheimer approximation, Degree of freedom, Frank Condon Principle, Fluorescence and Phosphorescence.

Ultraviolet and Visible Spectroscopy

The energy of electronic excitation, Measurement techniques, Beer-Lambert Law, Molar extinction coefficient. Different types of transition noticed in UV spectrum of organic functional groups and their relative energies. Chromophore, Auxochromes, Absorption and intensity shifts, Factors affecting λ_{max}, Effect of steric hindrance to coplanarity, Solvent effects.

UNIT – II

Infrared Spectroscopy (10 Hrs)

Vibrational energy levels, Selection rules, Force constant, Fundamental vibration frequencies, Factors influencing Vibrational Frequencies (Vibrational Coupling, Hydrogen Bonding, Electronic effect, Bond Angles, Field Effect) of different functional groups, Sampling techniques.

Applications of UV and IR Spectroscopy

Applications of UV spectroscopy, Woodward Fieser rules for calculating λ_{max} of conjugated polyenes and α,ß -unsaturated carbonyl compounds. Applications of IR spectroscopy, Absorption of Common functional Groups, Interpretation of simple IR spectra, Finger print regions. Simple numerical problems based on UV and IR spectroscopy.

UNIT-III

Proton Magnetic Resonance spectroscopy (^{1}HNMR) (13 Hrs)

The Nuclear spin, Larmor frequency, the NMR isotopes, Population of nuclear spin level, Spin and Spin lattice relaxation, Measurement techniques (CW and FT method), Solvent used, Reference compounds, Chemical shift, nuclear shielding and deshielding, chemical

shift, spin-spin splitting and coupling constants, Anisotropic effect, Application of structure elucidation of simple organic molecules.

UNIT- IV

Mass Spectrometery (12 Hrs)

Basic Principles, Elementary theory, Molecular ions, isotope ions, Fragment ions of odd and even electron types, Nitrogen rule, Factors affecting cleavage patterns, Simple cleavage, Cleavages at a hetero atom, Multicentre fragmentations, Rearrangements, Diels – Alder fragmentation, Mc Lafferty rearrangement, Interpretation of the spectrum of unknown simple molecules.

Books Suggested:

1. Organic Spectroscopy By W. Kemp; Publisher- Palgrave, NewYork
2. D.H. Williams and I. Fleming. Spectroscopic Methods in OrganicChemistry.
3. Spectrometric Identification of Organic Compounds - R.M. Silverstein and F. X. Webster; Publisher: John Willey and Sons,Inc.
4. Introductory Problems in Spectroscopy- By R.C. Banks, E.R. Matjeha and G. Mercer; Publisher : The Benzamine / Cummings Publishing CompanyInc.
5. Introduction to Spectroscopy – D. L. Pavia, G. M .Lampman, and G. S. Kriz Publisher: Brooks / Cole, a part of cengage learning.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Chemistry (Inorganic Chemistry)

Course Code: BSMM- 6084 (I)

(THEORY)

Time : 3 Hours	**Maximum Marks: 50**
L-T-P: 2-0-0	**Theory: 40**
	CA: 10

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Botany (Ecology)
Course Code: BSMM- 6075 (I)
(THEORY)

Course outcome:

After passing this course the student will develop:

CO1: Understand the abiotic components and relationship with living organism.

CO2: Demonstrate an understanding keys of community ecology and biodiversity

CO3: Understand the structure and function of ecosystem and growth curve

CO4: Study the biogeographical region and vegetation of India

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Botany (Ecology)

Course Code: BSMM- 6075 (I)

(THEORY)

Time : 3 Hours **Maximum Marks: 50**

L-T-P: 2-0-0 **Theory: 40**

CA: 10

Instructions for the Paper Setters:

Eight questions of equal marks (8 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.

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Unit-I

Plants and Environment: Atmosphere (gaseous compositions), water (properties of water cycle),light (global radiation, photosynthetically active radiation), temperature, soil (development, soil profiles, physico-chemical properties), and biota.

Morphological, anatomical and physiological responses of plants to water (hydrophytes and xerophytes), temperature (thermoperiodicity and vernalization), light (photoperiodism, heliophytes and sciophytes) and salinity.

Unit-II

Community Ecology: Community characteristics, absolute and relative frequency, density and dominance, basal area and importance value index (IVI), Whittaker's classification of biodiversity, indices of alpha, beta and gamma diversity, life forms, biological spectrum, ecological succession.

Unit-III

Population Ecology: Growth curves, ecotypes, ecads.

Ecosystem: Structure, abiotic and biotic components, food chain, food web, ecological pyramids, energy flow, biogeochemical cycles of carbon, nitrogen and phosphorus.

Unit-IV

Biogeographical Regions of India

Vegetation types of India: Forests and grasslands

Landscape Ecology: Definition & concept, effect of patch size and shape on biodiversity, dynamics of land use.

Suggested Readings:

1. De, Debapriya and De, Debasish (2014). Fundamentals of Environment and Ecology. S. Chand Publishing, New Delhi
2. Kumar, H.D. (2018). Modern Concepts of Ecology 8thedition.Vikas Publishing House, New Delhi.
3. Mackenzie, A., Ball,A. and Virdee, S. (2001). Instant Notes in Ecology. Taylor & Francis, London, United Kingdom

4. Odum, E.P. and Barrett, G.W. (2012). Fundamentals of Ecology. Cengage Learning India Pvt.Ltd., New Delhi.
5. Saini, A. (2019). Plant Ecology. Trueman Book Company. New Delhi.
6. Sharma, P.D. (2017). Environmental Biology and Toxicology. 3rd edition. Rastogi Publications, Meerut.
7. Srivastava, H. N. (2020). Botany Vol VI, Ecology and Utilization of Plants. Pradeep publications, Jalandhar.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Botany (Economic Botany)
Course Code: BSMM- 6075 (II)
(THEORY)

Course outcome:

After passing this course the students will be able to:

CO1: Understand the cultivation and economic importance of various food plant crops, fibre and oil yielding plants.

CO2: Understand the economic importance of spices and condiments.

CO3: Understand economic importance of medicinal plants.

CO4: Understand the processing and economic value of beverages, rubber plant, firewood, timber and bamboos.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Botany (Economic Botany)

Course Code: BSMM- 6075 (II)

(THEORY)

Time : 3 Hours **Maximum Marks: 75**

L-T-P: 3-0-0 **Theory: 60**

CA: 15

Instructions for the Paper Setters:

Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (I-IV). Questions of Sections I-IV 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

Food Plants: *Oryza sativa* (Rice), *Triticum aestivum* (Wheat), *Zea mays* (Maize), *Solanum tuberosum* (Potato), *Saccharum officinarum* (Sugarcane).

Fibres: *Gossypium hirsutum*(Cotton) and *Chorchorus capsularis* (Jute).

Vegetable Oils: *Arachis hypogea* (Groundnut), *Brassica campestris* (Mustard) and *Cocos nucifera* (Coconut).

Unit-II

Spices: General account of *Piper nigrum* (Black pepper), *Eugenia caryophyllum* (Cloves), *Cinnamomum verum* (Cinnamomum), *Elettaria cardamomum* (cardamom), *Zingiber officinalis* (Ginger), *Curcuma longa* (Turmeric), *Coriandrum sativum* (Coriander), *Foeniculum vulgaris*(Fennel) and *Mentha arvensis* (Mint).

Unit-III

Medicinal Plants: General account of *Terminalia chebula* (Harar), *Terminalia belerica* (Bahera), *Azadirachta indica* (Neem), *Phyllanthus emblica* (Amla), *Aconitum napellus*(Aconite), *Rauwolfia serpentina* (Sarpagandha), *Atropa belladonna* (Belladonna), *Datura stramonium* (Datura), *Withaniasomnifera* (Ashwagandha) *and Papaver somniferum* (Poppy).

Unit-IV

Beverages: *Camellia sinensis* (Tea) and *Coffea arabica* (Coffee).

Rubber: Morphology of *Hevea brasiliensis*(Rubber), Processing and Uses. General account of sources of firewood, timber and bamboos.

Suggested Readings:

1. Verma, V. (2016). Textbook of Economic Botany, ANE Books, New Delhi.
2. Das, K. (2014). Medicinal plants- Their importance in Pharmaceutical Sciences, Kalyani Publishers, New Delhi.

3. Kocchar, S.L. (2016). Economic Botany of the Tropics, Macmillan India Pvt. Ltd., New Delhi.
4. Prinentel, D. and Hall, C.W. (Eds.) (2001). Food and Natural Resources. Academic Press, London, New York.
5. Reddy, K. et al. (2015). Advances in Medicinal plants, Universities Press, Hyderabad.
6. Sharma, O.P. (1996). Hill's Economic Botany. Tata McGraw Hill Co. Ltd., New Delhi.
7. Swaminathan, M.S. and Kocchar, S.L. (Eds) (2009). Plants and Society. Macmillan Publications Ltd., London.
8. Council of Scientific & Industrial Research (1986). The Useful Plants of India. Publications and Information Directorate. CSIR, New Delhi.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Botany (Practical (Based on Paper I and II))
Course Code: BSMM- 6075 (P)
(PRACTICAL)

Course Outcomes:

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

CO1: Determination of abundance and frequency of species by quadrate method.

CO2: To measure the dissolved oxygen content in polluted and unpolluted water samples.

CO3: Study of anatomical peculiarities with reference to ecological adaptations.

CO4: Preparation of different stains, solutions and reagents as per theory paper.

CO5: To understand the economic importance of plants.

CO6: To acquire knowledge in the preparation of herbarium techniques.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)
Course Title: Botany (Practical (Based on Paper I and II))
Course Code: BSMM- 6075 (P)
(PRACTICAL)

Time : 3 Hours **Maximum Marks: 50**
L-T-P: 0-0-2 **Theory: 40**
CA: 10

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.

Suggested Laboratory Exercises

1. To determine minimum number of quadrats required for reliable estimate of biomass in grasslands through species area curves.
2. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkiaer's Standard Frequency Diagram.
3. To estimate Importance Value Index for grassland species on the basis of relative frequency, relative density, and relative dominance in protected and grazed grassland.
4. To measure the vegetation cover of grassland through point frame method.
5. To measure the above ground plant biomass in a grassland.
6. To study the morphological anatomical features of hydrophytes (*Hydrilla, Eichhornia*)
   Xerophytes (*Nerium, Calotropis*).
7. To determine diversity indices (richness, Simpson, Shannon-Weaver) in grazed and protected grassland.
8. To estimate bulk density and porosity of grassland and woodland soils.
9. To determine moisture content and water holding capacity of grassland and woodland soil.
10. To study the vegetation structure through profile diagram.
11. To estimate transparency, pH, and temperature of different water bodies.
12. To measure dissolved oxygen content in polluted and unpolluted water samples.
13. To estimate salinity of different water samples.
14. To determine the percent leaf area injury of different leaf samples collected around polluted sites.
15. To estimate dust-holding capacity of the leaves of different plant species.
16. **Food Plants:** Study of the morphology, structure and simple microchemical tests of the foods storing tissues rice, wheat, maize, potato, and sugarcane. Microscopic examination of starch in these plants (excepting sugarcane).
17. **Fibers:** Study of cotton flowers, sectioning of the cotton ovules/developing seeds to trace the origin and development of cotton fibers. Microscopic study of cotton and test for cellulose.
18. Sectioning and staining of jute stem to show the location and development of fibers.
19. Microscopic structure. Tests for lignocelluloses.
20. **Vegetable Oils:** Study of hand sections of groundnut, mustard and coconut and

staining of oil droplets by Sudan III and Sudan Black.

21. **Field Visits:** To study sources of firewood (10 plants)/timber yielding trees (10trees)/bamboos, list to be prepared mentioning special features, collection of plant-based articles of common use.
22. **Spices:** Examine black pepper, cloves, cinnamon (hand sections) and opened of cardamom and describe them briefly.
23. Preparations of an illustrated inventory of 10 medicinal plants used in indigenous systems of medicine or allopathy: Write their botanical and common names parts used and diseases/disorders for which they are prescribed.
24. **Beverages:** Section boiled coffee beans and tea leaves to study the characteristic structural features.
25. Visit to *in situ* conservation site/Botanical Garden.

Suggested Readings (for laboratory exercises)

1. Council of Scientific & Industrial Research. (1986). The Useful Plants of India. Publications and Information Directorate. CSIR, New Delhi.
2. Kocchar, S.L. (2016). Economic Botany of the Tropics, Macmillan India Pvt. Ltd., New Delhi.
3. De, Debapriya and De, Debasish (2014). Fundamentals of Environment and Ecology. S. Chand Publishing, New Delhi
4. Kumar, H.D. (2018). Modern Concepts of Ecology 8thedition. Vikas Publishing House, New Delhi.
5. Mackenzie, A., Ball,A. and Virdee, S. (2001). Instant Notes in Ecology. Taylor & Francis, London, United Kingdom
6. Prinentel, D. and Hall, C.W. (Eds.) (2001). Food and Natural Resources. Academic Press,London, New York.
7. Sharma, O.P. (1996). Hill's Economic Botany. Tata McGraw Hill Co. Ltd., New Delhi.
8. Swaminathan, M.S. and Kocchar, S.L. (Eds.) (2009). Plants and Society. Macmillan Publications Ltd., London.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Food Science and Quality Control (Vocational) (Food Plant Layout and Management)

Course Code: BSMM- 6255 (L)

(THEORY)

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand the importance of plant layout and learn how to set up the proper plant layout to reduce the production cost and increase the productivity.

CO2: Learn how market research helps to understand the consumers, their needs and their satisfaction level.

CO3: Understand the societal changes and their impact on food consumption trends.

CO4: Learn about product development and different types of food products.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Food Science and Quality Control (Vocational) (Food Plant Layout and Management)

Course Code: BSMM- 6255 (L)

(THEORY)

Time : 3 Hours **Maximum Marks: 100**

L-T-P: 4-0-0 **Theory: 60**

Practical: 20

CA: 20

Instructions for the Paper Setter: Eight questions of equal marks (12 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

Importance of a plant layout, selection of site and layouts of different food industries, selection of equipments, machinery and building material, selection and planning of manufacturing process and service facilities, maintenance and replacement, depreciation of machinery, management set up in a plant.

UNIT-II

Market and Consumer Research. Economic, Psychological, Anthropological and Sociological dimensions of food consumption pattern. Food situation in India and outside.

UNIT-III

Needs and types of Food consumption trends. Trends in social change and its role in diet pattern using social trends as a framework in new product innovation. Trapping the unconventional post-harvest losses and prospects of food processing for export.

UNIT –IV

Traditional foods-Status and need for revival in the context of westernized non-traditional foods, urbanization and such factors. Product development: Primary Processing, Secondary Processing, Types of products e.g. Quick cooking, fast foods, fabricated food, convenience foods.

Recommended Books:

1. Principle of Food Sanitation by Marriott, 5th ed., 2006, CBS Publishers, New Delhi.
2. Food Processing Waste Management by Green JH and Kramer A, 1979, AVI Publishers, USA.
3. Food Science by Potter NN, 5th ed., 2006, CBS Publishers, New Delhi.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Food Science and Quality Control (Vocational) (Food Plant Layout and Management)

Course Code: BSMM- 6255 (P)

(PRACTICAL)

Course Outcomes:

CO1: Familiarity with effective facility layout and process design critical for efficient and safe food production.

CO2: Proficiency in designing efficient facility layouts taking into account factors such as workflow, safety and hygiene and regularity compliance.

CO3: Understanding of financial concepts including depreciation and cost analysis.

CO4: Gaining practical exposure to real-world food processing facilities to observe and analyze different layout designs.

Bachelor of Science (Medical) Semester–VI (Session 2025-26)

Course Title: Food Science and Quality Control (Vocational) (Food Plant Layout and Management)

Course Code: BSMM- 6255 (P)

(PRACTICAL)

Time : 3 Hours **Practical: 20**

L-T-P: 0-0-1

Instructions for the practical examiner: Question paper is to be set on the spot jointly by the Internal and External Examiners. Copy of the same may be submitted for the record to COE office, Kanya MahaVidyalaya, Jalandhar.

List of Practicals:

1. Calculation of depreciation and processing costs.
2. Preparation of layout and Process diagram of potato chips manufacturing plant.
3. Preparation of layout and Process diagram of jam/marmalade manufacturing plant.
4. Preparation of layout and Process diagram of bread making plant.
5. Preparation of layout and Process diagram of dairy industry.
6. Preparation of layout and Process diagram of wine making unit.
7. Preparation of layout and Process diagram of modern slaughter plant.
8. Preparation of layout and Process diagram of confectionary unit.
9. Determination of sanitary status of plant equipment.
10. Visit to various food industries.