

FACULTY OF LIFE SCIENCES

SYLLABUS

Of

Bachelor of Science Bio-Technology (Semester: I-VI)

(Under Continuous Evaluation System)

Session: 2022-23



The Heritage Institution
KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)

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

PSO1: gain and apply knowledge of Biotechnology and Science concepts to solve problems related to field of Biotechnology.

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

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

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

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

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

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

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Bio-Technology)

Session: 2022-23

Bachelor of Science (Bio-Technology) Semester-I

Course Code	Course Name	Course Type	Marks				Examination time (in Hours)
			Total	Ext.		CA	
				L	P		
BBTL -1421	Punjabi (Compulsory)	C	50	40	-	10	3
BBTL -1031	¹ Basic Punjabi						
BBTL -1431	² Punjab History and Culture						
BBTL-1102	Communication Skills in English	C	50	40	-	10	3
BBTM-1483	Cell Biology	C	60	30	18	12	3+3
BBTM-1074	Botany-I	C	60	30	18	12	3+3
BBTM-1085	Biochemistry-I	C	60	30	18	12	3+3
BBTM-1346	General Microbiology-I	C	60	30	18	12	3+3
BBTM-1087	Chemistry-I	C	60	30	18	12	3+3
AECD-1161	*Drug Abuse: Problem Management and Prevention (Compulsory)	AC	50	40	-	10	3
SECF-1492	*Foundation Course	AC	25	20	-	5	1
Total			400				

¹ Special Course in lieu of Punjabi (Compulsory)

² Special Course in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab

*Marks of these papers will not be added in total marks and only grades will be provided.

C-Compulsory

AC- Audit course

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME
Bachelor of Science (Bio-Technology)
Session: 2022-23

Bachelor of Science (Bio-Technology) Semester II

Course Code	Course Name	Course Type	Marks				Examination time (in Hours)
			Total	Ext.		CA	
				L	P		
BBTL -2421	Punjabi (Compulsory)	C	50	40	-	10	3
BBTL -2031	¹ Basic Punjabi						
BBTL -2431	² Punjab History and Culture						
BBTM-2102	Communication Skills in English	C	50	25	15	10	3+3
BBTL-2333	Biostatistics	C	40	32	-	8	3
BBTM-2484	Zoology-I	C	60	30	18	12	3+3
BBTM-2065	Genetics	C	60	30	18	12	3+3
BBTM-2086	Biochemistry-II	C	60	30	18	12	3+3
BBTM-2347	General Microbiology-II	C	60	30	18	12	3+3
SECM-2502	*Moral Education	AC	25	20	-	5	-
Total			380				

¹ Special Course in lieu of Punjabi (Compulsory)

² Special Course in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab

*Marks of these papers will not be added in total marks and only grades will be provided.

C-Compulsory

AC- Audit course

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME
Bachelor of Science (Bio-Technology)
Session: 2022-23

Bachelor of Science (Bio-Technology) Semester-III							
Course Code	Course Name	Course Type	Marks				Examination Time (in Hours)
			Total	Ext.		CA	
				L	P		
BBTM-3061	Fundamentals of Biotechnology	C	60	30	18	12	3+3
BBTM-3062	Immunology-I	C	60	30	18	12	3+3
BBTM-3083	Chemistry-II	C	60	30	18	12	3+3
BBTM-3074	Botany-II	C	60	30	18	12	3+3
BBTM-3085	Biochemistry-III	C	60	30	18	12	3+3
BBTM-3066	Molecular Biology	C	60	30	18	12	3+3
AECE-3221	*Environmental Studies (Compulsory Paper)	AC	100	60	20	20	3
SECP-3512	*Personality Development	AC	25	20	-	5	-
Total			360				

*Marks of these papers will not be added in total marks and only grades will be provided.

C-Compulsory

AC- Audit Course

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME
Bachelor of Science (Bio-Technology)
Session: 2022-23

Bachelor of Science (Bio-Technology) Semester-IV							
Course Code	Course Name	Course Type	Marks				Examination Time (in Hours)
			Total	Ext.		CA	
				L	P		
BBTM-4061	Industrial Biotechnology-I	C	60	30	18	12	3+3
BBTM-4062	Immunology-II	C	60	30	18	12	3+3
BBTM-4083	Biochemistry-IV	C	60	30	18	12	3+3
BBTM-4064	Skill Development in Biotechnology	C	60	30	18	12	3+3
BBTM-4065	Fundamentals of Bioinformatics	C	60	30	18	12	3+3
BBTM-4486	Zoology-II	C	60	30	18	12	3+3
BBTF-4067	Industrial/ Institutional Visit	C	20	-	20	-	-
SECS-4522	*Social Outreach	AC	25	-	20	5	-
Total			380				

*Marks of these papers will not be added in total marks and only grades will be provided.

C-Compulsory

AC- Audit Course

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Science (Bio-Technology)

Session: 2022-23

Bachelor of Science (Bio-Technology) Semester-V							
Course Code	Course Name	Course Type	Marks				Examination Time (in Hours)
			Total	Ext.		CA	
				L	P		
BBTM-5061	rDNA Technology-I	C	60	30	18	12	3+3
BBTM-5062	Plant Biotechnology-I	C	60	30	18	12	3+3
BBTM-5063	Animal Biotechnology-I	C	60	30	18	12	3+3
BBTM-5064	Bioprocess Engineering-I	C	60	30	18	12	3+3
BBTM-5065	Biochemical and Biophysical Techniques-I	C	60	30	18	12	3+3
BBTM-5066	Industrial Biotechnology-II	C	60	30	18	12	3+3
SECJ-5551	*Job Readiness course	AC	25	20	-	5	-
Total			360				

***Marks of these papers will not be added in total marks and only grades will be provided.**

C-Compulsory

AC- Audit course

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME
Bachelor of Science (Bio-Technology)
Session: 2022-23

Bachelor of Science (Bio-Technology) Semester-VI							
Course Code	Course Name	Course Type	Marks				Examination Time (in Hours)
			Total	Ext.		CA	
				L	P		
BBTM-6061	rDNA Technology-II	C	60	30	18	12	3+3
BBTM-6062	Animal Biotechnology-II	C	60	30	18	12	3+3
BBTM-6063	Plant Biotechnology-II	C	60	30	18	12	3+3
BBTM-6064	Bioprocess Engineering-II	C	60	30	18	12	3+3
BBTM-6085	Chemistry-III	C	60	30	18	12	3+3
BBTM-6066	Biochemical and Biophysical Techniques-II	C	60	30	18	12	3+3
BBTS-6067	Term Paper	C	20	-	20	-	-
Total			380				

C-Compulsory

B.Sc. Bio-Technology Semester-I

Bachelor of Science (Bio-Technology) Semester-I

Session: 2022-23

Course Code: BBTL-1421

Punjabi Compulsory

(Theory)

COURSE OUTCOMES

CO1:ਆਤਮ ਅਨਾਤਮ' ਪੁਸਤਕ ਦੇ ਕਵਿਤਾ ਭਾਗ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋ+ਕ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਵਿਤਾ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਤਾਂ ਕਿ ਉਹ ਆਧੁਨਿਕ ਦੌਰ ਵਿਚ ਚੱਲ ਰਹੀਆਂ ਕਾਵਿ ਧਾਰਾਵਾਂ ਅਤੇ ਕਵੀਆਂ ਬਾਰੇ ਗਿਆਨ ਹਾਸਿਲ ਕਰ ਸਕਣ।

CO2:ਇਸ ਦਾ ਹੋਰ ਮਨੋਰਥ ਕਵਿਤਾ ਦੀ ਵਿਆਖਿਆ, ਵਿਸ਼ਲੇਸ਼ਣ ਤੇ ਮੁਲੰਕਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਤੋਂ ਜਾਣੂ ਕਰਾਉਣਾ ਵੀ ਹੈ ਤਾਂ ਕਿ ਉਹ ਸਮਕਾਲੀ ਸਮਾਜ ਦੀਆਂ ਸਮੱਸਿਆਵਾਂ ਨੂੰ ਸਮਝ ਸਕਣ ਅਤੇ ਆਲੋਚਨਾਤਮਕ ਦ੍ਰਿਸ਼ਟੀ ਬਣਾ ਸਕਣ।

CO3:ਗੱਦ ਪ੍ਰਵਾਹ (ਰੇਖਾ ਚਿਤ੍ਰ ਤੇ ਹਲਕੇ ਲੇਖ) ਪੁਸਤਕ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਮੁੱਲਵਾਨ ਇਤਿਹਾਸ ਤੋਂ ਜਾਣੂ ਕਰਵਾਉਣਾ ਹੈ।

CO4:ਪੈਰ੍ਹਾ ਰਚਨਾ ਅਤੇ ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉਤਰ ਦੇਣ ਦਾ ਮਨਰੋਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ।

CO5:ਧੁਨੀ ਵਿਉਂਤ ਪੜ੍ਹਣ ਨਾਲ ਵਿਦਿਆਰਥੀ ਧੁਨੀਆਂ ਦੀ ਉਚਾਰਨ ਪ੍ਰਣਾਲੀ ਤੋਂ ਵਾਕਫ਼ ਹੋਣਗੇ।

Bachelor of Science (Bio-Technology) Semester-I

Session: 2022-23

Course Code: BBTL-1421

Punjabi Compulsory

(Theory)

ਸਮਾਂ : 3 ਘੰਟੇ

Maximum Marks: 50

Theory : 40

CA: 10

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਆਤਮ ਅਨਾਤਮ(ਕਵਿਤਾ ਭਾਗ),(ਸੰਪ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ) ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

(ਭਾਈ ਵੀਰ ਸਿੰਘ ,ਡਾ.ਜਸਵੰਤ ਸਿੰਘ ਨੇਕੀ,ਸਿਲੇਬਸ ਦਾ ਹਿੱਸਾ ਨਹੀਂ ਹੈ)

(ਸਾਰ,ਵਿਸ਼ਾ ਵਸਤੂ)

08 ਅੰਕ

ਯੂਨਿਟ-II

ਗੱਦ ਪ੍ਰਵਾਹ (ਰੇਖਾ ਚਿਤ੍ਰ ਤੇ ਹਲਕੇ ਲੇਖ), ਸੰਪਾ.ਬਿਕਰਮ ਸਿੰਘ ਘੁੰਮਣ, ਜਸਪਾਲ ਸਿੰਘ ਰੰਧਾਵਾ,ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ,ਅੰਮ੍ਰਿਤਸਰ।

(ਰੇਖਾ ਚਿਤ੍ਰ 1 ਤੋਂ 5)(ਨੰਗੀ ਮੁਸਕਾਨ ਰੇਖਾ ਚਿੱਤਰ ਸਿਲੇਬਸ ਦਾ ਹਿੱਸਾ ਨਹੀਂ ਹੈ)

(ਸਾਰ,ਵਿਸ਼ਾ ਵਸਤੂ)

08 ਅੰਕ

ਯੂਨਿਟ-III

(ੳ)ਪੈਰ੍ਰਾ ਰਚਨਾ

(ਅ)ਪੈਰ੍ਰਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉਤਰ।

08 ਅੰਕ

ਯੂਨਿਟ-IV

(ੳ) ਪੰਜਾਬੀ ਧੁਨੀ ਵਿਉਂਤ :ਪਰਿਭਾਸ਼ਾ ਤੇ ਉਚਾਰਨ ਅੰਗ

(ਅ) ਸਵਰ, ਵਿਅੰਜਨ

8 ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ।ਸੈਕਸ਼ਨ A-Dਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟ I-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 08 ਅੰਕ ਹਨ।

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

Bachelor of Science (Bio-Technology) Semester-I

Session: 2022-23

Course Code: BBTL-1031

Basic Punjabi

(In lieu of Punjabi Compulsory)

COURSE OUTCOMES

CO1:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨੂੰ ਸਿਖਾਉਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਵਿਚ ਪਾ ਕੇ ਇਕ ਹੋਰ ਭਾਸ਼ਾ ਸਿੱਖਣ ਦਾ ਮੌਕਾ ਪ੍ਰਦਾਨ ਕਰਨਾ ਹੈ।

CO2:ਇਸ ਵਿਚ ਵਿਦਿਆਰਥੀ ਨੂੰ ਬਾਰੀਕਬੀਨੀ ਨਾਲ ਭਾਸ਼ਾ ਦਾ ਅਧਿਐਨ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO3:ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ ਤੋਂ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO4:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ ਬਾਰੇ ਦੱਸਣਾ ਹੈ।

CO5:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦਾ ਸ਼ਬਦ ਘੇਰਾ ਵਿਸ਼ਾਲ ਕਰਨਾ ਹੈ।

CO6:ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਵਿਚ ਹਫਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ, ਇਕ ਤੋਂ ਸੌ ਤੱਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿਚ ਸਿਖਾਉਣਾ ਹੈ।

Bachelor of Science (Bio-Technology) Semester-I

Session: 2022-23

Course Code: BBTL-1031

Basic Punjabi

(In lieu of Punjabi Compulsory)

ਸਮਾਂ : 3 ਘੰਟੇ

Maximum Marks: 50

Theory : 40

CA : 10

ਪਾਠਕ੍ਰਮ

ਯੂਨਿਟ-I

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

08ਅੰਕ

ਯੂਨਿਟ-II

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

08ਅੰਕ

ਯੂਨਿਟ-III

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

08 ਅੰਕ

ਯੂਨਿਟ-IV

ਹਫਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ, ਇਕ ਤੋਂ ਸੌ ਤਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂਵਿਚ ।

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ। ਸੈਕਸ਼ਨ A-D ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟ I-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 08 ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTL-1431
Punjab History and Culture (From Earliest Times to C 320)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

COURSE OUTCOMES:

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

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

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

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

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTL-1431
Punjab History and Culture (From Earliest Times to C 320)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Time: 3 Hours

Max. Marks: 50

Theory: 40

CA: 10

Instructions for the Paper Setters

1. Question paper shall consist of four Units
2. Examiner shall set 8 questions in all by selecting **Two Questions** of equal marks from each Unit.
3. Candidates shall attempt **5 questions** in **600 words**, by at least selecting **One Question** from each Unit and the **5th question** may be attempted from any of the **four Units**.
4. Each question will carry 8 marks.

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

7. Teachings of Buddhism
8. Teachings of Jainism

Suggested Readings

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTL-1102
Communication Skills in English
(Theory)

COURSE OUTCOMES:

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

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

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

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

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTL-1102
Communication Skills in English
(Theory)

Total Marks: 50

Examination Time: 3 Hrs

Theory: 40

CA: 10

Instructions for the paper setter and distribution of marks:

The question paper will consist of four sections. The candidate will have to attempt five questions in all selecting one from each section and the fifth question from any of the four sections. Each question will carry 8 marks.

Section-A: Two questions of theoretical nature will be set from Unit I.

Section-B: Two comprehension passages will be given to the students from Unit II.

Section-C: Two questions will be given from Unit III.

Section-D: Two questions will be set from Unit IV.

(8 x 5 = 40)

The syllabus is divided in four units as mentioned below:

Unit I

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

Unit II

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

Activities:

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

Unit III

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

Activities

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

Unit IV

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

Activities:

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

Writing blogs

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *Business Communication*, by Sinha, K.K. Galgotia Publishers, 2003.
3. *Business Communication* by Sethi, A and Adhikari, B., McGraw Hill Education 2009.
4. *Communication Skills* by Raman, M. & S. Sharma, OUP, New Delhi, India (2011).

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1483
Cell Biology
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

- CO1.** Understanding the basic unit of life – cell and broad classification of cell types.
- CO2.** Understanding the structure and functions of cell organelles.
- CO3:** Understand Cell Division and Cell Cycle.
- CO4.** Understanding the biological membranes along with membrane transport mechanism.

Bachelor of Science (Bio-Technology) Semester-I

Session: 2022-23

Course Code: BBTM-1483

**Cell Biology
(Theory)**

Time: 3 Hrs.

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter

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

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

Books Recommended:

1. De-Robertis, F.D.P. and De-Robertis Jr. E.M.F. (2017) Cell and Molecular Biology, Saunders, Philadelphia.
2. Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh and Matsudaira (2007) Molecular Cell Biology 6th Edition, W.H.Freeman& Co Ltd.
3. Geoffrey, M. Cooper & Robert E. Hausman (2013) The Cell: A molecular approach 6th Edition, Sinauer Associates.
4. Alberts, Johnson, Lewis, Raff, Roberts and Walter (2008) Molecular Biology of the Cell, 5th Edition, Garland Science.

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1483(P)
Course Title: Cell Biology
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

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

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1483 (P)
Course Title: Cell Biology
(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

1. Study of Cells:
 - (a) Prokaryotic cells: Lactobacillus, E. coli. Blue green algae.
 - (b) Eukaryotic cells: Testicular material (for studies of spermatogenesis)

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

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

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

5. Preparation of Buccal Smear for microscopic examination.

6. Barr body observation in human squamous epithelial cells.

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

Books Recommended:

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

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1074
Botany-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the diversity of plants.

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

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

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

Bachelor of Science (Bio-Technology) Semester -I

Session: 2022-23

Course code: BBTM-1074

**Botany-I
(Theory)**

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setters:

Eight questions of equal marks (6 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting atleast one question from each section. The fifth question may be attempted from any Section.

Unit –I

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

Unit –II

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

Unit –III

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

Unit –IV

Taxonomy of flowering plants: Artificial (Linnaeus), natural (Bentham & Hooker) and phylogenetic (Engler and Prantl) systems of classification; Terminology pertaining to floral description, General characteristics (including economic importance) of following families of angiosperms; giving examples of few important genera:

Solanaceae: *Solanum/Petunia*, Rutaceae: *Citrus, Murraya*, Cruciferae- *Brassica*, Apiaceae (Umbelliferae)-
Coriander, Asteraceae - *Helianthus*, Leguminosae –*Cassia/Acacia/Sweet pea*, Poaceae (Graminae)- *Triticum*.

Suggested Readings:

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

Bachelor of Science (Bio-Technology) Semester-I

Session: 2022-23

Course Code: BBTM-1074

Botany-I

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the diversity of plants.

CO2: Understand the structure of root and stem.

CO3: Understand structure and development of anther, male gametophyte, ovule and female gametophyte.

CO4: Understand different aspects of Pollination, fertilization and sterility.

CO5: Understand terminology related to floral descriptions.

Bachelor of Science (Bio-Technology) Semester-I

Session: 2022-23

Course Code: BBTM-1074 (P)

Botany-I

(Practical)

Time: 3 Hrs.

Max. Marks: 18

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 MahaVidyalaya, Jalandhar.

Experiments:

Plant Anatomy:

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

Embryology:

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

Taxonomy:

- a) Description of flowers including floral diagram, floral formula, V.S. of flower of the representative genera of families mentioned in syllabus.
- b) Identification and short morphological economic note on the specimens included in Unit IV of the theory paper.

Suggested Readings:

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1085
Biochemistry-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Gain basic knowledge about water and pH.

CO2: Acquire the knowledge of Carbohydrates, their classification, biological functions that can relate in day to day life

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

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1085
Biochemistry-I
(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

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

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

Unit-II

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

Unit-III

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

Unit-IV

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

Books Recommended:

1. Voet, D., Voet, J.G. and Prait, C.W. (2018). Principles of Biochemistry, 5th Edition, Wiley.
2. Stryer, L. (2015). Biochemistry, 8th Edition, W.H. Freeman and Company, New York
3. Berg, J.M., Tymoczko, J. L. And Stryer, L. (2019). Biochemistry, 9th Edition, Freeman.
4. Mathew, C.K., Van, K.E. and Anthern, K.G. (2012). Biochemistry 4th Edition, Addison Wesley.
5. Lehninger, A.L., Nelson, D.L. and Lox, M.M. (2017). Principles of Biochemistry, 7th Edition, CBS Publishers and Distributors, New Delhi.

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1085 (P)
Biochemistry-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Perform Beer Lamberts Law

CO2: Determine pKa value while performing practical

CO3: Estimate carbohydrates and sugars in the given sample

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1085(P)
Biochemistry-I
(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

Experiments:

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

Books Recommended:

1. Plummer D.T. (2017). An Introduction to Practical Biochemistry, 3rd Edition Tata McGraw Hill Education.
2. Sawhney, S.K. and Singh, R. (2014). Introductory Practical Biochemistry, Narosa Publishing House.
3. Wilson, K. And Walker, J. (2018). Principles and Techniques of Biochemistry, 8th Edition, McGraw Hill Education.

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1346
General Microbiology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Know the contribution of microbiologists, the principle and application of various types of microscopic techniques.

CO2: Apply the concept, principle and types of sterilization techniques while performing microbiological experiments

CO3: Apply the concept and characteristics of antiseptics, disinfectants & their mode of action in day to day life

CO4: Perform microbial preservation methods.

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1346
General Microbiology-I
(Theory)

Time: 3 Hours

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

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

Introduction to Microbiology- Historical Perspective and Important discoveries related to Microbiology. Relationship between Microbiology and Biotechnology- The Microbial Biotechnology. General Features- Bacteria, Fungi, Neurospora, Yeast and Viruses. Microbes in extreme environments- the thermophiles, halophiles, acidophiles, psychrophiles and alkalophiles.

Unit-II

Basic concept of Microbial growth & culture media and its components, Sterilization-Basic concept, physical and chemical methods of sterilization. Bacterial Nutrition-Introduction, Nutritional forms of bacteria, Basic concept of Transport mechanisms of nutrients across microbial cell membranes: Facilitated diffusion, Active transport and Group translocation

Unit-III

Principles and application of bright field, dark field, phase contrast, fluorescence & immunofluorescence, electron microscopy (Scanning electron microscopy & transmission electron microscopy). Gram positive and Gram negative bacteria: Introduction, Structure and anatomy of bacterial cell walls and Nature of the Microbial Cell Surface. Types of bacterial flagella. Different types of bacterial staining.

Unit-IV

Bacterial Classification: Bacterial classification and taxonomy based on Bergey's Manual of Determinative bacteriology– General outline only. An introduction to Bacterial Serotypes. Microbial culture collection centres, Methods of Microbial preservation: Refrigeration, Cryopreservation, lyophilization, Paraffin method

Books Recommended:

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1346(P)
General Microbiology-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

- CO1:** Sterilize glassware & plastic ware while performing microbiological experiments.
- CO2:** Learn and do basics of microbiological experiments like to make cotton plugs
- CO3:** Cultivate various bacteria, fungi, yeast etc. by different methods
- CO4:** Study motility of microbes.

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1346(P)
General Microbiology-I
(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

Experiments:

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

Books Recommended:

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1087
Course Title: Chemistry-I
(Theory)

COURSE OUTCOMES:

Students will be able to:

CO1: understand the key features of coordination compounds viz. variety of structures, oxidation numbers and electronic configurations, coordination numbers and explain the bonding and stability of complexes along with their nomenclature and structure.

CO2: understand the postulates of VBT, inner and outer orbital complexes

CO3: describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them, understand macrocyclic effect, crown ethers, cryptands

CO4: understand Crystal field splitting of d-orbitals in octahedral, tetrahedral, cubic and square planer fields of ligands.

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1087
Course Title: Chemistry-I
(Theory)

Time: 3 Hrs.

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

Instructions for the Paper Setters:

Eight questions of equal marks (6 each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

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

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

Unit-II

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

Unit-III

Stability of co-ordination compounds

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

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

Unit-IV

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

Books Recommended:

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

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: BBTM-1087
Course Title: Chemistry-I
(Theory)

COURSE OUTCOMES:

Students will be able to:

CO1: understand the technique of volumetric analysis

CO2: understand Iodimetry, Iodometry

CO3: understand Redox titrations using $K_2Cr_2O_7$ and $KMnO_4$.

CO4: identify the various ions present in the mixture.

Bachelor of Science (Bio-Technology) Semester-I

Session: 2022-23

Course Code: BBTM-1087(P)

**Course Title: Chemistry-I
(Practical)**

Time: 3 Hrs.

Practical Marks: 18

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

Experiments:

Volumetric Analysis:

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

Inorganic qualitative analysis:

Four ions (Two cations two anions).

A. Preliminary tests: Physical examination, Dry heating test, charcoal cavity test,

$Co(NO_3)_2$ test, flame test, borax bead test.

B. Acid radical analysis:

Dil. H_2SO_4 group: CO_3^{2-} , NO_2^- , S^{2-} , SO_3^{2-}

Conc. H_2SO_4 group: Cl^- , Br^- , I^- , NO_3^- , CH_3COO^-

Individual group: SO_4^{2-} , PO_4^{3-} , BO_3^{3-}

C. Basic radical analysis:

NH_4^+ Pb^{2+} , Cu^{2+} , Cd^{2+} , Fe^{2+} or Fe^{3+} , Al^{3+} , Co^{2+} , Ni^{2+} , Mn^{2+} , Zn^{2+} , Ba^{2+} , Sr^{2+} , Ca^{2+} Mg^{2+} , Na^+ , K^+
and their confirmation.

Book recommended:

G. Svehla, B. Sivasankar, Vogels Qualitative Inorganic Analysis 7 Edition, 2012

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: AECD-1161
Course Title: Drug Abuse: Problem Management and Prevention (Compulsory)
(Theory)

COURSE OUTCOMES

After completing the course, the students will be able to:

CO1. Learn how to include factual data about what substance abuse is; warning signs of addiction; information about how alcohol and specific drugs affect the mind and body;

CO2. Learn how to be supportive during the detoxification and rehabilitation process.

CO3. Focus on substance abuse education- is teaching individuals about drug and alcohol abuse and how to avoid, stop, or get help for substance use disorders.

CO4. Understand that substance abuse education is important for students alike; there are many misconceptions about commonly used legal and illegal substances, such as alcohol and marijuana

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: AECD-1161
Course Title: Drug Abuse: Problem Management and Prevention (Compulsory)
(Theory)

Time: 3 Hr

Max. Marks: 50
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

Meaning, Nature and Extent of Drug Abuse in India and Punjab.

Consequences of Drug Abuse for:

Individual: Education, Employment, Income.

Family: Violence

Society: Crime

Nation : Law and Order problem

UNIT-II

Management of Drug Abuse

Medical Management: Medication for treatment and to reduce withdrawal effects.

Psychiatric Management: Counselling, Behavioural and Cognitive therapy.

Social Management: Family, Group therapy and Environmental Intervention.

UNIT-III

Prevention of Drug abuse:

Role of family: Parent child relationship, Family support, Supervision

School: Counselling, Teacher as role-model. Parent-Teacher-Health, Professional Coordination.

UNIT-IV

Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Educational and awareness program

Legislation: NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws.

Suggested Readings:

1. Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. *The Drug Crime Connection*. Beverly Hills: Sage Publications.
4. Kapoor. T. (1985) *Drug epidemic among Indian Youth*, New Delhi: Mittal Pub.
5. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
6. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
7. Sain, Bhim 1991, *Drug Addiction Alcoholism, Smoking obscenity* New Delhi: Mittal Publications.
8. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab: A Sociological Study*. Amritsar: Guru Nanak Dev University.
9. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
10. Sussman, S and Ames, S.L. (2008). *Drug Abuse: Concepts, Prevention and Cessation*, Cambridge University Press.

Bachelor of Science (Bio-Technology) Semester-I
Session: 2022-23
Course Code: SECF-1492
Course Title: Foundation Course
(Theory)

Time: 1 Hr

Max. Marks: 25
Theory: 20
CA: 05

PURPOSE & AIM

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

INSTRUCTIONAL OBJECTIVES

- to enable the students to realise their position in the whole saga of time and space
- to inculcate in them an appreciation of life, cultures and people across the globe
- to promote, in the students, an awareness of human intellectual history
- to make them responsible and humane world citizens so that they can carry forward the rich legacy of humanity

LEARNING OUTCOMES

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

- learn how past societies, systems, ideologies, governments, cultures and technologies were built, how they operated, and how they have changed
- understand how the rich history of the world helps us to paint a detailed picture of where we stand today
- understand the Vedic theism, Upanishads Philosophy and doctrines of Jainism, Buddhism and Sikhism
- acquire knowledge of women rights and courage to face day to day challenges
- acknowledge the changes in society, religion and literature in the renaissance period and the importance of empathy and compassion for humanity
- *learn about the prominent Indians (Men and Women) who contributed significantly in freedom struggle, education, economic development and in the formation and evolution of our nation*
- understand meaning of race and how that concept has been used to justify exclusion, inequality, and violence throughout history and the origin of civil right movements to fight for equality, liberty and fraternity
- critically evaluate the socio-political and economic issues at global level and its implications in the present
- upgrade and enhance learning technological skills and striking a balance between technology and their well being

- take pride in learning the saga of Indian Past Culture and Heritage
- understand the rich legacy of KMV and its progressive endeavours

MODULE	TITLE	CONTACT HOURS
I	Introduction and Initial Assessment	2
II	The Human Story	3
III	<i>The Vedas</i> and the Indian Philosophy	2.5
IV	The Journey of Woman The Story and the Dream	2.5
V	Changing Paradigms in Society, Religion & Literature	2.5
VI	Makers of Modern India	2.5
VII	Racism: Story of the West	2.5
VIII	Modern World at a Glance: Political & Economic Perspective	2.5
IX	Technology Vis a Vis Human Life	2.5
X	My Nation My Pride	2.5
XI	The KMV Experience	2.5
XII	Final Assessment, Feedback and Closure	2.5

EXAMINATION

- **Total Marks: 25 (Final Exam: 20; Internal Assessment: 5)**
- Final Exam: multiple choice quiz. Marks – 20; Time: 1 hour
- Internal Assessment: 5 (Assessment: 3; Attendance:2)
Comparative assessment questions (medium length) in the beginning and close of the programme. Marks: 3; Time: 0.5 hour each at the beginning and end.
- Total marks: 25 converted to grade for final result
- Grading system: 90% marks & above: A grade
80% - 89% marks : B grade
70% - 79% marks : C grade
60% - 69% marks : D grade
50% - 59% marks : E grade
Below 50% marks : F grade (Fail - must give the exam again)

SYLLABUS

Module I Being a Human: Introduction & Initial Assessment

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

Module 2 The Human Story

- Comprehensive overview of human intellectual growth right from the birth of human history
- The wisdom of the Ancients
- Dark Middle Ages
- Revolutionary Renaissance
- Progressive modern times
- Most momentous turning points, inventions and discoveries

Module 3 *The Vedas* and the Indian Philosophy

- Origin, teachings and significance of *The Vedas*
- Upanishads and Puranas
- Karma Theory of *The Bhagwad Gita*
- Main tenets of Buddhism & Jainism
- Teachings of Guru Granth Sahib

Module 4 Changing Paradigms in Society, Religion & Literature

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

Module 5 Woman: A Journey through the Ages

- Status of women in pre-vedic times
- Women in ancient Greek and Roman civilizations
- Women in vedic and ancient India
- Status of women in the Muslim world
- Women in the modern world
- Crimes against women
- Women labour workforce participation
- Women in politics
- Status of women- our dream

Module 6 Makers of Modern India

- Early engagement of foreigners with India
- Education: The first step to modernization

- Railways: The lifeline of India
- Raja Ram Mohan Roy, Gandhi, Nehru, Vivekanand, Sardar Patel etc.
- Indira Gandhi, Mother Teresa, Homai Vyarawala etc.
- The Way Ahead

Module 7 Racism: Story of the West

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

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

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

Module 9 Technology Vis a Vis Human Life

- Impact of technology on modern life
- Technological gadgets and their role in our lives
- Technology and environment
- Consumerism and materialism
- Psychological and emotional consequences of technology
- Harmonizing technology with ethics and humaneness

Module 10 My Nation My Pride

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

Module 11 The KMV Experience

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

Module 12 Final Assessment, Feedback & Closure

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

PRESCRIBED READING

- *The Human Story* published by Dawn Publications

B.Sc. Bio-Technology Semester-II

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTL-2421

Punjabi Compulsory

COURSE OUTCOMES:

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

CO2: ਗੱਦ ਪ੍ਰਵਾਹ (ਰੇਖਾ ਚਿਤ੍ਰ ਤੇ ਹਲਕੇ ਲੇਖ) ਪੁਸਤਕ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਮੁੱਲਵਾਨ ਇਤਿਹਾਸ ਤੋਂ ਜਾਣੂ ਕਰਵਾਉਣਾ ਹੈ।

CO3: ਸੰਖੇਪ ਰਚਨਾ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਸਮੇਂ ਅਤੇ ਮਿਹਨਤ ਦੀ ਬੱਚਤ ਕਰਨ ਬਾਰੇ ਦੱਸਣਾ ਹੈ।

CO4: ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ-ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

CO5: ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਗੱਲਬਾਤ ਵਿਚ ਪਰਪੱਕਤਾ ਆਉਂਦੀ ਹੈ। ਇਹ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਗੱਲਬਾਤ ਵਿਚ ਨਿਖਾਰ ਲਿਆਉਣ ਦਾ ਕੰਮ ਕਰਨਗੇ।

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTL-2421

Punjabi Compulsory

ਸਮਾਂ : 3 ਘੰਟੇ

Maximum Marks: 50

Theory : 40

CA: 10

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਆਤਮ ਅਨਾਤਮ(ਕਹਾਣੀਭਾਗ),(ਸੰਪ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ) ਗੁਰੂ ਨਾਨਕ ਦੇਵ

ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

(ਉਜਾੜ,ਦਲਦਲ ਕਹਾਣੀਆਂ ਸਿਲੇਬਸ ਦਾ ਹਿੱਸਾ ਨਹੀਂ ਹੈ)

(ਵਿਸ਼ਾ-ਵਸਤੂ, ਸਾਰ)

08 ਅੰਕ

ਯੂਨਿਟ-II

ਗੱਦ ਪ੍ਰਵਾਹ (ਰੇਖਾ ਚਿੜ੍ਹ ਤੇ ਹਲਕੇ ਲੇਖ), ਸੰਪਾ.ਬਿਕਰਮ ਸਿੰਘ ਘੁੰਮਣ, ਜਸਪਾਲ ਸਿੰਘ ਰੰਧਾਵਾ,ਗੁਰੂ ਨਾਨਕ ਦੇਵ
ਯੂਨੀਵਰਸਿਟੀ,ਅੰਮ੍ਰਿਤਸਰ।

(ਹਲਕੇ ਲੇਖ 1 ਤੋਂ 5)(ਆਉ ਗੱਲਾਂ ਕਰੀਏ ਲੇਖ ਸਿਲੇਬਸ ਦਾ ਹਿੱਸਾ ਨਹੀਂ ਹੈ)

(ਸਾਰ,ਵਿਸ਼ਾ ਵਸਤੂ)

08 ਅੰਕ

ਯੂਨਿਟ-III

(ੳ) ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ,ਪੜਨਾਂਵ,ਕਿਰਿਆ,ਵਿਸ਼ੇਸ਼ਣ

(ਅ) ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ: ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ,ਸੰਬੰਧਕ,ਯੋਜਕ,ਵਿਸਮਿਕ

08 ਅੰਕ

ਯੂਨਿਟ-IV

(ੳ)ਸੰਖੇਪ ਰਚਨਾ

(ਅ) ਮੁਹਾਵਰੇ

08 ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ। ਸੈਕਸ਼ਨ A-D ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟ I-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 08 ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTL-2031

Basic Punjabi

In lieu of Punjabi (Compulsory)

Time: 3 Hours

Max. Marks: 50

Theory: 40

CA: 10

COURSE OUTCOMES:

CO1:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨੂੰ ਸਿਖਾਉਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਵਿਚ ਪਾ ਕੇ ਇਕ ਹੋਰ ਭਾਸ਼ਾ ਸਿੱਖਣ ਦੇ ਮੌਕੇ ਪ੍ਰਦਾਨ ਕਰਨਾ ਹੈ।

CO2:ਇਸ ਵਿਚ ਵਿਦਿਆਰਥੀ ਨੂੰ ਬਾਰੀਕਬੀਨੀ ਨਾਲ ਭਾਸ਼ਾ ਦਾ ਅਧਿਐਨ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO3:ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ ਤੋਂ ਜਾਣੂ ਕਰਵਾਇਆ ਜਾਵੇਗਾ।

CO4:ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ-ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

CO5:ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦਾ ਸ਼ਬਦ ਘੇਰਾ ਵਿਸ਼ਾਲ ਕਰਨਾ ਹੈ।

CO6:ਵਿਦਿਆਰਥੀ ਵਾਕ ਦੀ ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਇਸਦੀ ਬਣਤਰ ਤੋਂ ਜਾਣੂ ਹੋਣਗੇ ਅਤੇ ਭਾਸ਼ਾ ਤੇ ਪਕੜ ਮਜ਼ਬੂਤ ਹੋਵੇਗੀ।

CO7:ਪੈਰਾ ਰਚਨਾ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ।

CO8: ਘਰੇਲੂ ਅਤੇ ਦਫ਼ਤਰੀ ਚਿੱਠੀ ਪੱਤਰ ਲਿਖਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਇਸ ਕਲਾ ਵਿਚ ਨਿਪੁੰਨ ਕਰਨਾ ਹੈ।

CO9:ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਗੱਲਬਾਤ ਵਿਚ ਪਰਪੱਕਤਾ ਆਉਂਦੀ ਹੈ। ਇਹ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਗੱਲਬਾਤ ਵਿਚ ਨਿਖਾਰ ਲਿਆਉਣ ਦਾ ਕੰਮ ਕਰਨਗੇ।

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTL-2031

Basic Punjabi

In lieu of Punjabi (Compulsory)

ਸਮਾਂ: 3 ਘੰਟੇ

Maximum Marks: 50

Theory : 40

CA : 10

ਪਾਠਕ੍ਰਮ

ਯੂਨਿਟ-I

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

08 ਅੰਕ

ਯੂਨਿਟ-II

ਪੰਜਾਬੀਵਾਕਬਣਤਰ : ਮੁੱਢਲੀਜਾਣਪਛਾਣ

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

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

08 ਅੰਕ

ਯੂਨਿਟ-III

ਪੈਰ੍ਰਾ ਰਚਨਾ

ਅਖਾਣ (ਅਖਾਣਾਂ ਦੀ ਲਿਸਟ ਨਾਲ ਨੱਥੀ ਹੈ)

08 ਅੰਕ

ਯੂਨਿਟ-IV

ਚਿੱਠੀ ਪੱਤਰ (ਘਰੇਲੂ ਅਤੇ ਦਫ਼ਤਰੀ)

ਮੁਹਾਵਰੇ (ਮੁਹਾਵਰਿਆਂ ਦੀ ਲਿਸਟ ਨਾਲ ਨੱਥੀ ਹੈ)

08 ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ। ਸੈਕਸ਼ਨ A-D ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟ I-IV ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 08 ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2431
Punjab History and Culture (C. 320 to 1000 A.D.)
(Special Paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

COURSE OUTCOMES

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

CO 1: The reasons and impact of Alexander's invasions

CO 1 (a): To understand the various factors leading to rise and fall of empires and emergence of new dynasties and their administration specifically of Maurya rule in general and Ashok in particular

CO 2: art and architecture of Gupta period and the Indo-Greek style of architecture under Gandhara School

CO 3: To have an insight into the socio-cultural history under Harshvardhan and Punjab under the stated period

CO 4: To enable students to have thorough insight into the various forms/styles of Architecture and synthesis of Indo - Greek Art and Architecture in Punjab

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2431
Punjab History and Culture (C. 320 to 1000 A.D.)
(Special Paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Examination Time: 3 Hour

Max. Marks: 50

Theory: 40

CA: 10

Instructions for the Paper Setter:

- 1. Question paper shall consist of four Units**
- 2. Examiner shall set 8 questions in all by selecting Two Questions of equal marks from each Unit.**
- 3. Candidates shall attempt 5 questions in 600 words, by at least selecting One Question from each Unit and the 5th question may be attempted from any of the four Units.**
- 4. Each question will carry 8 marks**

Unit-I

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

Unit-II

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

Unit-III

5. The Punjab under Harshvardhana
6. Socio-cultural History of Punjab from 7th to 1000 A.D.

UNIT-IV

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

8. Development to Art and Architecture

Suggested Readings

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

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2102
Communication Skills in English
(Theory)

COURSE OUTCOMES

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

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

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

CO 3: Acquisition of knowledge of phonetics which will help them in learning about correct pronunciation as well as effective speaking

CO 4: Speaking skills of the students enabling them to take active part in group discussion and present their own ideas

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2102

Communication Skills in English

(Theory)

Time: 3 Hours

Max. Marks: 50

Theory: 25

Practical: 15

CA: 10

Instructions for the paper setters and distribution of marks:

The question paper will consist of four sections and distribution of marks will be as under:

Section-A: Two questions of theoretical nature will be set from Unit I of the syllabus and the candidates will have to attempt one carrying 5 marks.

Section-B: Two questions will be set from Unit II of the syllabus. Candidates will have to attempt one carrying 5 marks.

Section-C: Two questions will be set from Unit III of the syllabus. Candidates will have to attempt one carrying 5 marks.

Section-D: Two questions will be set from Unit IV of the syllabus. Candidates will have to attempt one carrying 5 marks.

Important Note:

The candidate will have to attempt five questions in all selecting one from each section of the question paper and the fifth question from any of the four sections.

(5 x 5 = 25)

Course Contents:

Unit I

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

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

Unit II

Attending telephone calls; note taking and note making

Activities: Taking notes on a speech/lecture

Unit III

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

Activities: 1) Making conversation and taking turns

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

Unit IV

The study of sounds of English,

stress Situation based

Conversation in English Essentials of

Spoken English

Activities: Giving Interviews

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *Business Communication* by Sethi, A and Adhikari, B., McGraw Hill Education 2009.
3. *Communication Skills* by Raman, M. & S. Sharma, OUP, New Delhi, India (2011).
4. *A Course in Phonetics and Spoken English* by J. Sethi and P.V. Dhamija, Phi Learning.

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2102

**Communication Skills in English
(Practical/ Oral Testing)**

Time: 3 Hours

Marks: 15

Course Contents:

1. Oral Presentation with/without audio visual aids
2. Group Discussion
3. Listening to any recorded or live material and asking oral questions for listening comprehension

Questions:

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

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTL-2333

Biostatistics

(Theory)

Time: 3 Hours

Max. Marks: 40

Theory: 32

CA: 8

COURSE OUTCOMES

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

CO 1: Calculate summary statistics (mean, median, mode, range, standard deviation and variance) from the data.

CO 2: Familiar with the concepts of probability, conditional probability and Bayes theorem.

CO 3: Familiar with the concepts of correlation and regression, Scatter diagram, linear correlation, linear regression lines

CO 4: State the null hypothesis and alternative hypothesis (both one way and two ways) appropriate to a given scenario and determine if it is appropriate to use the Chi-Square test for testing the significance of fit between data and predicted data.

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTL-2333

Biostatistics

(Theory)

Time: 3 Hours

Max. Marks: 40

Theory: 32

CA: 8

Instructions for the Paper Setter:

There will be five sections, namely A, B, C, D, E

Section –A: The examiner shall set 10 short answer type questions covering entire syllabus and the candidates will have to attempt 8 questions of 1 mark each. Answer to each question shall be approximately of 50 words. The total weight age of this section shall be 8 marks.

Section-B, C, D, and E: Eight questions of equal marks are to be set, two in each of the four sections (B-E). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt four questions, selecting at least one question from each section. Each question shall carry 6 marks. The total weightage of these sections shall be 24 marks.

The students can use only Non Programmable & Non Storage Type Calculator and statistical tables.

Unit-I

Elementary Statistics: Collection of data. Frequency distribution and its graphical representation. The mean, median, mode, standard deviation, variance, covariance of data.

Unit-II

Probability: Basic concepts, sample space and events, use of counting method in probability, addition law, Multiplication Law, Conditional Probability and Independent Events, Bayes theorem with application (without proof).

Unit-III

Introduction to Correlation & Regression: Scatter diagram, linear correlation, linear regression lines

Unit-IV

Hypothesis Testing: Sample Statistics and parameters, Level of significance, Concept of Null and Alternate Hypothesis, Normal test for single mean (Z-test), Chi-square test (Goodness of fit and association of attributes).

Text Books:

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

Reference Books:

1. S.C Gupta, V.K Kapoor, Fundamentals of mathematical statistics, Sultan Chand and Sons , Delhi, Ninth edition,1997.
2. W. Mendenhall and T.L. Sincich, Statistics for engineering and sciences, Chapman and Hall, sixth edition, 2016.
3. S.P. Gupta, Statistical methods, Sultan Chand and Company, New Delhi,1978.

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2484
Course Title: Zoology-I
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

CO1: Understand the general classification of Kingdom Animalia.

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

CO3: Understand the excretory and circulatory system of man.

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

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2484

**Course Title: Zoology-I
(Theory)**

Time: 3 Hrs.

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

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

Unit-1

Introduction to Animal Kingdom and its diversification:

Overview and General classification of Kingdom Animalia, General Characteristics of each group upto class level with an example.

Unit-2

Digestive System: The alimentary canal and associated glands of Man. Digestion of dietary constituents, regulation of digestive processes and absorption. Extra and intracellular digestion, enzymatic digestion and symbiotic digestion.

Respiratory System: Respiratory system of man, Transport of O₂ and CO₂, Oxygen dissociation curve of haemoglobin, Bohr effect, chloride shift, Haldane effect and control of breathing.

Unit-3

Circulatory System: General plan of circulation in Man, structure of human heart. Origin and regulation of heart beat, Electrocardiogram, Cardiac output and Blood pressure, Composition and functions of blood and lymph, Blood clotting, blood groups including Rh-factor.

Excretory system: Structure of Kidney and nephron. Urine formation and osmoregulation.

Unit-4

Skeletal system: Ultrastructure, chemical and physical basis of skeletal muscle contraction.

Neural Integration: Structure and functions of brain, Structure of neuron, resting membrane potential, Origin and propagation of impulse along the axon, synapse and myoneural junction.

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

Suggested Readings:

1. Sobti, R.C. & Nigam, S.K. (2002). Structural & function biology of chordates, VishalPublishers, Jalandhar.
2. Sobti, R.C. & Sharma, V.L. (2005). Basics of Biotechnology: Introduction of LifeSciences. Vishal Publishers, Jalandhar.
3. Sobti, R.C. (2005). Introduction to Biotechnology, Part-2, Concepts Tools andApplication, Vishal Publishers.

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2484 (P)

**Course Title: Zoology-I
(Practical)**

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the estimation of blood haemoglobin.

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

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

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2484 (P)
Course Title: Zoology-I
(Practical)

Time: 3 Hrs.

Max. Marks: 18

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

Experiments:

1. Study the following system of Human with the help of charts / models /videos:

Digestive, Arterial, Venous and Urinogenital systems.

2. Analysis of food stuff for the presence of starch, protein and fats.

3. Determination of blood groups of human blood samples.

4. Recording of blood pressure of man.

5. Estimation of hemoglobin content.

6. Make a temporary preparation of the following:

Blood smear of mammals.

7. Visit to clinical laboratory / hospital for demonstration of ECG, ECHO, X-ray, ultrasound, CT-scan and MRI.

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2065

**Genetics
(Theory)**

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting atleast one question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

Unit - I

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

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

Unit – II

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

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

Unit – III

Mutation: Spontaneous versus induced mutations, types of mutations, mutations rate and frequency, Mutagens: Physical and Chemical, the molecular basis of mutations. Significance & Practical applications of Mutation

Basic Microbial Genetics: Conjugation, transduction, transformation

Unit – IV

Organization of Chromosomes: The structure of prokaryotic and eukaryotic chromosome, centromere and telomere structure, euchromatin and heterochromatin, Special chromosomes:

Polytene chromosomes and Lampbrush chromosomes, satellite DNA, the supercoiling of DNA.

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

Books Recommended:

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

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2065 (P)
Genetics
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand Mendelian laws.

CO2: Solve Paternity disputes.

CO3: Demonstrate segregation in preserved material.

CO4: Study polytene chromosomes and dermatoglyphics.

CO5: Study mitosis from onion root tips.

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2065 (P)

**Genetics
(Practical)**

Time: 3 Hrs.

Practical Marks: 18

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

Experiments:

1. Demonstration of Law of segregation and Independent assortment (use of coloured beads, capsules etc.).
2. Numerical problems on Mendelism and on modified F₂ ratios.
3. Numerical problems on Paternity disputes (Blood groups)
4. Segregation demonstration in preserved material
5. Study of polytene chromosomes from permanent slides.
6. Dermatographics: Palm print taking and fingertip patterns.
7. Preparation and study of mitosis slides from onion root tips by squash method.

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2086
Biochemistry – II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Familiarize with biomolecules, enzymes and related Metabolic pathways

CO2: Know the importance & metabolic role of ATP and other energy rich metabolites

CO3: Familiarize with enzymes and related mechanism through which they work

CO4: Get acquainted with the concept of bioenergetics and various metabolic processes

CO5: Differentiate between equilibrium and steady state kinetics and analysed simple kinetic data and estimate important parameter (Km. Vmax)

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2086

Biochemistry – II

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

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. Each question carries 6 marks.

Unit-I

Introduction to metabolism, catabolism, anabolism, Laws of Thermodynamics and living system, Free energy change and direction of metabolism, Characteristics of Metabolic pathways, Compartmentation and Inter-organ metabolism, Regulation & evolution of metabolic pathways

Unit-II

ATP: Structure, Free energy change, energy coupling with ATP (Creatinine phosphokinase, NDP kinase, Adenylate kinase), metabolic roles of ATP; Experimental methods for studying metabolism, Energy rich metabolites, biological oxidation – Reduction reactions

Unit-III

Introduction to Enzymes: Nomenclature, Classification and Characteristics of enzymes, Cofactors, Co-enzyme and Prosthetic group, Mechanism of Enzyme Action: Nature of active site, enzyme substrate complex, Factors responsible for catalytic efficiency of enzymes., Covalent catalysis, Acid base catalysis, Strain and distortion theory, Induced fit hypothesis.

Unit-IV

Enzyme Kinetics: A brief overview of enzyme energetics, Michaelis Menten equation. Derivation of Michaelis Menten equation and determination of K_m and V_{max} values

Enzyme inhibition: Reversible and Irreversible inhibition, Kinetics of competitive, uncompetitive and non-competitive inhibition. Regulation of enzyme activity, Isozymes and their importance

Books Recommended:

1. Voet, D., Voet, J.G. and Prait, C.W. (2018). Principles of Biochemistry, 5th Edition, Wiley.
2. Stryer, L. (2015). Biochemistry, 8th Edition, W.H. Freeman and Company, New York
3. Berg, J.M., Tymoczko, J. L. And Stryer, L. (2011). Biochemistry, 7th Edition, Freeman.
4. Nelson, D.L. and Cox, M.M. (2013). Principles of Biochemistry, 7th Edition, Freeman
5. Mathew, C.K., Van, K.E. and Anther, K.G. (2012). Biochemistry 4th Edition, Addison Wesley.
6. Lehninger, A.L., Nelson, D.L. and Lox, M.M. (2017). Principles of Biochemistry, 7th Edition, CBS Publishers and Distributors, New Delhi.

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2086(P)
Biochemistry – II
(Practical)

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Estimate salivary amylase and acid phosphatase activity.

CO2: Know the Effect of temperature and pH on enzyme activity.

CO3: Determine K_m value for the activity of acid phosphatase

CO4: Perform and analyse Competitive and non-competitive inhibition

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2086(P)
Biochemistry – II
(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

Experiments:

1. Estimation of Alpha-amylase activity from saliva.
2. Assay of acid phosphatase activity.
3. Effect of temperature on enzyme activity.
4. Effect of pH on enzyme activity
5. Determination of K_m for acid phosphatase.
6. Competitive and non-competitive inhibition.

Books Recommended:

1. Plummer D.T. (2017) An Introduction to Practical Biochemistry, 3rd Edition Tata McGraw Hill Education.
2. Sawhney, S.K. and Randhir singh (2001). Introductory Practical Biochemistry, Narosa Publishing House.
3. Wilson, K. and Walker, J. (2018). Principles and Techniques of Biochemistry, 8th Edition, McGraw Hill Education.

Bachelor of Science (Bio-Technology) Semester-II
Session: 2022-23
Course Code: BBTM-2347
General Microbiology-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Know the concept of microbial growth in batch and continuous system.

CO2: Know the whole process of Natural resistance and Non-specific defense mechanism against microorganisms occurs in the human body

CO3: Have the full knowledge of mechanism of action, its diagnosis and treatment for different Viral, Bacterial & Fungal diseases

CO4: Acquire the best knowledge of Industrial Microbiology

CO5: Describe how biotechnology is used to understand and protect the environment, treat sewage and Domestic waste water treatment

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2347

General Microbiology-II

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

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. Each question carries 6 marks.

UNIT-I

Factors affecting Microbial Growth: Temperature, pH, provision of gases. Introduction to concept of microbial growth in batch and continuous system. Bacterial generation, doubling time and specific growth rate. Monoauxic, diauxic and synchronised growth curve. Sporulation and regeneration of bacteria.

UNIT-II

Viruses-Introduction, Plant and animal viruses-structure and composition, Classification based on differences in their transcription process. Cultivation of plant and animal viruses. Life cycle Tobacco Mosaic Virus, Herpes simplex and Bacteriophages (Lysogenic and Lytic cycle).

UNIT-III

Pathogenic microorganisms- Factors contributing towards microbial pathogenicity (Adhesion, Invasiveness and toxigenicity), Natural resistance and Non-specific defense mechanism against microorganisms. Introduction, mechanism of action, diagnosis and treatment for viral diseases- Influenza, AIDS and Hepatitis. Bacterial Diseases-Diphtheria, Tuberculosis, Typhoid, Streptococcus, Klebsiella infection. Fungal diseases-Aspergillosis and Candidiasis.

UNIT-IV

Introduction to roles of microbes in environment, Bio-mining, Bioconversion, Bioremediation, and Municipal solid waste transformations.

Books Recommended:

1. Davis, B.D., Dulbecco. R., Eisen, H.N. and Ginsberg, H.S. (1990). Microbiology: 4th Edition, Harper & Row, Publishers, Singapore.
2. Tortora, G.J., Funke, B.R. and Case, C.L. (1994). Microbiology: An Introduction: 5th Edition, The Benjamin / Cummings Publishing Company, Inc.
3. Stanier, R.Y. (1995). General microbiology, MacMillan Press, London.
4. Pelczar, M.T. (1995). Microbiology, Tata McGraw Hill Publication, New Delhi.
5. Schlegel, H. G., (1995). General Microbiology 7th Edition, Cambridge Univ. Press.
6. Jain, S.K. (1999). Prescott and Dunn's Industrial Microbiology 4th Edition, CBS Publishers & Distributors.
7. Chander, M. and Puri, P (2008). A Concise Course in Microbiology, Krishna Brothers Publishers, Old Railway Road, Jalandhar.
8. Postgate. J. (2000). Microbes & Man, 4th Edition, Cambridge Univ. Press.
9. Tortora. G.J., Funke. B.R. (2001). Microbiology: An Introduction, Benjamin Cummings.

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2347(P)

General Microbiology-II

(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Enumerate the microorganisms by different methods while performing microbiological practices

CO2: Know the real importance of Personal hygiene.

CO3: Identify different fungus by lactophenol staining

CO4: Apply basic knowledge of nutrients to study the Growth curve of different microorganisms

CO5: Acquire skills and competency in microbiological laboratory practices applicable to microbiological research

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: BBTM-2347(P)

General Microbiology-II

(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

Experiments:

1. Enumeration of microorganism. Total vs viable counts.
2. Personal Hygiene-Microbes from hands, tooth-scum and other body parts.
3. Monoauxic and diauxic growth curve of micro-organisms.
4. Identification of fungus by and lactophenol staining.
5. Identification of formation of germ tube by *Candida albicans*.
6. Visualization of Streptococcus
7. Waste water management test

Books Recommended:

1. Cappuccino, J.G. and Sherman, N. (2014). Microbiology: A Laboratory Manual 10th Edition, Harlow, Addition-Wesley.
2. Sambrook, J. and Russel, D.W. (2012). Molecular Cloning: A laboratory manual 4th Edition, Cold Spring Harbor Laboratory Press, New York.
3. Dubey, R.C. and Maheshwari (2012) Practical Microbiology 5th Edition, S. Chand and company Ltd, New Delhi

Bachelor of Science (Bio-Technology) Semester-II

Session: 2022-23

Course Code: SECM-2502

Moral Education

(Theory)

Time: 3 Hours

Max. Marks: 25

Theory: 20

CA: 05

Course Description:

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

Expectations: -

This academic input has been taken up to sensitize the students to the need of a morally upright character in the present times

EXAMINATION

- **Total Marks: 25 (Final Exam: 20; Internal Assessment: 5)**
- Final Exam: multiple choice Questions Marks-20; Time: 1 hour
- Internal Assessment: 5 (Assessment: 3; Attendance:2)
- Total marks: 25 converted to grade for final result
- Grading system: 90% marks & above: A grade

80%-89% marks : B grade

70%-79% marks : C grade

60%-69% marks : D grade

50%-59% marks : E grade

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

SYLLABUS

Module I: Introduction

- What is Moral Education
- Need content and purpose
- Vedic values

- Character building

Module II: The Self and You

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

Module III: The Family and You

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

Module IV: The Society and You

- Social responsibility
- Our rights and duties
- Civic sense
- Opposite sex relations
- Globalization and IT boom - Cellphone menace
- Drug abuse
- Sex abuse

Module V: The Nation and You

- International peace and brotherhood
- Saving the environment

B.Sc. Bio-Technology Semester-III

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3061
Fundamentals of Biotechnology
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

CO1: Know Basic Concept of Biotechnology and recombinant technology

CO2: Understand applications of biotechnology in health care and agriculture

CO3: Know how biotechnology can impact the research and development in industry and food technology.

CO4: Know different Ethical issues pertaining to biotechnology

CO5: Understand the concept of biodegradation, bioremediation and biotransformation

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3061
Fundamentals of Biotechnology
(Theory)

Time: 3 Hours

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

Instructions for the Paper Setter

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

UNIT-I

Emergence, scope and basics of biotechnology

Historical perspective, Appraise the interplay of science & technology in the development of biotechnology, Definition and areas of Biotechnology, Overview - DNA, gene, gene expression, Recombinant DNA technology. Role of Bacteria (*E.coli*), Yeast, Viruses (bacteriophages), *Drosophila melanogaster*, *Caenorhabditis elegans*, *Arabidopsis thaliana* as workhorses of biotechnology. Biotechnology Research in India. Biotechnology Institutions in India (Public and Private Sector), Biotech Success Stories, Biotech Policy Initiatives.

UNIT-II

Applications of Biotechnology: An Overview

Applying Biotechnology to Modern life styles: Healthcare – Biopharma : Recombinant human insulin, Recombinant hepatitis B Vaccine; molecular diagnostics : PCR for infectious disease (viral / bacterial), blood screening and genetic testing, Gene therapy (for Alzheimer's disease), genetic counseling); Agriculture & food production (Genetically engineered food, Seed banks, aquaculture); Green biotechnology (Bioremediation, Biofuels, Conservation); Forensics & biodefense; Evo Devo (The development of life and human family tree); careers and employment opportunities in biotechnology.

UNIT-III

Bio business and IPRs in Biotechnology

Commercialization of Biotechnology: Concerns and Consequences, Biotechnology Industry Practices & Government regulations, Concept and market potential of Bio business, Requirements and Objectives of Patent, Patentable and non-patentable inventions, process of writing and filing a patent, patenting genes/ gene fragments /SNPs/ proteins / stem cells. Patents related to bacteria, viruses, fungi and medicinal plants, Plant Breeder's Right. IPR: Introduction, types (Trade secret, Copyright, trademark)

UNIT-IV

Biotechnology & Society

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

Books Recommended:

1. David P Clark & Nanette J. Pazdernik (2017) Biotechnology – Applying the Genetic Revolution, Elsevier Academic Press.
2. Bernard R Glick, Jack J Pasternak and Cheryl L Patten (2010) Molecular Biotechnology: Principles and applications of Recombinant DNA, ASM Press.
3. Singh, B.D. (2018). Biotechnology expanding horizons, Kalyani Publishers, New Delhi.
4. Singh, I. and Kaur, B (2010) Patent law and Entrepreneurship, 3rd Edition, Kalyani Publishers.

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3061(P)
Fundamentals of Biotechnology
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Learn Good lab practices in Biotechnology Laboratory

CO2: Apply principle, working and applications of instruments viz., laminar air flow, autoclave, hot air oven etc.

CO3: Know the Handling and disposal procedure regarding hazardous reagents

CO4: Know different steps in Patent writing

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3061(P)
Fundamentals of Biotechnology
(Practical)

Time: 3 Hrs.

Max. Marks: 18

Instructions for the practical Examiner:

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

Experiments:

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

Bachelor of Science (Bio-Technology) Semester-III

Session: 2022-23

Course Code: BBTM-3062

Immunology-I

(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Familiarize with the Immune system

CO2: Know about different immune cells providing immunity

CO3: Understand immunoglobulin structure and different pathways of complement systems

CO4: Have understanding of Major Histocompatibility system in relation to disease susceptibility

Bachelor of Science (Bio-Technology) Semester-III

Session: 2022-23

Course Code: BBTM-3062

Immunology-I

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter

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

Unit-I

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

Unit-II

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

Unit-III

Introduction of Antigen and Antibody, Epitope (B cell & T Cell epitope), Introduction to Immunogen, Molecular basis of immunogenicity and antigenicity, Factors influencing immunogenicity. Immunoglobulins: classes and structure, affinity and avidity. Antigen-Antibody Interaction. Complement fixing antibodies and complement cascade: Classical, Alternative and Lectin Pathway.

Unit-IV

MHC class I and class II molecules, structure and function of class I and class II MHC molecules. Organization of Major Histocompatibility complex (MHC) and inheritance, regulation of MHC expression and disease susceptibility. T & B Cells and their response, Structure of T-cell antigen receptors: TCR-CD3 complex.

Books Recommended:

1. Punt, J., Stranford, S., Johns, P. And Owen, J.A (2018). Kuby Immunology, 8th Edition. W.H. Freeman and Company, New York.
2. Delves, P. J., Martin, S. J., Burton, D. R. and Roitt, I.M. (2017). Roitt's Essential Immunology, Wiley Blackwell Publishers.
3. Paul, W.E. (2012). Fundamental Immunology, 7th Edition, LWW Publishers.

4. Kanfmann, S.H.E., Sher A. and Ahmed, R. (2002). Immunology of Infectious Diseases, ASM Press, Washington, D.C.
5. Roitt, I.M. Brostoff, J. and Male, D.K. (2012). Immunology, 8th Edition, Mosby publishers.

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3062(P)
Immunology-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Collect blood sample by different methods

CO2: Calculate Differential leucocyte count, Total leucocytes and RBC count in the given blood sample

CO3: Perform Blood group testing, isolation of mononuclear cells from peripheral blood

CO4: Perform various immunological techniques

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3062 (P)
Immunology-I
(Practical)

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. Blood Group testing.
2. Differential leucocytes count.
3. Total Leucocytes count.
4. Total RBC count
5. Separation of serum & Plasma from blood.
6. Isolation of mononuclear cells from peripheral blood and to check their viability by dye exclusion method.
7. Collection of blood sample by different method.
8. To perform Double immune diffusion.

Books Recommended:

1. Celis, J.E., Hunter, T. and Carter, N (2005). Cell Biology: A laboratory handbook. 3rd Edition, Vol-III, Academic Press, U.K.
2. Stevans, C.D. (2017). Clinical Immunology and Serology: A Laboratory Perspective 4th Edition, F.A Davis Company, Philadelphia.
3. Hay, F.C. and Westwood O.M.R. (2002). Practical Immunology, 4th Edition, Wiley Blackwell.

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3083
Chemistry-II
(Theory)

COURSE OUTCOME:

Students will be able to

CO1: explain the various reactive intermediates.

CO2: explain the bonding between different organic compounds

CO3: explain the effect of various substituents on the reactivity of aromatic compounds

CO4: learn Molecular chirality, enantiomers, the Cahn-Ingold Prelog R-S notational system, Resolution of enantiomers, chiral centres other than carbon.

CO5: understand mechanism of nucleophilic substitution, stereochemistry of SN^1 and SN^2 reactions

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3083
Chemistry-II
(Theory)

Time: 3 Hours

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

UNIT-I

Reactive intermediates

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

Bonding

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

UNIT-II

Aromaticity

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

UNIT-III

Stereochemistry: Molecular chirality, enantiomers/symmetry in achiral structures, chiral centres in chiral molecules, properties of chiral molecules-optical activity, absolute and relative configuration,

the Cahn-Ingold Prelog R-S notional system physical properties of enantiomers. Stereochemistry of chemical reactions that produce chiral centres, chemical reactions that produce stereoisomers, Resolution of enantiomers, chiral centres other than carbon, prochirality.

UNIT-IV

Nucleophilic substitution :Functional group transformation by nucleophilic substitution, the bimolecular (SN^2), mechanism of nucleophilic substitution , stereochemistry of SN^2 reactions, how SN^2 reactions occur, steric effect in SN^2 reactions, nucleophiles and nucleophilicity, the unimolecular (SN^1) mechanism of nucleophilic substitution, carbocation stability and the rate of substitution, by the SN^1 mechanism stereochemistry of SN^1 reactions, carbocation rearrangements in SN^1 reactions, solvent effects, substitution and elimination as competing reactions.

Books Recommended:

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

Bachelor of Science (Bio-Technology) Semester-III

Session: 2022-23

Course Code: BBTM-3083 (P)

Chemistry-II

(Practical)

COURSE OUTCOMES:

Students will be able to

CO1: Detect elements (N, S and halogens) in simple organic compounds

CO2: Detect functional groups (Aldehydes, ketones carbohydrates, hydrocarbons, Amides, Amines, Carboxylic acids and phenols) in simple organic compounds

CO3: Prepare their derivatives of organic compounds.

CO4: Confirm the unknown organic compounds by determining its M.P.

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3083 (P)
Chemistry-II
(Practical)

Time: 3.0 Hrs.

Practical Marks: 18

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

Experiments:

Organic qualitative analysis:

Complete identification including derivation of following organic compounds:

- Amides
- Amines
- Carboxylic acids and phenols.

Organic qualitative analysis:

Complete identification including derivation of following organic compounds:

- Aromatic hydrocarbons
- Aldehydes
- Ketones
- Carbohydrates

Books Recommended:

Arthur Vogel (1978), Vogel's Textbook of practical organic chemistry, including qualitative organic analysis, 4th ed., Longman Scientific and Technical

Bachelor of Science (Biotechnology) Semester – III
Session 2022-23
Course Code: BBTM-3074
Botany-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

- CO1:** Understand the plants and plant cells in relation to water
- CO2:** Understand the chemical contents of the plant products
- CO3:** Know the concept and characteristics of antiseptic, disinfectant and their mode of action.
- CO4:** Know the prevention and control measures of plant diseases and its effect on economy of crops.

Bachelor of Science (Bio-Technology) Semester- III

Session 2022-23

Course Code: BBTM-3074

Botany-II

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter:

Eight questions of equal marks (6 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

Suggested Readings:

1. Salisbury, F.B. and C.W. Ross (1992), Plant Physiology, Wadsworth Publication Company
2. Taiz, L. and Zeiger, E. (2002), Plant Physiology. 3rd Edn., Sinauer Associates
3. Srivastava, H.N. (2005) Plant Physiology, Pardeep Publications.
4. Pandey, B.P. (2014) Plant Pathology, S Chand.
5. M.J. Carlile, S.C. Watkinson & G.W. Gooday (2001), The Fungi 2nd Ed. Academic Press.
6. G.N. Agrios (2008), Plant Pathology 5thEd., Academic Press.
7. R.S. Mehrotra and Ashok Aggarwal (2003) Plant Pathology Tata McGraw Hill New Delhi.

Bachelor of Science (Bio-Technology) Semester- III
Session 2022-23
Course Code: BBTM-3074 (P)
Botany-II
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to develop:

CO1: Practical skill on plants and plant cells in relation to water

CO2: Know the symptoms and control measures of plant diseases and its effect on economy of crops.

Bachelor of Science (Bio-Technology) Semester- III
Session 2022-23
Course Code: BBTM-3074(P)
Botany-II
(Practical)

Time: 3Hrs

Practical: 18

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

Experiments:

1. Estimation of relative water content of leaf.
2. Measurement of osmotic potential of different tissues by Chardokov method.
3. Demonstrate the transpiration pull by mercury method.
4. Demonstration that O₂ is evolved during photosynthesis.
5. Separation of pigments by paper chromatography/TLC method.
6. Study of Plant pathogens (a) Symptoms of the diseases (b) Morbid anatomy of the plants infected with following diseases:
Black stem rust of wheat, Loose smut of wheat, Late and early blight of potato, Red rot of sugarcane, TMV of potato, Yellow vein mosaic of bhindi.

Suggested Readings:

1. Salisbury, F.B. and C.W. Ross (1992), Plant Physiology, Wadsworth Publication Company
2. Taiz, L. and Zeiger, E. (2002), Plant Physiology. 3rd Edn., Sinauer Associates
3. Srivastava, H.N. (2005) Plant Physiology, Pardeep Publications.
4. Pandey, B.P. (2014) Plant Pathology, S Chand.
5. M.J. Carlile, S.C. Watkinson & G.W. Gooday (2001), The Fungi 2ndEd. Academic Press.
6. G.N. Agrios (2008), Plant Pathology 5thEd., Academic Press.
7. R.S. Mehrotra and Ashok Aggarwal (2003) Plant Pathology Tata McGraw Hill New Delhi.

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3085
Biochemistry-III
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Develop an understanding of Carbohydrates metabolisms in cell

CO2: Understand the Amphibolic nature of Kreb's cycle

CO3: Know Electron transport chain and ATP synthesis occurring inside cell

CO4: Understand the lipid metabolism occurring inside the cell

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3085
Biochemistry-III
(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

UNIT-1

Carbohydrate metabolism: - Biosynthesis and degradation of carbohydrates, Glycolysis, gluconeogenesis, feeder's pathways for glycolysis, regulation of carbohydrates metabolism.

UNIT-II

Kreb's cycle: - Amphibolic nature of kreb's cycle, regulation and enzymes of kreb's cycle, glyoxylate pathway. Electron transport chain: - Mitochondrial electron chain, oxidative phosphorylation, chemiosmotic hypothesis, ATP synthase and regulation of ATP synthesis

UNIT-III

Lipid digestion, Absorption and transport. Lipid Catabolism: Oxidation of fatty acids (Alpha, Beta, Omega oxidation), degradation of triacylglycerol, phosphoglycerides, sphingolipids, regulation of lipid metabolism.

UNIT-IV

Lipid Anabolism: Synthesis of fatty acids, triacylglycerol, phosphoglycerides, sphingolipids, cholesterol and regulation of Cholesterol metabolism.

Books Recommended:

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

2. Stryer, L. (2015). Biochemistry, 8th Edition, W.H. Freeman and Company, New York
3. Berg, J.M., Tymoczko, J. L. And Stryer, L. (2011). Biochemistry, 7th Edition, Freeman.
4. Nelson, D.L. and Cox, M.M. (2013). Principles of Biochemistry, 7th Edition, Freeman
5. Mathew, C.K., Van, K.E. and Anther, K.G. (2012). Biochemistry 4th Edition, Addison Wesley.
6. Lehninger, A.L., Nelson, D.L. and Lox, M.M. (2017). Principles of Biochemistry, 7th Edition, CBS Publishers and Distributors, New Delhi.

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3085 (P)
Biochemistry-III
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Perform carbohydrate estimation and determination of reducing sugar in the given sample

CO2: Understand the importance of absorbance maxima and perform spectral analysis of plant pigments

CO3: Separate lipids from wheat grains sample

CO4: Perform thin layer chromatography to separate macromolecules

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3085 (P)
Biochemistry-III
(Practical)

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. Carbohydrate estimation by Dubois method.
2. Determination of reducing sugar using 3,5 dinitrosalicylic acid.
3. (a) Absorbance curve of two dyes
(b) Spectral analysis of various plant pigments
4. Separation of lipids from wheat grains.
5. Separation of macromolecules using thin layer chromatography.

Books Recommended:

1. Celis, J.E., Hunter, T. and Carter, N (2005). Cell Biology: A laboratory handbook. 3rd Edition, Vol-III, Academic Press, U.K.
2. Stevans, C.D. (2017). Clinical Immunology and Serology: A Laboratory Perspective 4th Edition, F.A Davis Company, Philadelphia.
3. Hay, F.C. and Westwood O.M.R. (2002). Practical Immunology, 4th Edition, Wiley Blackwell.

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3066
Molecular Biology
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Study Molecular aspects of genetics.

CO2: Have full understanding of basic mechanism and essential component required for DNA replication in prokaryotic & eukaryotic organisms

CO3: Explain the concept of genetic code, decoding system, codon-anticodon interactions, and selection of initiation codons, initiation, elongation, termination and also regulation of translation.

CO4: Know how different genes are expressed and regulated in a cell by using different operon model.

Bachelor of Science (Bio-Technology) Semester-III

Session: 2022-23

Course Code: BBTM-3066

Molecular Biology

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

Unit-I

DNA as genetic material, Structure of DNA, Types of DNA, Modes of Replication of DNA in prokaryotes and eukaryotes, DNA polymerases, the replication complex: Pre-priming proteins, Fidelity of replication. Mechanism of replication.

Unit - II

DNA recombination in prokaryotes and eukaryotes: molecular mechanisms, Holiday Junction model, DNA damage and repair: causes and types of DNA damage, mechanism of DNA repair, Insertion elements and transposons: Bacterial and eukaryotic transposons.

Unit-III

Transcription and RNA processing

RNA structure and types of RNA, Transcription in prokaryotes: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains, Transcription in eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance and elongation RNA splicing and processing: processing of pre-mRNA: 5' cap formation, polyadenylation, splicing, rRNA and tRNA splicing.

UNIT IV

Regulation of gene expression and translation

Regulation of gene expression in prokaryotes: Operon concept (inducible and repressible system): lac, his, trp operons, Genetic code and its characteristics, Prokaryotic and eukaryotic translation: ribosome structure and assembly, Charging of tRNA, aminoacyl tRNA synthetases, Mechanism of initiation,

elongation and termination of polypeptides, Fidelity of translation, Inhibitors of translation, Regulation, Posttranslational modifications of proteins

Books Recommended:

1. Adams, R. L. P., Knowler, J. T., and Leader, D. P. (1992). *The Biochemistry of Nucleic acids*, 11th Edition, Chapman and Hall, The New York/London/Tokyo/Melbourne/Madras.
2. Bolsover, S. R., Hyams, J. S., S. Shephard, E. A. and White H. A. (1997). *From Genes to Cells*, John Wiley and Sons.
3. Krebs, J E, Goldstein, ES, Kilpatrick, ST (2017). *Lewin's Gene XII*, Jones and Bartlett publishers, Inc.
4. Maulik, S. and Patel, S. D. (1997). *Molecular Biotechnology Therapeutic Application and Strategies*, John Wiley & Sons.
5. Primrose, SB and Twyman, R. (2010). *Principles of Gene Manipulation and genomics*, 8th Edition, Wiley Blackwell.
6. Strachan, T. and Read, A. (2010). *Human Molecular Genetics*, Garland Science
7. Pierce, B. (2016). *Genetics: A conceptual approach*, 6th Edition, WH Freeman.

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3066(P)
Molecular Biology
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Isolate genomic DNA and RNA from plants

CO2: Perform agarose gel electrophoresis.

CO3: Quantify DNA.

CO4: Do SDS-PAGE electrophoresis of different protein samples.

Bachelor of Science (Bio-Technology) Semester-III

Session: 2022-23

Course Code: BBTM-3066(P)

Molecular Biology

(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

Experiments

1. Isolation of genomic DNA from plants by CTAB method.
2. Isolation of genomic DNA from blood and perform agarose gel electrophoresis.
3. Quantification and determination of purity of DNA.
4. To perform RNA Isolation from plants.
5. Quantification and determination of purity of RNA.
6. SDS-Page electrophoresis of different protein samples.

Books Recommended:

1. Primrose, SB and Twyman, R. (2010). Principles of Gene Manipulation and genomics, 8th Edition, Wiley Blackwell
2. Sambrook J. and Green M. R. (2013). Molecular Cloning: A Laboratory Manual, 4th Edition, CSHL.
3. Brown T.A (2017). Genomes, 3rd Edition, Garland Science.

Bachelor of Science (Bio-Technology) Semester-III
Session: 2022-23
Course Code: BBTM-3221
Environmental Studies (Compulsory Paper)

Time: 3 Hours

Max. Marks: 100

Theory: 60

Practical: 20

CA: 20

COURSE OUTCOMES:

After passing this course student will be able to:

CO1: Understand the concept and need of environmental education.

CO2: Understand the role of an individual in conservation of natural resources.

CO3: Learn about role of major Eco system and their conservation.

CO4: Develop desirable attitude value and respect for protection of Biodiversity.

CO5: Learn about the control measure of pollution and solid waste management.

CO6: Understand the role of different agencies in the protection of environment.

CO7: Knowledge regarding welfare programmes and Human rights.

CO8: Knowledge about the applied value of environmental studies.

Bachelor of Science (Bio-Technology) Semester-III

Session: 2022-23

Course Code: BBTM-3221

Environmental Studies (Compulsory Paper)

Time: 3 Hours

Max. Marks: 100

Theory: 60

Project Report: 20

CA: 20

Instructions for the Paper Setter:

The question paper should carry 60 marks.

The structure of the question paper being:

Part-A, Short answer pattern – 20 marks

Attempt any five questions out of seven. Each question carries 4 marks. Answer to each question should not exceed 2 pages

Part-B, Essay type with inbuilt choice – 40 marks

Attempt any five questions out of eight. Each question carries 8 marks. Answer to each question should not exceed 5 pages.

Unit 1

The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

Unit 2

Natural Resources: Renewable and non-renewable resources:

Natural resources and associated problems.

- (a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit 3

Ecosystems

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

Unit 4

Biodiversity and its conservation

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

Unit 5

Environmental Pollution

Definition

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

- Disaster management: floods, earthquake, cyclone and landslides

Unit 6

Social Issues and the Environment

- From unsustainable to sustainable development
 - Urban problems and related to energy
 - Water conservation, rain water harvesting, watershed management
 - Resettlement and rehabilitation of people; its problems and concerns. Case studies.
 - Environmental ethics: Issues and possible solutions
 - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
 - Wasteland reclamation
 - Consumerism and waste products
 - Environmental Protection Act, 1986
 - Air (Prevention and Control of Pollution) Act, 1981
 - Water (Prevention and control of Pollution) Act, 1974
 - Wildlife Protection Act
 - Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

Unit 7

Human Population and the Environment

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

Unit 8

Field Work

- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-pond, river, hill slopes, etc

References:

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

Bachelor of Science (Bio-Technology) Semester-III

Session: 2022-23

Course Code: SECP-3512

Personality Development

Time: 3 Hours

Max. Marks: 25

Theory: 20

CA: 05

PURPOSE

To enhance holistic development of students and improve their employability skills.

INSTRUCTIONAL OBJECTIVES

- To re-engineer attitude and understand its influence on behaviour.
- To develop inter-personal skills and be an effective goal-oriented team player.
- To develop communication and problem solving skills.
- To develop professionals with idealistic, practical and moral values.

LEARNING OUTCOMES

- On completion of the course, students will be able to hone their personality by
- Realisation of the importance and incorporation of positive thinking and attitude in life
- Enhancement of self confidence and analysis of self capabilities
- Learning the different communication skills for self expression
- Effective use of time to combat stress and increase in productivity
- Enhancing personality by physical grooming and fitness
- Understanding the role of design principles and appropriateness of apparel
- Incorporating social etiquettes in daily life and conduct
- Excelling in decision making and leadership qualities

CURRICULUM

Course credits-2

Total Contact Hours-30

MODULE	TITLE	HOURS
1.	Positive Thinking & Attitude	2
2.	Self Analysis & Self Confidence	2

3.	Communication Skills	10
	<ul style="list-style-type: none"> • Basic Communication Skills • Body Language • Interview Skills • Résumé Writing • Group Discussion • Telephone and E-mail etiquette • Public Speaking 	
4.	Time Management	2
5.	Stress and Conflict Management	2
6.	Physical Fitness and Personal Grooming	2
7.	Appropriateness of Apparel	2
8.	Social Etiquette	2
9.	Decision Making process & Problem Solving Skills	5
	<ul style="list-style-type: none"> • Leadership Skills • Goal Setting • Motivation 	
10.	Closure	1

EXAMINATION

1. Total marks of the course will be 25 (Final Examination: 20 Marks; Internal Assessment: 5Marks)
2. The pattern of the final examination will be multiple choice questions. 25 multiple choice type questions will be set. The student shall attempt 20 questions. Each question will carry 1 mark (20 X 1 = 20). Total time allotted will be 1 hour.
3. Internal Assessment will consist of Attendance: 2 Marks, Internal: 3 Marks.(Total Internal Assessment:5 Marks)

SYLLABUS

MODULE 1: Positive Thinking & Attitude

- Factors Influencing Attitude
- Essentials to develop Positive Attitude
- Challenges & lessons from Attitude

MODULE 2: Self Analysis & Self Confidence

- Who am I
- Importance of Self Confidence
- SWOT Analysis

MODULE 3: Communication Skills

(i) Basic Communication Skills

- Speaking skills
- Listening skills
- Presentation skills

(ii) Body Language

- Forms of Non-Verbal Communication
- Interpreting body language clues
- Effective use of body language

(iii) Interview Skills

- Type of Interviews
- Ensuring success in job interviews
- Appropriate use of Non-verbal Communication

(iv) Résumé Writing

- Features
- Different types of résumé for Different posts

(v) Group Discussion

- Difference between Group discussion and debate
- Importance of Group Discussion

- Group Decision
- Ensuring success in group discussions

(vi) Telephone & E-mail Etiquette

- Telephone etiquette
- E-mail etiquette

(vii) Public Speaking

- Introductory speech
- Informative speech
- Persuasive speech
- Extempore session

MODULE 4: Time Management

- Importance of time management
- Values & beliefs
- Goals and benchmarks – The ladders of success
- Managing projects and commitments
- Prioritizing your To-do's
- Getting the results you need

MODULE 5: Stress & Conflict Management

- Introduction to stress
- Types of stressors
- Small changes and large rewards
- Stress prevention
- Overcoming unhealthy worry
- Stress at home and workplace
- Dealing with frustration and anger
- Stress reducing exercises
- Understanding conflicts
- Violent and Non-violent conflicts
- Source of conflict
- Structural and cultural violence

MODULE 6: Physical Fitness and Personal Grooming

- Fitness and exercise
- Balanced & healthy diet
- Skin care & Hair care
- Make-up skills

MODULE 7: Appropriateness of Apparel

- Apparel & Personality
- Psycho-social aspects of apparel
- Style-tips for smart dressing & effective use of design elements

MODULE 8: Social Etiquette

- Civic Sense
- Workplace skills
- Meeting and greeting people
- Table Setting and table manners

MODULE 9: Decision Making Process and Problem Solving Skills

- Anatomy of a decision
- How to use problem solving steps and problem solving tools
- How to distinguish root causes from symptoms to identify right solution for right problems
- How to improve problem solving and decision making by identifying individual problem solving styles
- The creative process for making decisions
- Tools to improve creativity
- Implementing the decision – Wrap up

(i) Leadership Skills

- Handling peer pressure and bullies
- Team work
- Decision making
- Taking initiatives

(ii) Goal Setting

- Wish list
- SMART goals
- Blueprint for success

- Short-term, Long-term, Life-term Goals

(iii) Motivation

- Factors of motivation
- Self talk
- Intrinsic & extrinsic motivators

Books Recommended

1. Rossi, P. (2011). *Everyday Etiquette: How to navigate 101 common and uncommon social situations*. St Martins Pr.
2. Pietrzak, T., & Fraum, M. (2005). *Building career success skills*. ASTD Press.
3. Treffinger, D.J., Isaksen, S.G., & Brian, K. (2005). *Creative problem solving: An Introduction*.
4. Carr, A. (2004). *Positive Psychology: The science of happiness and human strengths*. Burnner-Routlrdge.
5. Oberg, B.C. (1994). *Speech craft: An Introduction to public speaking*. Meriwether Publishing.

B.Sc. Bio-Technology Semester-IV

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4061
Industrial Biotechnology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the basics of microbial industrial process

CO2: Know about isolation of industrially important microbes and their screening methods

CO3: Understand different Strain Improvement method required for industrial important microbes and
Know Media formulation and its optimization process

CO4: Understand Primary and secondary metabolite production at industrial level

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4061

**Industrial Biotechnology-I
(Theory)**

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setters:

Eight questions of equal marks (6 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. Each question carries 6 marks.

Unit-I

Introduction: Basic concept of agriculture and food processing as industry, Methods and Principles of Food Processing, Differences between microbial industrial processes and chemical industrial processes.

Unit-II

Industrially important microbes, screening (primary and secondary methods), selection and identification. Maintenance and preservation of industrially important microbial cultures.

Unit-III

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

Unit-IV

Introduction to primary and secondary metabolites production. Dairy products like curd, yoghurt, Cheese, bread. Fermented foods-Pickles, Saurkraut, Enzyme production-Amylases, cellulases, proteases in leather industries.

Books Recommended:

1. Wittmann, C. and Liao, J. (2017). Industrial Biotechnology:Products and Processes (Advanced Biotechnology), Vol. 4 Wiley-VCH.
2. Singh B.D. (2016). Biotechnology:Expanding horizons, Kalyani Publishers / Lyall Bk Depot
3. Chakraborty, P.K. (2013). Agro and Industrial Biotechnology, Black Prints
4. Tyagi, N. (2012). Industrial Microbiology and Biotechnology, Agrotech Press.

5. Casida, L.E.J.R. (2007). *Industrial Microbiology*, New Age International Publishers
6. Okafor N, Okeke B.C. (2018). *Modern Industrial Microbiology and Biotechnology*, 2nd edition, CRC Press.

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4061(P)

**Industrial Biotechnology-I
(Practical)**

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Measure any bacterial size

CO2: Perform IMVIC test for metabolic characterization of bacteria

CO3: Isolation of enzyme producing microbes

CO4: Starter culture preparation

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4061(P)

**Industrial Biotechnology-I
(Practical)**

Time: 3 Hrs.

Max. Marks: 18

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

Experiments

1. Measurement of bacterial size.
2. Metabolic Characterization by IMVIC test
3. Isolation of Amylase producing microbes.
4. Starter culture preparation, evaluation and application.
5. Screening of cellulase producing microorganism from wood degrading soil.

Books Recommended:

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

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4062

Immunology-II

(Theory)

COURSE OUTCOMES:

After passing this course, student will be able to

CO1: Familiarize with immune effector mechanisms, hybridoma technology and vaccination

CO2: Have sound knowledge of how immune system deals with various pathogens, different processes and different cell types involved in the prevention of disease.

CO3: Become aware about concept, synthesis and action mechanism of vaccines.

CO4: Perform various immune-diagnostic techniques.

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4062

Immunology-II

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

Unit-I

T-cell subsets and surface markers, T-dependent and T-independent antigens, Adjuvants, Monoclonal antibodies: its production and uses.

Unit-II

Various types of immunodiffusion and immunoelectrophoretic procedures. Immunoblot, ELISA, RIA, Agglutination of pathogenic bacteria, Haemagglutination and haemagglutination inhibition.

Unit-III

Immune invasion: mechanism used by parasites, regulation of immune invasion, Immunity to viruses, intracellular and extracellular bacteria, immunopathological consequences of parasitic infections.

Unit-IV

Whole organism vaccine, Types of vaccines: purified macromolecules as vaccine, recombinant antigen vaccine, recombinant vector vaccine, synthetic peptide vaccine, multivalent subunit vaccine, DNA Vaccine, RNA Vaccine.

Books Recommended:

1. Abbas, A.K. Litchman, A.H. and Pillai, S. (2017). Cellular and Molecular Immunology, 9th Edition, Elsevier.
2. Benjamni, E., Coico, R. and Sunshine, G. (2015). Immunology: A short course, 7th Edition, New York, Wiley- Wiley-Blackwell.
3. Delves, P. J., Martin, S. J., Burton, D. R. and Roitt, I.M. (2017). Roitt's Essential Immunology, Wiley Blackwell Publishers.

4. Roitt, I., Brostoff, J. and Male, D. (2001). Immunology, 6th Edition, Mosby.
5. Kanfmann S.H.E., Sher, A., Ahmed, R. (2002). Immunology of infectious Diseases, ASM Press, Washington D.C.
6. Butler, M. (2004). Animal Cell culture and Technology, 2nd Edition, Garland Science.
7. Punt, J., Stranford, S., Johns, P. And Owen, J.A (2018). Kuby Immunology, 8th Edition, W.H. Freeman and Company, New York.

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4062(P)
Immunology-II
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Prepare Vaccine chart of child.

CO2: Study Haemagglutination & Haemagglutination inhibition assay.

CO3: Perform Direct and indirect ELISA.

CO4: Perform Double immunodiffusion test.

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4062(P)

Immunology-II

(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

Experiments

1. Preparation of vaccine chart of child, highlighting optional vaccines
2. Haemagglutination assay
3. Haemagglutination inhibition assay
4. Double immunodiffusion test using specific antibody and antigen Line of identity, partial identity and non-identity
5. Single immunodiffusion test using specific antibody and antigen
6. Direct and indirect ELISA
7. To perform Immunoelectrophoresis.
8. Separation and purification of IgG antibodies from Serum using protein A column.

Books Recommended:

1. Stevans, C.D. (2003). Clinical Immunology and Serology: A Laboratory Perspective 2nd Edition, F.A Davis Company, Philadelphia.
2. Celis, J.E., Hunter, T. and Carter, N. (2005). Cell Biology: A laboratory handbook. 3rd Edition, Vol-III, Academic Press, U.K.
3. Hay, F.C. and Westwood O.M.R. (2002). Practical Immunology, 4th Edition, Wiley Blackwell.

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4083

Biochemistry-IV

(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Know the main objective of amino acid metabolism and urea cycle

CO2: Have knowledge of importance of essential amino acids, its biosynthesis and their regulation.

CO3: Explain the Biosynthetic pathways of purines and pyrimidines nucleotides

CO4: Explain the Degradative pathways of purines and pyrimidines

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4083

Biochemistry-IV

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

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. Each question carries 6 marks.

UNIT-I

Amino Acid Metabolism: Overview of amino acid metabolism. Glucogenic and ketogenic amino acids. Biosynthesis of essential amino acids, Regulation of amino acid biosynthesis by feedback inhibition

UNIT-II

Amino Acid Metabolism: Transamination reactions of amino acids, Deamination and decarboxylation reactions. Role of pyridoxal phosphate, Urea cycle and inherited defects of urea cycle. catabolism of essential amino acids, Disorders of amino acids metabolism, phenylketonuria, alkaptonuria, maple syrup urine disease, methylmalonic academia (MMA), homocystinuria

UNIT-III

Nucleic Acid Metabolism: Structure of purine and pyrimidine bases. Nucleosides and nucleotides. Biologically important nucleotides. Biosynthesis of purines and pyrimidines nucleotides Clinical significance of purine biosynthetic pathway.

UNIT-IV

Nucleic Acid Metabolism: Degradation of purines and pyrimidines, nucleotides, salvage pathway. Regulation of nucleotide biosynthesis.

Books Recommended:

1. Jain, J. L., Jain, S. and Jain. N. (2016). Fundamentals of Biochemistry, S. Chand & Company Ltd., New Delhi.
2. Rawn, J.D. (1989). Biochemistry, Niel Patterson Publications, North Carolina.
3. Berg, J.M., Tymoczko, J.L., Gatto, G.L., Stryer, L. (2015). Biochemistry, 4th Edition., W.H. Freeman & Co., San Francisco.
4. Voet, D., Voet, J.G. (2012). Fundamentals of Biochemistry, John Wiley and Sons, New York.

5. Nelson, D.L. and Cox, M.M. (2017). *Lehninger's Principles of Biochemistry*, 7th Edition.,WH Freeman, New York.

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4083(P)
Biochemistry-IV
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Quantitatively estimate amino acids by using Ninhydrin reaction

CO2: Acquire skills to perform protein purification by using salt precipitation

CO3: Isolate casein from milk to determine isoelectric pH of casein

CO4: Check fat content in milk sample

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4083(P)

Biochemistry-IV

(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

Experiments:

1. Quantitative estimation of amino acids using the Ninhydrin reaction.
2. Purification of protein using salt precipitation.
3. Isolation of Casein from milk and Isoelectric pH of casein.
4. Determination of fat content in milk.
5. Estimation of blood cholesterol.

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4064
Skill Development in Biotechnology
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Detect different food borne infections by different methods

CO2: Test food adulterants Biochemically/ microbiologically.

CO3: Learn all the nutritional aspects of the carbohydrates, lipids & proteins.

CO4: Describe the role of biotechnologies in food production and food processing

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4064
Skill Development in Biotechnology
(Theory)

Time: 3 Hours

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

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. Each question carries 6 marks.

Food Biotechnology

Unit-I

Commercial potential of food fermentation industry; Novel food ingredients: Low calorie sweetener, Plant tissue culture and naturally produced flavor modifiers, natural food coloring agents; Nutraceuticals: Probiotics, Food spoilage: Detection and mechanism of food borne infections (*Clostridium*, *Salmonella*, *Staphylococcus*, *Aspergillus* sp.)

Unit-II

Introduction to HACCP plan, Preservation: thermal processing, cold preservation, chemical preservatives, food dehydration, food irradiation, biological control; Quality assurance: Biochemical/microbial testing of food adulterants: milk, butter, oil, jams, jellies, Government regulatory practices and policies (FSSAI, FDA etc.), Food packaging: need and ways (glass, metal, plastics, moulded pulp and aluminium foil).

Dietetics and Nutrition Management

Unit III

Energy value of biomolecules: carbohydrates, fats and proteins, basal metabolic rate definition and its measurement, factors affecting BMR, energy requirements of human beings, Energy requirements in different age groups and special conditions (pregnant ladies and lactating mothers), different dietary types, requirements, utilization and functions.

Unit-IV

Methods of protein determination, amino acid imbalance, protein requirements, utilization and functions, nutritional aspects of vitamins and minerals, food processing and loss of nutrients during processing and cooking, naturally occurring antinutrients, balanced diet, recommended dietary

allowances for different categories of human beings, disorders related to nutrition-protein energy malnutrition, starvation and obesity.

Books Recommended:

1. Frazier, W.C. and Westhoff, D.C. (2013). Food microbiology (Tata McGraw-Hill publishing Co. Ltd).
2. Admas, M.R. and Moss, M.O. (2015). Food microbiology, 4th Edition, Royal Society of Chemistry).
3. SriLakshmi B. (2018). Food science, 7th Edition, New Age International Publishers, India.
4. Jay J.M., Loessner M.J. and Golden D.A. (2006). Modern Food Microbiology, 7th Edition, Springer India.
5. Sivasankar B. (2004). Food processing and preservation, 1st Edition, Prentice-Hall of India Pvt. Ltd, New Delhi.
6. Michael P. Doyle, Larry R. Beuchat (2007). Food Microbiology: Fundamentals and Frontiers, 3rd Edition, ASM Press.

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4064(P)
Skill Development in Biotechnology
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Check different food adulterants in the given products.

CO2: Determine Gluten content in wheat flour.

CO3: Give quality index of fats content in different food products

CO4: Calculate BMR

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4064(P)
Skill Development in Biotechnology
(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

Experiments:

1. Detection of Adulteration in food (oil, butter).
2. Determination of crude fibre content in wheat and chickpea.
3. Determination of Gluten content in wheat flour.
4. Isolation of protein concentrates.
5. Determination of fat content in different food products.
6. Determine the BMR.

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4065
Fundamentals of Bioinformatics
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand basics of computer and data storage devices

CO2: Understand basics of bioinformatics and sequence alignment

CO3: Know about scoring matrices and database searching

CO4: Know about primary and secondary databases

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4065
Fundamentals of Bioinformatics
(Theory)

Time: 3 Hours

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

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. Each question carries 6 marks.

UNIT-I

Computers: General introduction to computers, organization of computers, Computer hardware and software. Data Storage Devices: Primary and secondary Storage devices. Input/Output Device: Key-tape/diskette devices, light pen mouse and joystick. Printed Output: Serial, line, page, printers; plotters, visual output; voice response units.

UNIT-II

Introduction to bioinformatics: History, Milestones and Applications, Local and Global alignments, Gap Penalties, Pairwise sequence alignments (Needleman-Wunsch, Smith-Watermann Algorithms), Significance of Sequence Alignment.

UNIT-III

Scoring Matrices: PAM, BLOSUM,

Multiple Sequence Alignment: Progressive Alignment, Iterative Alignment Methods,

Database Searching: BLAST and its types

UNIT-IV

Primary and Secondary databases, Online resources of Bioinformatics: Introduction about: NCBI, EBI, DDBJ, Expasy, PUBMED, PDB, UNIPROT, Pfam, Prosite.

Books Recommended:

1. Norton's P. (2017). Introduction to Computing Fundamental, 7th Edition, McGraw Hill Education, New Delhi.
2. Sinha P.K. (2010). Fundamental of Computers, 8th Edition, BPB Publication, New Delhi.
3. Jin Xiong. (2006) Essential Bioinformatics. Cambridge University Press.

4. Baxevais B.F. and Quellette F. (2004). *Bioinformatics a Practical Guide to the Analysis of Genes and Proteins*, 3rd Edition, Wiley-Interscience

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4065 (P)
Fundamentals of Bioinformatics
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Use and perform MS -office

CO2: Know and use various databases

CO3: Perform Sequence alignment

CO4: Perform prediction of protein functional domain

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4065 (P)
Fundamentals of Bioinformatics
(Practical)

Time: 3 Hrs.

Practical Marks: 18

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

Experiments:

1. Ms-Office: word, Excel, Power-point
2. Introduction about Various Databases: NCBI, EMBL, UNIPROT, PUBMED
3. GenBank Format, FASTA format etc
4. Basic Local Alignment Search tools (BLAST)
5. Multiple Sequence Alignment using Clustal Omega
6. Prediction of Protein functional domain using PFAM/PROSITE

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4486

Zoology-II

(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand evolution of Prokaryotes and Eukaryotes.

CO2: Understand the process and theories in evolutionary biology.

CO3: Aware the students about various pathogenic protozoans and helminths and diseases caused by them in humans.

CO4: Understand diseases caused by arthropod vectors and their control measures.

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4486

Zoology-II

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setters:

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

Unit-1

Origin of Life on Earth: Origin of earth and primitive earth conditions, Theories of origin of life (Theory of Extraterrestrial contact- Import of life through meteorites, Special creation theory, Oparin Haldane Theory, Abiogenesis, Evidences against theory of spontaneous generation of life, Biogenesis, Theory of chemical evolution, Miller & Urey Experiment).

Evolution of Prokaryotes and Eukaryotes (unicellularity to multicellularity).

Unit-2

Evolution: Definition, Scope and History, Theories of Evolution (Lamarckism, Darwinism, Hugo de Vries and Modern theory of Evolution).

Geological time scale.

Unit-3

Introduction to Parasitology (pertaining to various terminologies in use).

Brief account of Life history, mode of infection and pathogenicity of the following pathogens with reference to man, prophylaxis and treatment.

Pathogenic Protozoans: Entamoeba, Trypanosoma, Giardia and Plasmodium.

Pathogenic Helminths: Tape Worm, Ascaris and Ancylostoma.

Unit-4

Arthropod vectors of human diseases: Malaria, Yellow fever, Dengue haemorrhagic fever, Filariasis, Plague and Epidemic typhus.

Distribution and control of the above mentioned vectors.

Books:

1. Sobti, R.C. & Nigam, S.K. (2002). Structural & function biology of chordates, Vishal Publishers, Jalandhar.
2. Sobti, R.C. & Sharma, V.L. (2005). Basics of Biotechnology: Introduction of Life Sciences. Vishal Publishers, Jalandhar.
3. Sobti, R.C. (2005). Introduction to Biotechnology, Part-2, Concepts Tools and Application, Vishal Publishers.

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2022-23

Course Code: BBTM-4486(P)

Zoology-II

(Practical)

COURSE OUTCOMES

After passing this course the student will be able to:

CO1: Aware the students for various parasites and diseases which spreads in human with the help of study of host-parasite relationship.

CO2: Aware about the typhoid, cholera likes disease.

CO3: Understand the evolutionary phenomena.

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: BBTM-4486(P)
Zoology-II
(Practical)

Time: 3 Hrs.

Max. Marks: 18

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

1. Study of Evolutionary phenomenon with the help of charts / models /videos:

Homology, Analogy and Mimicry.

2. Study of the skeleton of human.

3. Study of the following prepared slides: histology of man (compound tissues).

4. Study of following prepared slides/specimen :

Pathogenic Protozoans:Entamoeba, Trypanosoma, Giardia and Plasmodium.

Pathogenic Helminths: Tape Worm, Ascaris and Ancylostoma.

Arthropod vectors of human diseases: Anopheles, Culex, Aedes Mosquitoes, Rat flea.

Books:

1. Sobti, R.C. & Nigam, S.K. (2002). Structural & function biology of chordates, Vishal Publishers, Jalandhar.
2. Sobti, R.C. & Sharma, V.L. (2005). Basics of Biotechnology: Introduction of Life Sciences. Vishal Publishers, Jalandhar.
3. Sobti, R.C. (2005). Introduction to Biotechnology, Part-2, Concepts Tools and Application, Vishal Publishers.

Bachelor of Science (Bio-Technology) Semester-IV
Session:2022-23
Course Code: BBTF-4067
Industrial/ Institutional Visit

Time: 3 Hours

Max. Marks: 20

Note:

Students will go for a visit to industry/institute and the students will be required to submit written report for the same which will be evaluated.

Bachelor of Science (Bio-Technology) Semester-IV
Session: 2022-23
Course Code: SECS-4522
Social Outreach Programme

Course Objectives:

- The Social outreach program proposes to equip the students for community upliftment work.
- It will strive to prepare citizens who will make a marked difference in society.
- The students will be provided with numerous opportunities to build their knowledge and skills on the fundamental values of social fairness and compassion.
- The program will focus on integrating academic work with community services

Learning Outcomes:

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

- connect the knowledge gained in the classroom with real-life situations by getting hands-on experience through community services.
- get an opportunity to engage in social service. It will also foster the development of civic responsibility.
- reflect upon larger issues that affect communities through readings and discussions.
- integrate academic learning and community engagement through practical fieldwork.
- develop awareness, knowledge, and skills for working with diverse groups in society.

Curriculum

The curriculum involves two aspects:

- A. Students will be introduced to various broad areas in which they can take up projects
- B. The students are expected to be actively engaged in working on any of the project areas listed below as volunteers. Evaluation will be based on consistency, commitment, and results achieved in the areas taken up.

MODULE	TOPI C	HOURS
1.	Sensitizing the students towards Social Issues	3
2.	Collaborating with NGOs	1
3.	Social Extension in villages & literacy drive	1
4.	NSS, Swatch Bharat, Unnat Bharat	1
5.	Projects related to Environmental issues/NCC	1
6.	Setting up Empathy Corners	1
7.	Food Adulteration and Medical Camps	1
8.	Medical Camp/ Adulteration Camp / Science Awareness Camp in Villages	1
Total Hours of interactive Sessions		10
Hours for Project Work:		20

List of Projects Areas under Social Outreach Program:

- Working as Motivators under the Swatch Bharat Campaign of the Government,
- Literacy drive: (I). Teaching in the Charitable School Adopted by the College(ii).
Work on projects undertaken by the Rotary Club of Jalandhar for inducting students into child labor Schools.
- Enroll as NSS Volunteers for various projects (Cleanliness, Women's health awareness)
- Counseling camps in villages
- Tree plantation (i) Maintaining the trees in the park adopted by the college.in Vikas Puri, Jalandhar
(ii)Enroll in projects undertaken by JCI Jalandhar City

- Enroll in the Gandhian Studies Centre as a Student Volunteer for surveys in villages.
- Women Empowerment Programmes in collaboration with JCI Jalandhar Grace
- Generating awareness on voting among the youth.
- Drug Abuse (Generate awareness among the school children)
- Environment Awareness (Reduce Pollution, Plant trees, and work as waterwarriors)
- Visit Old Age Homes/Orphanages
- Operating the Empathy Corner outside the college gate and setting up empathy corners in Villages.
- Help in Disaster Management/Relief Work
- Organize Food Adulteration and Medical Camps in Villages
- Organize Science Awareness Camps in Villages

Evaluation /Assessment:

At the beginning of the semester, the students after enrolling for one of the Projects offered will be given deadlines for the project.

- Students will be responsible for recording their hours of service with the faculty and also map the progress of their subjects (children, old people, saplings, etc.).
- The respective departments will monitor the involvement of their students.
- The students will submit a report of the project taken up by them.
- There will be no written examination, The students will be given a grade based on the evaluation of the projects by an evaluation committee, comprising of the Dean of the respective streams, the Head, and two teachers of the concerned department.

Total Marks: 25 (Internal Assessment: 5 and Project Report: 20)

Internal Assessment based on the attendance during the Lectures Project

Report based on the work done by the student.

Total marks: 25 converted to grade for final

result Grading system:

90% marks & above:

A grade 80% - 89%

marks : B grade 70% -

79% marks : C grade

60% - 69% marks : D

grade 50% - 59%

marks : E grade

Below 50% marks : F grade (Fail – To repeat Project)

B.Sc. Bio-Technology Semester-V

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5061
rDNA Technology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

- CO1:** Understand the concept of genetic engineering and Know about different DNA Modifying enzymes
- CO3:** Know about cloning vectors
- CO4:** Study different methods of Transformation.
- CO5:** Study how labelling of DNA and RNA is done

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: BBTM-5061

**rDNA Technology-I
(Theory)**

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

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

Introduction to genetic engineering. Why gene cloning and DNA analysis is important. What is clone, how to clone a gene: Overview of the procedure.

Tools in Recombinant DNA Technology: Restriction and modifying enzymes, Type I, Type II and Type III enzymes and their characteristic features; restriction sequences, isoschizomers, rare cutting enzymes, enzyme cutting similar sequence in different manner

DNA Modifying enzymes: Characteristics and applications of Nucleases – DNase and RNase, DNA-Pol I, Klenow fragment, T4DNA polymerase, T7 DNA polymerase, T4 Polynucleotide kinase, Phosphatase, Reverse transcriptase, Taq polymerase and Ligase. Terminal deoxynucleotidyl transferase, reverse transcriptase. RNase-H, DNase-I, Nuclease S-I

Unit-II

Cloning vectors: Basic features of plasmids, role of antibiotics and resistance genes in a vector, multiple cloning site, copy number regulation, pBR 322, pUC 8, Bacteriophage λ based vectors: insertional and replacement vectors, phagemid, cosmid, fosmid. Isolation and purification of DNA from bacteria, plants, animals and soil.

Unit-III

Gene Cloning: Ligation, Methods of Transformation: CaCl₂, electroporation, transfection, micro projectile. Transformation efficiency, Screening of transformants by gene inactivation: antibiotic inactivation and blue white selection.

Unit-IV

Labelling of DNA and RNA- Radioactive labelling (Nick Translation, Random Priming, End Labelling), Non-Radioactive labelling (Direct & Indirect non isotopic labelling), Gene identification: Nucleic acid hybridization (Southern & Northern blotting), Western blotting.

Books Recommended:

1. Primrose, SB and Twyman, R. (2013). Principles of Gene Manipulation and genomics, 8th Edition, Wiley Blackwell.
2. Sambrook, J and Green MR (2012) Molecular Cloning: A Laboratory Manual, 4th Edition, CSHL.
3. Brown TA. (2017) Genomes, 4th Edition, Garland Science.
4. Glick, B. R., & Pasternak, J. J (2010). Molecular biotechnology- principles and applications of recombinant DNA. Washington: ASM Press.
5. Clark, D. P. & Pazdernik, N. J. (2009). Biotechnology- applying the genetic revolution. USA: Elsevier Academic Press.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5061(P)
rDNA Technology-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Isolate genomic DNA from bacteria.

CO2: Quantify DNA using Spectrophotometer and determine their purity.

CO3: Perform and understand concept of restriction digestion

CO4: Perform and understand concept of transformation

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: BBTM-5061(P)

rDNA Technology-I

(Practical)

Time: 3 Hrs.

Max. Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. Isolation of genomic DNA from bacteria.
2. Confirmation of high molecular weight DNA on agarose gel.
3. To perform spectrophotometric quantification of DNA for determination of purity.
4. Restriction enzyme digestion of isolated DNA.
5. Preparation of competent cells
6. Transformation of competent cells by CaCl₂ method.

Books Recommended:

1. Primrose, SB and Twyman, R. (2013). Principles of Gene Manipulation and genomics, 8th Edition, Wiley Blackwell.
2. Sambrook, J and Green MR (2012) Molecular Cloning: A Laboratory Manual, 4th Edition, CSHL.
3. Brown TA. (2017) Genomes, 4th Edition, Garland Science

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5062
Plant Biotechnology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Study the macronutrients and micronutrients and their deficiency symptoms in plants.

CO2: Know about the different physiological functions & biosynthesis of major plant growth regulators.

CO3: Understand the concept of Totipotency.

CO4: Understand the different methods of gene transfer in plants.

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: BBTM-5062

**Plant Biotechnology-I
(Theory)**

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

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

Introduction to Plant Tissue Culture and its Historical Background, Plant nutrition: macronutrients and micronutrients and their deficiency symptoms. Plant tissue culture media: types, components and their role.

Unit-II

Physiological functions and biosynthesis of major plant growth regulators such as auxins, cytokinins, gibberellins and abscisic acid.

Unit-III

Totipotency, factors affecting cellular totipotency, Cell differentiation, Dedifferentiation and redifferentiation of cells. Tissue competency, plant-explant-plant concept. Factors influencing plant tissue culture: Genotypic, physiological, biochemical and other extrinsic factors.

Unit IV

Transgenic Plant Biotechnology: Methods of gene transfer - Direct (Electroporation, Microprojectile, Microinjection, PEG mediated, DEAE Dextran mediated methods) and indirect (agrobacterium mediated gene transfer).

Books Recommended:

1. Taiz, L and Zeiger, E. (2014). Plant Physiology, 6th Edition, Sinauer Associates.
2. Razdan, MK. (2019) Introduction to Plant tissue culture, Science Publishers
3. Bhojwani, SS and Razdan, MK. (2004). Plant Tissue Culture. Theory and Practice, Elsevier.
4. Smith, RH. (2012) Plant tissue culture: techniques and experiments, Gulf professional publishing

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5062 (P)
Plant Biotechnology-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Get acquainted with functions and operations of various instruments used in plant tissue culture laboratory.

CO2: Prepare cotton plugs.

CO3: Prepare stock solutions of Murashige & Skoog (1962) medium.

CO4: Clean glassware, plasticware and contaminated cultures.

CO5: Prepare, sterilize and inoculate the explants.

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: BBTM-5062 (P)

Plant Biotechnology-I

(Practical)

Time: 3 Hrs.

Max. Marks: 18

Instructions for the practical Examiner:

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

Experiments:

- 1.To study functions and operations of various instruments required for plant tissue culture (pH meter, autoclave, laminar air-flow, incubators, oven, distillation unit etc).
- 2.Laboratory design set up for a PTC Laboratory.
- 3.Cleaning of glassware, plasticware and contaminated cultures.
- 4.Different types of enclosure used in plant tissue culture. Preparation of cotton plugs.
- 5.Preparation of stock solutions of Murashige & Skoog (1962) medium.
- 6.Preparation of Murashige & Skoog's medium from stock solutions.
- 7.Different sterilization process (Instruments, glassware and thermolabile and thermostable components)
- 8.Selection, preparation, sterilization and inoculation of explants.

Books Recommended:

- 1.Taiz, L and Zeiger, E. (2014). Plant Physiology, 6th Edition, Sinauer Associates.
- 2.Razdan, MK. (2019) Introduction to Plant tissue culture, Science Publishers
- 3.Bhojwani, SS and Razdan, MK. (2004). Plant Tissue Culture. Theory and Practice, Elsevier.
- 4.Smith, RH. (2012) Plant tissue culture: techniques and experiments, Gulf professional publishing.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5063
Animal Biotechnology-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Learn about the different aseptic techniques used in Animal Tissue Culture (ATC).

CO2: Know about the different sources, types and eradication of contamination.

CO3: Study the different culture media and reagents used in ATC.

CO4: Study different safety considerations in ATC laboratory.

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: BBTM-5063

Animal Biotechnology-I

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

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

Historical background, Advantages & Disadvantages of animal tissue culture, Design and layout of ATC Lab, Equipments used in ATC Lab, Aseptic Techniques in ATC- Sterilization of culture media, glassware & tissue culture laboratory. Growth and viability of cells in culture, cryopreservation and retrieval of cells from frozen storage, transportation of cells. Characteristics of normal and transformed cells.

Unit- II

Contamination- sources, Types, monitoring and eradication of contamination, Cross Contamination. Safety considerations in ATC laboratory, Clean Environment – P1, P2, P3, P4 facility and their applications.

Unit-III

Culture Media and Reagents-Types of cell culture media, physiochemical properties, balanced salt solution, constituents of serum, serum free media (SFM), design of SFM, Advantages and disadvantages of serum supplemented and serum free media, conditioned media

Unit-IV

Primary culture and Established cell line Culture (Finite & continuous cell lines), Isolation of Cells-Enzyme digestion, perfusion and mechanical disaggregation. Culture of attached cells

and cells in suspension, phases of cell growth and determination of cell growth data (calculation of *in vitro* age, multiplication rate, population doubling time, cell counting, phases of cell cycle)

Books Recommended

1. Gareth, EJ. (2016). Human Cell Culture Protocols, Humara Press.
2. Butler, M. (2004). The Animal Cell Culture and Technology, IRL Oxford Univ. Press.
3. Julio, E., Celis (2006). Cell Biology-A laboratory hand book, Vol. I-IV, Academic Press, New York.
4. Freshney, RT. (2016), Culture of Animal Cells 7th Edition, John Wiley and Sons, New York.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5063(P)
Animal Biotechnology-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Perform different Sterilization techniques.

CO2: Prepare Hanks Balanced salt solution.

CO3: Prepare Minimal Essential Growth medium.

CO4: Isolate lymphocytes for culturing.

CO5: Isolate macrophages from blood for culturing.

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: BBTM-5063(P)

Animal Biotechnology-I

(Practical)

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. Sterilization techniques: Theory and Practical -Glass ware sterilization -Media sterilization -Laboratory Sterilization
2. Sources of contamination and decontamination measures.
3. Preparation of Hanks Balanced salt solution
4. Preparation of Minimal Essential Growth medium.
5. Isolation of lymphocytes for culturing and perform cell viability test.
6. Isolation of macrophages from blood for culturing

Book Recommended:

1. Freshney, RT. (2016), Culture of Animal Cells. 7th Edition, John Wiley and Sons, New Delhi.
2. Butler, M. (2004). The Animal Cell Culture and Technology, IRL Oxford Univ. Press.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5064
Bioprocess Engineering-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the fundamental principles of chemical Engineering and biochemical engineering.

CO2: Perform assay of various enzymes according to their properties and can analyse their kinetics data.

CO3: Learn about different types of microbial culture

CO4: Know the effect of temperature, pH and inducer on the product synthesis.

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: BBTM-5064

**Bioprocess Engineering-I
(Theory)**

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

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

Introduction: Fundamental principles of Chemical Engineering and biochemical engineering. Fourier's Laws of heat transfer, Molecular diffusion, Diffusion theory, role of diffusion in bioprocessing, Oxygen transfer methodology in bioreactors and factors affecting oxygen transfer, Types of microbial culture: Batch, Fed batch and continuous culture.

Unit-II

Microbial Growth Kinetics: Simple kinetics of microbial growth, yield coefficient, doubling time, specific growth rate, substrate inhibition kinetics, product inhibition kinetics, metabolic and biomass productivities.

Unit-III

Introduction to multistage feedback systems: Internal & external feedback systems, effector molecules (Enzyme inhibitors and enzyme activators) and their kinetics, Effect of temperature, pH and inducer on product synthesis.

Unit-IV

Sterilization: Introduction, air and media sterilizations, design of batch sterilization process, Methods of batch sterilization, Del factor, sterilization cycle, continuous sterilization of feeds and liquid wastes, Filter sterilization, sterilization of fermenters.

Books Recommended:

1. Stanbury, PF, Whitaker, A. and Hall, SJ. (2016). Principles of Fermentation Technology 2nd Edition., Pergamon Press, Oxford.
2. Young, MY. (2000). Comprehensive Biotechnology (Vol. 1-4), Pergamon Press, Oxford.
3. Young, MY. (1996). Environmental Biotechnology, Principles & Applications, Kluwer Academic Publications, New Delhi.
4. Bailary, JE. and Ollis, DF. (1986). Biochemical Engineering Fundamentals, McGraw Hills, New York.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5064 (P)
Bioprocess Engineering-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Study growth curve of microorganisms while growing them in different media under optimal conditions.

CO2: Determine the specific growth rate and generation time of a bacterium during fermentation.

CO3: Study the effect of temperature, pH and aeration on microbial growth

CO4: Know about the production of an enzyme in a Bioreactor/shaking flask.

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: BBTM-5064(P)

**Bioprocess Engineering-I
(Practical)**

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. To study the growth curve of microorganism.
2. To determine the specific growth rate and generation time of a bacterium during submerged fermentation.
3. Demonstration of sterilization of fermenter and other accessories.
4. To study the effect of temperature, pH and aeration on growth of microbes.
5. Production and assay of an enzyme in a Bioreactor/shaking flask along with method of validation.

Books Recommended:

1. Cappuccino JG., Sherman N. (2007). Microbiology: A laboratory, Pearson Benjamin Cummings.
2. Plummer DT. (2004). An introduction to practical biochemistry, Tata McGraw Hill Publishers Co. Ltd., New Delhi.
3. Bansal, DD., K Hardori, R., Gupta, MM. (1985). Practical biochemistry, Standard Publication Chandigarh.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5065
Biochemical and Biophysical Techniques-I
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Gain fundamental knowledge about the basic principles of sedimentation, centrifugation machines and rotors.

CO2: Understand the principles of different types of chromatography (Paper, column, ion-exchange etc).

CO3: Understand the principles of single and double beam UV/Visible spectroscopy.

CO4: Understand the basic principle and instrumentation of NMR and ESR.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5065
Biochemical and Biophysical Techniques-I
(Theory)

Time: 3 Hours

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

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

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

Unit - II

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

Unit III

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

Unit IV

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

Books Recommended:

1. Upadhyay, A., Upadhyay, K. and Nath N. (2016) Biophysical chemistry: Principles and Techniques. Himalaya Publishing House, India.
2. Wilson K. and Walker J. (Eds.) (2010). Practical Biochemistry: Principles and Techniques, Cambridge University Press, U.K.
3. Sheehan, D. (2009). Physical Biochemistry: Principles and Applications, John Wiley and Sons Ltd., Chichester, England.
4. Freifelder, D. (1982). Physical Biochemistry. Applications to Biochemistry & Molecular Biology, W.H. Freeman.
5. Mousumi, D. (2011). Tools and techniques of biotechnology. Jaipur, India: Pointer Publisher.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5065
Biochemical and Biophysical Techniques-I
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the concept of differential centrifugation.

CO2: Separate bio-molecules by paper chromatography and thin layer chromatography.

CO3: Separate proteins by ion-exchange column chromatography.

CO4: Separate proteins by affinity column chromatography.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5065(P)
Biochemical and Biophysical Techniques-I
(Practical)

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. To study sedimentation using Swing Bucket Rotor and Angle Rotor.
2. To study differential centrifugation.
3. To study separation of bio-molecules by paper and thin layer chromatography.
4. Separation of proteins by ion-exchange column chromatography
5. Separation of proteins by affinity column chromatography.

Books Recommended:

1. Upadhyay, A., Upadhyay, K. and Nath N. (2016) Biophysical chemistry: Principles and Techniques. Himalaya Publishing House, India.
2. Wilson K. and Walker J. (Eds.) (2010). Practical Biochemistry: Principles and Techniques, Cambridge University Press, U.K.
3. Sheehan, D. (2000). Physical Biochemistry: Principles and Applications, John Wiley and Sons Ltd., Chichester, England.
4. Freifelder, D. (1982). Physical Biochemistry. Applications to Biochemistry & Molecular Biology, W.H. Freeman & Co.

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5066
Industrial Biotechnology-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Know about production of antibiotics and solvents from industrial microbes

CO2: Understand concept of Biotransformation, microbial production of organic acids, Vitamins and amino acids

CO3: Know about Biofertilizers, vermicomposting, fermented foods

CO4: Importance of Biological Nitrogen Fixation

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5066
Industrial Biotechnology-II
(Theory)

Time: 3 Hours

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

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

Antibiotics production: Penicillin and Streptomycin, pharmaceutical drugs, solvent production: Acetone, butanol and ethanol. Biodegradation of xenobiotic compound. Fuel Biotechnology: Types of Biofuels and Feedstocks for Production of Biofuel, Biogas production, Industrial alcohol production

Unit-II

Biotransformation, organic acids: production of citric Acid and acetic acid, microbial production of vitamin B12 and vitamin C, amino acids: Glutamic acid and lysine production, Alcoholic Beverages: wine, beers.

Unit-III

Introduction to BT gene, transgenic crops (BT cotton and maize) and their potentials in agro industry, SCP: Spirulina production (Yeast, Bacteria), soil treatment with microbes, Vermicomposting, production of bacterial biofertilizers, Biocontrol agent and their significance. Mycorrhizal fungi,

Unit-IV

BNF and its significance, diazotrophes and their characterization, Microbial association and their interaction with plants, nitrogen cycle and role of Nitrogen fixing microbes in sustainable agriculture.

Books Recommended:

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

Bachelor of Science (Bio-Technology) Semester-V
Session: 2022-23
Course Code: BBTM-5066(P)
Industrial Biotechnology-II
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the concept of additive and synergistic effect of antibiotics

CO2: Perform different types of Fermentation

CO3: Isolate nitrate reducing bacteria from the environment

CO4: Learn about wine production

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: BBTM-5066(P)

Industrial Biotechnology-II

(Practical)

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. Alcoholic and Mixed–Acid Fermentation.
2. Additive and Synergistic effect of two antibiotics on the above microorganism.
3. Minimum inhibitory concentration of an antibiotics for the above microorganism.
4. Demonstration of wine production by using grape juice.
5. Determination of nitrate reduction by bacteria.

Books Recommended:

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

Bachelor of Science (Bio-Technology) Semester-V

Session: 2022-23

Course Code: SECJ-5551

Job readiness Course

(Practical)

Objectives of the Course:

It is a specialised programme structured to prepare the students ready and adaptable for their professional career. The students will be able to set goals for themselves with the exposure provided to them during the course. The main purpose of the course is to enhance their life skills, increase their capacities for adapting to professional environment and teaming up. They will learn the importance and art of synergising with others and working in teams. It will help them to realize their potential and set high but realistic goals.

Learning Outcomes:

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

- Build confidence and have positive attitude
- Have an overview and exposure of job markets to realize their potential
- Get inputs on critical thinking and leadership qualities
- Comprehend how speaking skills can help them excelling in job interviews
- Acquire knowledge of team work
- Share their ideas in the group and improve their listening skills
- Learn skills of self-introduction to represent themselves and to write a well drafted resume

CURRICULUM

Course Code: SE CJ-5551

Course Credits: 02

Contact Hours: 30

MODULE	TITLE	HOURS
I	Goal Setting and Ambition	2 Hours
II	Positive Attitude and Self Confidence	2 Hours
III	Career Options and Job Markets	2 Hours
IV	Resume Building	4 Hours
V	Presentation Skills	4 Hours
VI	Public Speaking	4 Hours
VII	E-Mail Etiquette and Telephonic Conversation	2 Hours
VIII	Organizational Structure and Corporate Jargons	2 Hours
IX	Personal Interviews	4 Hours
X	Final Assessment, Feedback and Closure	4 Hours

EXAMINATION

- **Total Marks:** 25 (Exam: 20 and Internal Assessment: 5)

➤ **Final Exam:** Multiple Choice Quiz and/or practice/mock tests - Marks – 20; Time: 1 to 2 hours depending upon the batch size of 10-20 participants

➤ **Internal Assessment:** 5 (Assessment: 3; Attendance:2)

- Comparative assessment questions (medium length) in the beginning and at closure of the programme. Marks: 3; Time: 0.5 hour each at the beginning and end.

➤ **Total marks:** 25 converted to grade for final result

➤ **Grading system:**

90.1% -100% marks: O grade

80.1% - 90% marks: A+ grade

70.1% - 80% marks: A grade

60.1% - 70% marks: B+ grade

50.1% -60% marks: B grade

45%- 50 % marks: C grade

35%-44.9% marks: P grade

Below 35% marks: F grade

Absent: Ab

B. Sc. Bio-Technology Semester-VI

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6061
rDNA Technology-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand basics of cloning and expression vectors.

CO2: Understand Gene expression and processing of recombinant proteins

CO3: Know about primer designing and the concept of gene amplification.

CO4: Understand different generations of sequencing.

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6061

rDNA Technology-II

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

UNIT-I

Cloning vectors: Shuttle vectors and BAC, Overview of cloning, genomic cloning in Lambda vector, screening of recombinants, calculating number of clones that have to be screened, Linker, Adapters, Different strategies for cDNA cloning- self priming and adaptor/linker methods. Cloning vectors for Eukaryotes (yeast vectors, YAC, viral vectors, Ti & Ri plasmids)

UNIT-II

Gene expression: expression vectors with respect to different promoters (lac, tac, T5, T7, lamda) and their induction system, signal sequences (omp), tags (His, GST, MBP and IMPACT), selection of host with respect to promoter, Processing of recombinant proteins: soluble proteins, inclusion body, Protein refolding

UNIT-III

Basics of PCR, primer designing, Various types of PCR, applications of PCR, PCR based methods of site directed mutagenesis (overlap extension and cassette mutagenesis), random mutagenesis and gene cloning

UNIT-IV

DNA Sequencing: Sanger-Coulson method (chain termination method), Maxam- Gilbert method (chemical degradation of DNA), New generation sequencing (Illumina (Solexa) HiSeq, pyrosequencing), Ion Torrent technology, Single-molecule real-time (SMRT) sequencing, Fundamental concepts & applications of microarray, Phage display and selection of mutant peptides, yeast two hybrid assay.

Books Recommended:

1. Primrose, S.B. and Twyman, R. (2013). Principles of Gene Manipulation and genomics, 8th Edition, Wiley Blackwell.
2. Sambrook, J. and Green M.R. (2012) Molecular Cloning: A Laboratory Manual, 4th Edition, CSHL.
3. Brown, T.A. (2017) Genomes, 4th Edition, Garland Science.
4. Glick, B. R., and Pasternak, J. J (2003). Molecular biotechnology- Principles and applications of recombinant DNA, ASM Press, Washington.
5. Clark, D. P. and Pazdernik, N. J. (2009). Biotechnology- applying the genetic revolution, Elsevier Academic Press.

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6061(P)
rDNA Technology-II
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the role of restriction digestion in cloning

CO2: Understand the concept of transformation

CO3: Learn about ligation

CO4: Amplify genes.

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6061(P)

rDNA Technology-II

(Practical)

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. Isolation of plasmid DNA
2. Digestion of plasmid with three different restriction enzymes.
3. To perform Ligation reaction
4. Transformation of cells & Confirmation of the transformants for the presence of plasmid by blue white selection
5. To perform Polymerase chain reaction

Books Recommended:

1. Primrose, SB and Twyman, R. (2013). Principles of Gene Manipulation and genomics, 8th Edition, Wiley Blackwell.
2. Sambrook, J and Green MR (2012) Molecular Cloning: A Laboratory Manual, 4th Edition, CSHL.
3. Brown TA. (2017) Genomes, 4th Edition, Garland Science

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6062
Animal Biotechnology-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the basics of animal cell culture.

CO2: Understand about Transfection methods and expression vectors

CO3: Know about Stem cells and their benefit for human benefit.

CO4: Understand the role of genetic engineering in the improvement of animal cell for human welfare.

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6062

Animal Biotechnology-II

(Theory)

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting atleast one question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

Unit- I

Commonly used animal cell line, their origin and characteristics (WI-38, MRC-5, IMR-90, HEK-293, HeLa, A 549), Differentiation of cells, Organotypic and histotypic cultures: Organotypic culture: Gas and nutrient exchange, structure integrity, growth, differentiation, advantages and applications. Methods, advantages and applications of histotypic culture. Three dimensional culture and tissue engineering: Concept of tissue engineering, components of tissue engineering, cells imaging in 3D construct.

Unit- II

Transfection methods (calcium phosphate precipitation, DEAE-Dextran- mediated transfection, Lipofection, electroporation, Retroviral infection, Microinjection), Promoters, Expression vectors and detection of transgenics, need to express proteins in animal cells.

Unit- III

Applications: Cell fusion and production of monoclonal antibodies; scale up methods for propagation of anchorage dependent and suspension cell culture; Bioreactors for large scale culture of cells; micro carrier cultures; Stem cells- Basics, embryonic & adult stem cells & their applications, Transdifferentiation.

Unit-IV

Genetic Engineering in Animal Cells: Methodology for Transgenic animals (Mice, rabbit, Cattle, goat, sheep, pigs, Fish) production of regulatory proteins, blood products, vaccines

and hormones, Transgenic animal as bioreactor, Animal cloning- IVF & embryo transfer, Benefits and Concerns surrounding the use of animal biotechnology

Books Recommended

1. Gareth, EJ. (1996). Human Cell Culture Protocols, Humara Press.
2. Butler, M. (2004). The Animal Cell Culture and Technology, IRL Oxford Univ. Press.
3. Julio, E., Celis (1998). Cell Biology-A laboratory hand book, Vol. I-IV, 2nd Edition, Academic Press, New York.
4. Freshney, RT. (2016), Culture of Animal Cells 7th Edition, John Wiley and Sons, New York.

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6062(P)

Animal Biotechnology-II

(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Maintain cultures of animal cells and established cell lines with good viability, minimal contamination and appropriate documentation.

CO2: Perform supportive tasks relevant to cell culture, including preparation and evaluation of media, cryopreservation and recovery, and assessment of cell growth and health.

CO3: Recognise and troubleshoot problems common to routine cell culture.

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6062(P)

Animal Biotechnology-II

(Practical)

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. Seeding of cell line.
2. Maintenance of a cell line and check doubling time.
3. Isolation of RNA from blood.
4. Observation of adherent (Fibroblastic, epithelial) and suspension cultures (Lymphoblast).
5. To perform trypsinization of cells.
6. Cell counting by haemocytometer
7. Determination of the IC₅₀ value of a drug using MTT assay

Book Recommended:

1. Freshney, RT. (2016), Culture of Animal Cells. 7th Edition, John Wiley and Sons, New Delhi.
2. Butler, M. (2004). The Animal Cell Culture and Technology, IRL Oxford Univ. Press.

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6063
Plant Biotechnology-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand basic concepts of Micropropagation.

CO2: Understand the concept of generation of variations in plants.

CO3: Learn important milestones in plant tissue culture.

CO4: Understand the concept of protoplast fusion and somatic cell hybridization and secondary metabolite production

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6063

**Plant Biotechnology-II
(Theory)**

Time: 3 Hours

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting atleast one question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

Unit I

Micropropagation methods (axillary bud, shoot-tip and meristem culture), Stages of micropropagation, Factors affecting micropropagation and technical problems, Applications of micropropagation, Acclimatization of tissue culture raised plants. Modes of regeneration, Somatic embryogenesis and organogenesis, Types of somatic embryogenesis, Applications of somatic embryogenesis.

Unit II

Haploid and triploid plant production through tissue culture; ovary and ovule culture; embryo culture and rescuing hybrid embryos; somaclonal variations, selection of variant cell lines and its applications.

Unit-III

Protoplast isolation and culture, viability of protoplasts, protoplast fusion, selection of somatic hybrids and cybrids, applications of somatic cell hybridization.

Unit-IV

Cell suspension culture, production of secondary metabolites by plant tissue culture, immobilized plant cell culture, use of bioreactors in secondary metabolite production, transgenic approaches in secondary metabolite production.

Books Recommended:

1. Bhojwani, S.S, and Razdan, M.K. (2004). Plant Tissue Culture. Theory and Practice, Elsevier.

2. Razdan, M.K. (2019) Introduction to Plant tissue culture, Science Publishers.
3. Singh, B.D. (2021) Biotechnology expanding horizons, Kalyani Publishers, New Delhi.

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6063(P)
Plant Biotechnology-II
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Perform micropropagation techniques.

CO2: Learn different pathways of plant regeneration under in vitro conditions.

CO3: Understand techniques of establishing cell suspension cultures

CO4: Carry out culture experiments with different explants.

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6063(P)

**Plant Biotechnology-II
(Practical)**

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. Micropropagation and its different steps.
2. Significance of growth hormones in culture medium.
3. Induction of callus from different explants.
4. To study regeneration of shoots/embryos.
5. Raising of cell suspension cultures.
6. Anther culture, ovary culture and embryo rescue.

Books Recommended:

1. Taiz, L and Zeiger, E. (2014). Plant Physiology, 6th Edition, Sinauer Associates.
2. Razdan, MK. (2019) Introduction to Plant tissue culture, Science Publishers
3. Bhojwani, SS and Razdan, MK. (2004). Plant Tissue Culture. Theory and Practice, Elsevier.
4. Smith, RH. (2000) Plant tissue culture: techniques and experiments, Gulf professional publishing

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6064
Bioprocess Engineering-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Learn about the Design of a Fermenter and how to use it.

CO2: Study about all the parameters to be considered while operating a fermenter.

CO3: Study about different techniques of Downstream Processing.

CO4: Learn about Effluent treatment and fermentation Economics.

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6064
Bioprocess Engineering-II
(Theory)

Time: 3 Hours

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting atleast one question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

Unit-I

Design of a Fermenter: Introduction, fermenter for microbial, animal & plant cell culture, Aseptic operation of fermenter, impeller and spargers, batch, fed batch, C.S.T.B.R, plug flow and air loop bioreactors and its kinetics.

Unit-II

Control and measurement equipments of fermenter (Temperature & pH control system, Flow measurement, foam sensing, pressure control & D.O. probes, Operation and agitation and its kinetics.

Unit-III

Down Stream Processing: Introduction, removal of microbial cells and other solid matters. Foam separation, filtration, industrial filters and its principles, centrifugation and industrial centrifuges, cell disruption, aqueous two phase extraction system, Basics concept of super critical fluid extraction and whole broth processing.

Unit-IV

Effluent treatment- Primary, Secondary and Tertiary treatment, aerobic and anaerobic slug treatment process, fermentation economics.

Books Recommended:

1. Stanbury, PF, Whitaker, A. and Hall, SJ. (2016). Principles of Fermentation Technology 2nd Edition., Pergamon Press, Oxford.
2. Young, MY. (2000). Comprehensive Biotechnology (Vol. 1-4), Pergamon Press, Oxford.
3. Young, MY. (1996). Environmental Biotechnology, Principles & Applications, Kluwer Academic Publications, New Delhi.
4. Bailary, JE. and Ollis, DF. (1986). Biochemical Engineering Fundamentals, McGraw Hills, New York.

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6064(P)
Bioprocess Engineering-II
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Undergo two-week training in fermentation technology in industry/institute and learn practical aspects of fermentation technology

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6064(P)
Bioprocess Engineering-II
(Practical)

Time: 3 Hrs.

Practical Marks: 18

Note:

Students will go for at least two-week training in industry/institute and the students will be required to submit written report of their training which will be evaluated by the teacher who has taught theory course.

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6085
Chemistry-III
(Theory)

COURSE OUTCOME:

Students will be able to

CO1: understand the various thermodynamic properties and laws of Thermodynamics, and acquire knowledge about the various thermodynamic terms like enthalpy of formation, enthalpy of ionisation, entropy, internal energy. Calculate entropy change for reversible and irreversible processes under isothermal and non-isothermal conditions and also absolute entropies of substances.

CO2: acquire the knowledge of structure and intermolecular forces present between solids, liquids and gases.

CO3: Understand the concept of reaction rates and determine the rate law from initial rate data. Determine the order of reaction with respect to each reactant, the overall order of reaction, the rate constant with units. Learn about the Catalysis, hydrogenation Catalysis

CO4: understand the concept of Electrochemistry and various terms related to it like resistance, conductance, specific resistance, cell constant, EMF and determine the transference number of ions using Hittorf and moving boundary methods.

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6085

Chemistry-III

(Theory)

Time: 3 Hrs.

Max. Marks: 60

Theory: 30

Practical: 18

CA: 12

Instructions for the Paper Setters:

Eight questions of equal marks (6 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

CHEMICAL THERMODYNAMICS:

Objectives and limitations of Chemical Thermodynamics, State functions, thermodynamic equilibrium, work, heat, internal energy, enthalpy. First Law of Thermodynamics : First law of thermodynamics for open, closed and isolated systems. Reversible isothermal and adiabatic expansion/compression of an ideal gas. Irreversible isothermal and adiabatic expansion. Enthalpy change and its measurement, standard heats of formation and absolute enthalpies. Kirchoff's equation. Second and Third Law: Various statements of the second law of thermodynamics. Efficiency of a cyclic process (Carnot's cycle). Entropy. Entropy changes of an ideal gas with changes in P, V, and T. Free energy and work functions. Gibbs-Helmholtz Equation. Criteria of spontaneity in terms of changes in free energy. Third law of thermodynamics: Absolute entropies. Thermodynamics of Simple Mixtures: Partial molar quantities and their significance. Chemical potential and its variation with T and P. Fugacity function and its physical significance. Concept of activity and activity coefficient.

UNIT-II

SOLUTIONS:

Ideal and non-ideal solutions, method of expression concentrations of solution, activity and activity coefficients, dilute solution, Osmotic pressure, its law and measurements, Elevation of boiling point and depression of freezing points. Chemical Equilibrium : General characteristics

of chemical equilibrium, thermodynamic derivation of the law of chemical equilibrium, Van't Hoff reaction isotherm. Relation between K_p , K_c and K_x . Temperature dependence of equilibrium constant Van't Hoff equation, homogeneous & heterogeneous equilibria, Le Chatelier's principle.

UNIT-III

CHEMICAL KINETICS AND CATALYSIS:

Scope, rate of reaction, influencing factors such as concentration, temperature, pressure, solvent etc. theories of chemical kinetics. Arrhenius equation, concept of activation energy. Rates of reactions, rate constant, order and molecularity of reactions. Chemical Kinetics: Differential rate law and integrated rate expressions for zero, first, second and third order reactions. Half-life time of a reaction. Methods for determining order of reaction. Effect of temperature on reaction rate and the concept of activation energy. Reaction mechanism. Steady state hypothesis. Catalysis : Homogeneous catalysis, Acid-base catalysis and enzyme catalysis (Michaelis-Menten equation). Heterogeneous catalysis. Unimolecular surface reactions.

UNIT-IV

ELECTRO-CHEMISTRY:

Specific conductance, molar conductance and their dependence on electrolyte concentration. Ionic Equilibria and conductance, Essential postulates of the Debye-Huckel theory of strong electrolytes. Mean ionic activity coefficient and ionic strength. Transport number and its relation to ionic conductance and ionic mobility. Conductometric titrations. pH scale. Buffer solutions, salt hydrolysis. Acid-base indicators.

Books Recommended:

1. Physical Chemistry by Samuel H, Carl P. Putton; 4th Edition, Americ Inc. Co.
2. Physical Chemistry by Glasstone, 2nd Edition, The Macmillian Press Ltd.
3. Kinetic and Mechanism by Frost A and Pearson R.G, 3rd Edition, Wiley Eastern Pvt. Ltd.
4. Chemical Kinetic by K.J. Laidler, Harper and Row.
5. Physical Chemistry by Glberg W. Castellian Addison: 3rd Revised Edition Wesley publishing Comp
6. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, Ed. V and VI. Wiley Inter-science

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6085 (P)

Chemistry-III

(Practical)

Time: 3 Hrs

Practical Marks: 18

Course outcome:

Students will be able to

CO1: know the principle and mechanism of Conductometric titrations and polarimetric experiments

CO2: determine the heat of neutralization and Heat of solution calorimetrically

CO3: verify Beer Lambert Law for different solutions.

CO4: determine the pH of the solution and analyze optical active substances

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTM-6085 (P)

Chemistry-III

(Practical)

Time: 3 Hrs

Practical Marks: 18

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

Experiments:

1. Calorimetry:

a) Determination of Heat of neutralization

(i) Strong acid-strong base

(ii) Weak acid-strong base.

b) Determination of Heat of solution of KCl, NH₄Cl, KNO₃

2. Conductometry:

a) Determination of cell constant.

b) Determination of specific and equivalent conductance of electrolyte (NaCl and HCl).

c) Precipitation titration of Na₂SO₄ vs. BaCl₂.

d) Neutralization titrations NaOH vs. HCl and NaOH vs. CH₃COOH.

3. Photometry.

Verification of Lambert beer's law for solution of CoCl₂·2H₂O (in water) and K₂Cr₂O₇ (in water)

4. a) pH of buffer solution

b) Acid base titration HCl vs. NaOH.

c) Determination of ionization constant of a weak acid (CH₃COOH)

5. Determine composition of HCl and CH₃COOH in the given solution pH metrically.

6. Polarimetry: Determine the %age composition of an optically active solution.

Books Recommended:

1. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.
2. Experiments in Physical Chemistry, R.C. Das and B. Behra, Tata McGraw Hill.
3. Advanced Practical Physical Chemistry, J.B. Yadav, Goel Publishing House.

4. Advanced Experimental Chemistry, Vol. I, Physical, J.N. Guru and R. Kapoor, S. Chand and Co.
5. Selected Experiments in Physical Chemistry, N.G. Mukherjee, J.N. Ghosh and Sons.
6. Experiments Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6066
Biochemical and Biophysical Techniques-II
(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Illustrate the working principles electrophoresis techniques and their role in science.

CO2: Understand concept of Iso-electric focusing

CO3: How to measure radioactivity, instruments used for detecting and measuring radiations.

CO4: Understand the concepts of Mass spectrometry

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6066
Biochemical and Biophysical Techniques-II
(Theory)

Time: 3 Hours

Max. Marks: 60
Theory: 30
Practical: 18
CA: 12

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting atleast one question from each section. The fifth question may be attempted from any section. Each question carries 6 Marks.

UNIT-I

Electrophoresis: Factors affecting electrophoretic mobility, Types of electrophoresis, Basic principle, theory and application of native, SDS-PAGE and Agarose Gel electrophoresis, Use of solubilizers in electrophoresis.

UNIT-II

Introduction to IEF (Iso-electric focusing), Two dimensional gel electrophoresis and capillary electrophoresis, Applications of electrophoresis in biology for isolation of biomolecules based on charge and molecular weight.

UNIT III

Mass spectroscopy: Ionization methods and Analyzers, MALDI TOF and MALDI Q, Applications of mass spectroscopy in biology for qualitative and quantitative determination of bio-molecules, Introduction to fluorescence spectroscopy

UNIT-IV

Radioisotopic Techniques: Basic concepts of radioisotopy, theory and applications of Geiger-Muller tube, solid and liquid scintillation counters, primary and secondary flours. Safety rules for radioisotopic studies. Introduction to concept of biosafety and biosecurity

Books Recommended:

1. Upadhyay, A., Upadhyay, K. and Nath N. (2016) Biophysical chemistry: Principles and Techniques. Himalaya Publishing House, India.
2. Wilson K. and Walker J. (Eds.) (2010). Practical Biochemistry: Principles and Techniques, Cambridge University Press, U.K.
3. Sheehan, D. (2009). Physical Biochemistry: Principles and Applications, John Wiley and Sons Ltd., Chichester, England.
4. Freifelder, D. (1982). Physical Biochemistry. Applications to Biochemistry & Molecular Biology, W.H. Freeman.
5. Mousumi, D. (2011). Tools and techniques of biotechnology. Jaipur, India: Pointer Publisher.

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6066(P)
Biochemical and Biophysical Techniques-II
(Practical)

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Learn about the qualitative and quantitative analysis of DNA sample

CO2: Prepare standard curve of protein

CO3: Prepare standard curve of DNA

CO4: Separation of bio-molecules by vertical and horizontal gel electrophoresis

Bachelor of Science (Bio-Technology) Semester-VI
Session: 2022-23
Course Code: BBTM-6066(P)
Biochemical and Biophysical Techniques-II
(Practical)

Time: 3 Hrs.

Practical Marks: 18

Instructions for the practical Examiner:

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

Experiments:

1. Preparation of standard curve of protein
2. Preparation of standard curve of DNA.
3. Casting of horizontal gel and Separation of bio-molecules by electrophoresis
4. Casting of Native-PAGE gel and Separation of bio-molecules by electrophoresis.
5. Casting of discontinuous PAGE gel and Separation of bio-molecules by electrophoresis.

Books Recommended:

1. Upadhyay, A., Upadhyay, K. and Nath N. (2016) Biophysical chemistry: Principles and Techniques. Himalaya Publishing House, India.
2. Wilson K. and Walker J. (Eds.) (2010). Practical Biochemistry: Principles and Techniques, Cambridge University Press, U.K.
3. Sheehan, D. (2000). Physical Biochemistry: Principles and Applications, John Wiley and Sons Ltd., Chichester, England.
4. Freifelder, D. (1982). Physical Biochemistry. Applications to Biochemistry & Molecular Biology, W.H. Freeman & Co.

Bachelor of Science (Bio-Technology) Semester-VI

Session: 2022-23

Course Code: BBTS-6067

Term Paper

(Seminar)

Time: 3 Hrs.

Max. Marks: 20

Instructions:

Term paper on recent advances in Life Sciences using Internet and Library based resources.

To be presented as hard copy/ CD. Viva/ Seminar to be conducted by a panel of three internal examiners.