

**FACULTY OF SCIENCES**

**SYLLABUS**

**of**

**BACHELOR OF SCIENCE (Medical)**

**(Semester I-VI)**

**(Under Continuous Evaluation System)**

**Session: 2020-21**



**The Heritage Institution**

**KANYA MAHA VIDYALAYA**

**JALANDHAR**

**(AUTONOMOUS)**

**KanyaMahaVidyalaya, Jalandhar (Autonomous)**  
**CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM**  
**BACHELOR OF SCIENCE (Medical)**  
**Session-2020-21**

BACHELOR OF SCIENCE (Medical) Semester I								
Course Code		Course Name	Course Type	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
BSML-1421 BSML-1031 BSML-1431		Punjabi (Compulsory) <sup>1</sup> Basic Punjabi <sup>2</sup> Punjab History & Culture (From Earliest Times to C 320)	C	50	40	-	10	3
BSML-1212		English (Compulsory)	C	50	40	-	10	3
BSMM-1483	(I)	<b>Zoology</b> (Cell Biology)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Zoology</b> (Biodiversity-I) (Protozoa to Annelida)						
	(P)	<b>Zoology</b> (PRACTICAL–I -Related To Cell Biology & Biodiversity-I)						
BSMM-1343	(I)	<b>Microbiology</b> (Fundamentals of Microbiology)	E	100	60	20	20	3+3
	(P)	<b>Microbiology</b> (PRACTICAL-Fundamentals of Microbiology)						
BSMM-1084	(I)	<b>Chemistry</b> (Inorganic Chemistry–I)	C	100	60 (30+30)	20	20	3+3+3½
	(II)	<b>Chemistry</b> (Organic Chemistry–II)						
	(P)	<b>Chemistry</b> (Practical)						
BSMM-1075	(I)	<b>Botany</b> (Diversity of Microbes)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Botany</b> (Diversity of Cryptogams)						
	(P)	<b>Botany</b> (PRACTICAL–I –Related to Diversity of Microbes & Diversity of Cryptogams)						
BSMM-1255	(I)	<b>Food Science and Quality Control (Vocational)</b> (Food Chemistry and Nutrition)	E	100	60	20	20	3+3
	(P)	<b>Food Science and Quality Control (Vocational)</b> (PRACTICAL- Food Chemistry and Nutrition)						
AECD-1161		*Drug Abuse: Problem, Management and Prevention (Compulsory)	AC	50	40	-	10	3
SECF-1492		*Foundation Programme	AC	25	25	-	-	2

**C-Compulsory**

**E-Elective**

**AC- Audit Course**

<sup>1</sup>Special paper in lieu of Punjabi (Compulsory).

<sup>2</sup>Special paper 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.

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**BACHELOR OF SCIENCE (Medical)**  
**Session-2020-21**

**BACHELOR OF SCIENCE (Medical) Semester-II**

Course Code		Course Name	Course Type	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
BSML-2421 BSML-2031 BSML-2431		Punjabi(Compulsory) <sup>1</sup> Basic Punjabi <sup>2</sup> Punjab History & Culture (C. 320 to 1000 B.C.)	C	50	40	-	10	3
BSML-2212		English (Compulsory)	C	50	40	-	10	3
BSMM-2483	(I)	<b>Zoology</b> (Ecology)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Zoology</b> (Biodiversity –II) (Arthropoda to Hemichordata)						
	(P)	<b>Zoology</b> (Practical-II- ecology and Biodiversity-II)						
BSMM-2343	(T)	<b>Microbiology</b> (Basic Food Microbiology)	E	100	60	20	20	3+3
	(P)	<b>Microbiology</b> (Practical- Basic Food Microbiology)						
BSMM-2084	(I)	<b>Chemistry</b> (Inorganic Chemistry–I)	C	100	60	20	20	3+3+3½
	(II)	<b>Chemistry</b> (Physical Chemistry–II)						
	(P)	<b>Chemistry</b> (Practical)						
BSMM-2075	(I)	<b>Botany</b> (Cell Biology)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Botany</b> (Genetics)						
	(P)	<b>Botany</b> (Practical-II-Genetics and Cell Biology)						
BSMM-2255	(T)	<b>Food Science and Quality Control (VOCATIONAL)</b> (Food Plant Hygiene and Sanitation)	E	100	60	20	20	3+3
	(P)	<b>Food Science and Quality Control (VOCATIONAL)</b> (Practical-Food Plant Hygiene and Sanitation)						
AECD-2161		*Drug Abuse: Problem Management and Prevention (Compulsory)	AC	50	40	-	10	3
SECM-2502		*Moral Education Programme	AC	25	20	-	5	2

**C-Compulsory**

**E-Elective**

**AC- Audit Course**

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**CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM**  
**BACHELOR OF SCIENCE (Medical)**

Session-2020-21

BACHELOR OF SCIENCE (Medical) Semester III								
Course Code		Course Name	Course Type	Marks			Examination time (in Hours)	
				Total	Ext.			CA
					L	P		
BSML-3421 BSML-3031 BSML-3431		Punjabi (Compulsory) <sup>1</sup> Basic Punjabi <sup>2</sup> Punjab History & Culture (From 1000-1605 A. D.	C	50	40	-	10	3
BSML-3212		English (Compulsory)	C	50	40	-	10	3
BSMM-3483	(I)	<b>Zoology</b> (Evolution)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Zoology</b> (Biodiversity –III) (Chordates)						
	(P)	<b>Zoology</b> (Practical-III- related to Evolution and Biodiversity-III)						
BSMM-3343	(I)	<b>Microbiology</b> (Microbial nutrition and Metabolism)	E	100	60	20	20	3+3
	(P)	<b>Microbiology</b> (Practical- Microbial nutrition and Metabolism)						
BSMM-3084	(I)	<b>Chemistry</b> (OrganicChemistry–I)	C	100	60 (30+30)	20	20	3+3+3½
	(II)	<b>Chemistry</b> (Physical Chemistry–II)						
	(P)	<b>Chemistry</b> (Practical)						
BSMM-3075	(I)	<b>Botany</b> (Structure Development and Reproduction in Flowering Plant-I)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Botany</b> (Structure Development and Reproduction in Flowering Plant-II)						
	(P)	<b>Botany</b> (Practical-III -Structure Development and Reproduction in Flowering Plant I & II)						
BSMM-3255	(I)	<b>Food Science and Quality Control (Vocational)</b> (Food Processing and Packaging)	E	100	60	20	20	3+3
	(P)	<b>Food Science and Quality Control (Vocational)</b> (Practical-Food Processing and Packaging)						
AECE-3221		*Environmental studies (compulsory)	AECC**	100	60	20	20	3
SECP-3512/ SECG-3531		*Personality Development Programme (Skill Based)/ Gender Sensitization Programme	AC	25	25	-	-	2

**C-Compulsory**

**E-Elective**

**AC- Audit Course**

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\*\* **Ability enhancement compulsory course**

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**BACHELOR OF SCIENCE (Medical)**  
**Session-2020-21**

**BACHELOR OF SCIENCE (Medical) Semester-IV**

Course Code		Course Name	Course Type	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
BSML-4421 BSML-4031 BSML-4431		Punjabi(Compulsory) <sup>1</sup> Basic Punjabi <sup>2</sup> Punjab History & Culture (From 1605 to 1849 A.D.)	C	50	40	-	10	3
BSML-4212		English (Compulsory)	C	50	40	-	10	3
BSMM-4483	(I)	<b>Zoology</b> (Biochemistry)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Zoology</b> (Animal Physiology)						
	(P)	<b>Zoology</b> (Practical –IV- Biochemistry and animal physiology)						
BSMM-4343	(T)	<b>Microbiology</b> (Microbial Ecology)	E	100	60	20	20	3+3
	(P)	<b>Microbiology</b> (Practical – Microbial Ecology)						
BSMM-4084	(I)	<b>Chemistry</b> (Inorganic Chemistry–I)	C	100	60	20	20	3+3+3½
	(II)	<b>Chemistry</b> (Organic Chemistry–II)						
	(P)	<b>Chemistry</b> (Practical)						
BSMM-4075	(I)	<b>Botany</b> (Diversity of Seed Plants and their Systematics-I)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Botany</b> (Diversity of Seed Plants and their Systematics-II)						
	(P)	<b>Botany</b> (Practical-IV- Diversity of Seed Plants and their Systematics-I and II)						
BSMM-4255	(T)	<b>Food Science and Quality Control (VOCATIONAL)</b> (Quality Assurance)	E	100	60	20	20	3+3
	(P)	<b>Food Science and Quality Control (VOCATIONAL)</b> (Practical- Quality Assurance)						
SECS-4522		*Social Outreach	AC	Grade Only				10 hours per sem

**C-Compulsory**

**E-Elective**

**AC- Audit Course**

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**CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM**  
**BACHELOR OF SCIENCE (Medical)**

Session-2020-21

BACHELOR OF SCIENCE (Medical) Semester V								
Course Code		Course Name	Course Type	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
BSML-5421 BSML-5031 BSML-5431		Punjabi (Compulsory) <sup>1</sup> Basic Punjabi <sup>2</sup> Punjab History & Culture (From 1849-1947 A.D.)	C	50	40	-	10	3
BSML-5212		English (Compulsory)	C	50	40	-	10	3
BSMM-5483	(I)	<b>Zoology</b> (Developmental Biology)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Zoology</b> (Genetics)						
	(P)	<b>Zoology</b> (Practical –V- related to Developmental Biology and Genetics)						
BSMM-5343	(I)	<b>Microbiology</b> (Applied Microbiology-I)	E	100	60	20	20	3+3
	(P)	<b>Microbiology</b> (Practical – Applied Microbiology-I)						
BSMM-5084	(I)	<b>Chemistry</b> (Inorganic Chemistry–I)	C	100	60 (30+30)	20	20	3+3+3½
	(II)	<b>Chemistry</b> (Physical Chemistry–II)						
	(P)	<b>Chemistry</b> (Practical)						
BSMM-5075	(I)	<b>Botany</b> (Plant Physiology)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Botany</b> (Biochemistry & Biotechnology)						
	(P)	<b>Botany</b> (Practical-IV- Related to Plant Physiology and Biochemistry Biotechnology)						
BSMM-5255	(I)	<b>Food Science and Quality Control</b> (Vocational) (Food Analysis)		100	60	20	20	3+3
	(P)	<b>Food Science and Quality Control</b> (Vocational) (Practical – Food Analysis)						
BSMM-5046	(T)	<b>Bioinformatics (Vocational)</b> (Computational Methods for Sequence Analysis)	E	100	60	20	20	3+3
	(P)	<b>Bioinformatics (Vocational)</b> (Lab in Computational Methods for Sequence Analysis )						

**C-Compulsory**

**E-Elective**

**AC- Audit Course**

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**CURRICULUM AND SCHEME OF EXAMINATIONS OF THREE-YEAR DEGREE PROGRAM**  
**BACHELOR OF SCIENCE (Medical)**  
**Session-2020-21**

**BACHELOR OF SCIENCE (Medical) Semester-VI**

Course Code		Course Name	Course Type	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
BSML-6421 BSML-6031 BSML-6431		Punjabi(Compulsory) <sup>1</sup> Basic Punjabi <sup>2</sup> Punjab History & Culture (1947-2000A.D.)	C	50	40		10	3
BSML-6212		English (Compulsory)	C	50	40		10	3
BSMM-6483	(I)	<b>Zoology</b> (Medical Zoology)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Zoology</b> (Medical Laboratory Technology)						
	(P)	<b>Zoology</b> (Practical-VI-Medical Zoology &Medical Laboratory Technology)						
BSMM-6343	(T)	<b>Microbiology</b> (Applied Microbiology-II)	E	100	60	20	20	3+3
	(P)	<b>Microbiology</b> (Practical-Applied Microbiology-II)						
BSMM-6084	(I)	<b>Chemistry</b> (ORGANIC CHEMISTRY–I)	C	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Chemistry</b> (PHYSICAL CHEMISTRY–II)						
	(P)	<b>Chemistry</b> (Practical)						
BSMM-6075	(I)	<b>Botany</b> (Ecology)	E	100	60 (30+30)	20	20	3+3+3
	(II)	<b>Botany</b> (Economic Botany)						
	(P)	<b>Botany</b> (Practical-VI-Ecology and Economic botany)						
BSMM-6255	(T)	<b>Food Science and Quality Control (VOCATIONAL)</b> (Food Plant layout and management)	E	100	60	20	20	3+3
	(P)	<b>Food Science and Quality Control (VOCATIONAL)</b> (Practical-Food Plant layout and management)						
BSMM- 6046	(T)	<b>Bioinformatics (VOCATIONAL)</b> (Structural Biology and Molecular Modelling)	E	100	60	20	20	3+3
	(P)	<b>Bioinformatics (VOCATIONAL)</b> (Lab in Structural Biology and Molecular Modelling)						

**C-Compulsory**

**E-Elective**

**AC- Audit Course**

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# **SEMESTER-I**



**Bachelor of Science (Medical) (Semester- I)**

**Session 2020-21**

**Course Title: PUNJABI (COMPULSORY)**

**Course Code- BSML -1421**

**COURSE OUTCOMES:**

**CO1:** d' ozr (eftsk Gkr) Bz{ gVQkT[D dk wB'oE ftdnkoEhnK nzdo eftsk gqsh fdbu;gh, ;{M Bz{ g?dk eoBk j? sK fe T[j nkX[fBe d"o ftu uZb ojhnK ekft XkoktK ns/ ethnK pko/ frnkB jkf;b eo ;eD.

**CO2:**fj; dk j'o wB'oE eftsk dh ftnkfynk, ftPb/PD s/ w[bzeD dh gqfefonk s'A ikD{ eokT[Dk th j? sK fe T[j ;wekbh ;wki dhnK ;wZf;nktK Bz{ ;wM ;eD ns/ nkb'uBkswe fdqPNh pDk ;eD.

**CO3:**;z;ko dhnK gqf;X j;shnK ihtBh dh ftXk Bz{ f;b/p; ftu PkfwB eo e/ ftdnkoEhnK nzdo ihtBh Bz{ gVQD dh o[uh Bz{ g?dk eoBk j? ns/ ihtBh irs Bkb i'VDk j?.

**CO4:**g?oQk ouBk ns/ g?oQk gVQ e/ gqPBK d/ T[so d/D dk wBo'E ftdnkoEhnK dh p[ZXh B{z shyD eofdN T[BK dh fbyD gqfsGk B{z T[iKro eoBk j?.

**CO5:**X[Bh ftT[As gVQD Bkb ftdnkoEh X[BhnK dh T[uKoB gqDkbh s'A tke| j'Dr/.

Bachelor of Science (Medical) (Semester- I)

Session 2020-21

Course Title: (PUNJABI COMPULSORY)

Course Code- BSML -1421

;wK L 3 xzN/

Maximum Marks: 50

Theory: 40

CA: 10

gkm eqw ns/ gkm g[;seK

:{fBN-I

d' ozr (eftsk Gkr) (;zgkH jofizdo f;zx fYb'A ns/ gqhsW f;zx ;or'Xhnk), r[o{ BkBe d/t :{Bhtof;Nh, nzfwqs;o. (ਕਵਿਤਾ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ\$;ko) 8 nze

:{fBN-II

;z;ko dhNk gqf;X j;shNk (ihtBh BzL 1 s'A 9 se)  
(;zgkH fgqzH s/ik f;zx, joBkw f;zx Pkw),gzikph ;kfjs gqekPB, nzfwqs;o.  
(ਵਿਸ਼ਾ-ਵਸਤੂ/ਸਾਰ) 8 nze

:{fBN-III

(T) g?oQk ouBk (fszB ftu'A fJe)  
(n) g?oQk gVQ e/ gqPBK d/ T[so. 8 nze

:{fBN-IV

(T) gzikph X[Bh ftT[As L gfoGkPk s/T[ukoB nZr  
(n) ;to, ftnziB 8 nze

nze tzv ns/ gohfyne bJh jdkfJsK

1H gqPB gZso d/ uko ;?ePB j'Dr/.;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.

2H ftfDnkoEh B/ e[b gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzik gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ 08 nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g gqPBK

ftu eo ;edk j?.

**Bachelor of Science (Medical) (Semester- I)**

**Session 2020-21**

**Course Title- w[ZYbh gzikph  
(In lieu of Compulsory Punjabi)**

**Course Code- BSML-1031**

**COURSE OUTCOMES:**

**CO1:** w[ZYbh gzikph gVQkT[D dk wB'oE ftdnkoEhnK B{z gzikph GkPk B{z f;ykT[D dh gqfefonk ftu gk e/ fJe j'o GkPk f;ZyD d/ w"e/ gqdkB eoBk j?.

**CO2:** fJ; ftu ftdnkoEh B{z pkohephBh Bkb GkPk dk nfXn?B eotkfJnk ikt/rk.

**CO3:** ftdnkoEhnK B{z gzikph Ppd ouBk s'A ikD{ eotkfJnk ikt/rk.

**CO4:** w[ZYbh gzikph gVQkT[D dk wB'oE ftdnkoEhnK B{z fBZs tos'A dh gzikph Ppdktbh pko/ dZ;Dk j?.

**CO5:** w[ZYbh gzikph gVQkT[D dk wB'oE ftdnkoEhnK dk Ppd x/ok ftPkb eoBk j?.

**CO6:** ftdnkoEhnK B{z gzikph ftu j] s/ d/ ;s fdBK d/ BK, pkoQK wjhfbnK d/ BK, oZ[sK d/ BK, fJe s'A ;" se frDsh PpdK ftu f;ykT[Dk j?.

**Bachelor of Science (Medical) (Semester I)**

**Session 2020-21**

**Course Title- w[ZYbh gzikph  
(In lieu of Compulsory Punjabi)**

**Course Code- BSML-1031**

**;wK L 3 xzN/**

**Maximum Marks: 50**

**Theory : 40**

**CA: 10**

**gkm eqw**

**:{fBN-I**

**g?Ash nyoh, nyo eqw, g?o fpzdh tkb/ toD ns/ g?o ftu g?D tkb/ toD ns/ wksqtK (w[Ybh ikD gSkD) brkyo (fpzdh, fNgh, nXe) L gSkD ns/ tos'A .**

**08nze**

**:{fBN-II**

**gzikph Ppd pDso L w[Ybh ikD gSkD (;kXkoB Ppd, ;z:[es Ppd, fwPos Ppd, w{b Ppd, nr/so ns/ fgS/so)**

**08nze**

**:{fBN-III**

**fBs tos'A dh gzikph Ppdktbh L pkiko, tgko, foPs/Bks/, y/sh ns/ j'o XzfdnK nkfd Bkb ;zpzXs.**

**08 nze**

**:{fBN-IV**

**j|s/ d/ ;s fdBK d/ BK, pkoQK wjhfbnK d/ BK, o[sK d/ BK, fJe s'A ;" se frDsh PpdK ftu .**

**08nze**

**nze tzv ns/ gohfyne bJh jdkfJsK**

**1H gqPB gZso d/ uko :{FfBN j'Dr/...;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo :{fBN ftu d' gqPB g[S/ ikDr/.**

**2H ftfdnkoEh B/ e[b gzi gqPB eoB/ jB. jo Gkr ftu'A fJe gqPB bkiwh j?. gzikK gqPB fe;/ th Gkr ftu' \_ ehsk ik ;edk j?.**

**3H jo/e gqPB d/ nZm nze jB.**

**4H g/go ;?N eoB tkbk i/eo ukj/ sK gqPBK dh tzv nr'A tX s'A tX uko T[g gqPBK ftu eo ;edk j?.**

**Bachelor of Science (Medical) (Semester- I)**

**Session 2020-21**

**Course Title: Punjab History & Culture (From Earliest Times to C. 320)**

**(Special Paper in lieu of Punjabi compulsory)**  
**Course Code: BSML-1431**

**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.

**CO 1:** Identify and describe the emergence of earliest civilizations in: Indus Valley Civilization and Aryan Societies.

**CO 2:** Identify and analyses the Buddhist, Jain and Hindu faith in the Punjab

**CO 3:** Analyses the emergence of Early Aryans and Later Vedic Period, their Society, Culture, Polity and Economy

**CO 4:** To make students understand the concepts of two faiths Jainism and Buddhism, its principles and their application and relevance in present times

**Bachelor of Science (Medical) (Semester- I)**  
**Session 2020-21**  
**Course Title: Punjab History & Culture (From Earliest Times to C. 320)**  
**(Special Paper in lieu of Punjabi compulsory)**  
**Course Code: BSML-1431**

**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 **5<sup>th</sup> 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**

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

**Bachelor of Science (Medical) (Semester I)**  
**Session 2020-21**  
**Course Title: ENGLISH (COMPULSORY)**  
**Course Code: BSML -1212**

**COURSE OUTCOMES:**

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

- CO 1:** appreciate the writings of various Indian and foreign story and prose writers and relate them to their socio-cultural milieu
- CO 2:** comprehend the meaning of texts and answer questions related to situations, episodes, themes and characters depicted in them
- CO 3:** understand fundamental grammatical rules governing tenses, the use of modal verbs and make correct usage in their language
- CO 4:** develop an understanding of translation of written text from Hindi/Punjabi to English
- CO 5:** independently write paragraphs on any given topic

**Session 2020-21**  
**Course Title: ENGLISH (COMPULSORY)**  
**Course Code: BSML -1212**

**Examination Time: 3 Hrs**

**Max. Marks: 50**

**Theory: 40**

**CA: 10**

**Instructions for the Examiner:**

**The question paper will consist of 4 sections & distribution of marks will be as under:**

**Section A:** The question will be set from Unit I of the syllabus. Fifteen sentences will be set and the students would be required to attempt any ten. Each sentence will carry one mark.

**(1x10=10)**

**Section B:** Two questions will be set from Unit II of the syllabus. The students would be required to attempt one paragraph out of the given two topics (word limit 150 words). It will carry five marks. The second question will be based on translation. The students would be required to translate a paragraph from Hindi/Punjabi to English.

**(2x5=10)**

**Section C:** This section will be divided into two parts. Two questions will be set from Unit III of the syllabus. Part one will have one essay type question with internal choice carrying six marks (word limit 300 words). The students would be required to attempt any one. The second part will have three questions. The students would be required to attempt any two. Each question will carry two marks (50 words each).

**(6+2x2=10)**

**Section D:** This section will be divided into two parts. Two questions will be set from Unit IV of the syllabus. Part one will have one essay type question with internal choice carrying six marks (word limit 300 words). The students would be required to attempt any one. The second part will have three questions. The students would be required to attempt any two. Each question will carry two marks (50 words each).

**(6+2x2=10)**

**Unit I**

English Grammar in Use, 4<sup>th</sup> Edition by Raymond Murphy, CUP (Units: 1-37)

**Unit II**

Paragraph Writing and Translation of paragraph (from Hindi/Punjabi to English)

**Unit III**

*Tales of Life* (Guru Nanak Dev University, Amritsar): Stories at Sr. No. 1, 2, 3, 5, 6

**Unit IV**

*Prose for Young Learners*: Essays at Sr. No. 1, 2, 3, 5, 6

**Texts Prescribed:**

1. *English Grammar in Use* (Fourth Edition) by Raymond Murphy, CUP
2. *Tales of Life* (Guru Nanak Dev University, Amritsar)
3. *Prose for Young Learners* (Guru Nanak Dev University, Amritsar)



**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**ZOOLOGY**

**Course Title: CELL BIOLOGY**  
**Course Code: BSMM-1483 (I)**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

- CO1. Develop deeper understanding of what life is and how it functions at cellular level.
- CO2. Describe cellular membrane structure and function, fine structure and function of cell organelles.
- CO3. Perform a variety of molecular and cellular biology techniques.

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**ZOOLOGY**

**Course Title: CELL BIOLOGY**  
**Course Code: BSMM-1483 (I)**  
**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**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**

Methods in Cell Biology.

- (a) Principles of light and phase contrast microscopy
- (b) Electron microscopy (TEM and SEM)
- (c) Fixation and fixatives
- (d) Staining techniques.

**UNIT-II**

Organization of Cell: Extra nuclear and nuclear, ultrastructure and functions of cell organelles

- (a) Plasma Membrane: Structure, osmosis, active and passive transport, endocytosis and exocytosis.
- (b) Endoplasmic reticulum: Structure, types and associated enzymes.
- (c) Mitochondria: Structure, mitochondrial enzymes and role of mitochondria in respiration and mitochondrial DNA.

**UNIT-III**

Organization of Cell:

- (a) Golgi complex: Structure and functions.
- (b) Ribosomes: Types of ribosomes, their structure and functions.
- (c) Lysosomes: Polymorphism and their function.
- (d) Centrosome: Structure and functions.

**UNIT-IV**

Nucleus: Structure and functions of nuclear membrane, nucleolus and chromosomes.

An elementary idea of cell transformation in cancer.

An elementary idea of cellular basis of immunity.

**Suggested Readings:**

1. Alberts, B., Bray, D., Lewis, J., Raff, M. Roberts, K., Watson J.D.(1998), Molecular Biology of the Cell, Garland Publ. Inc., New York.
2. Chandra Roy, S and DE Kumar, K. (2001), Cell Biology, New Central Book Agency (P) Ltd. Kolkata.
3. Cooper, G. M. (2004), The cell, A Molecular Approach, ASM press, Washington, D. C.
4. De Robertis, E.D.P. De Robertis, E.M.F.(1995) Cell Biology and Molecular Biology (Eighth Edition), W.B. Saunders Co., Philadelphia.
5. Karp, G. (1984). Cell Biology (4<sup>th</sup> ed), McGraw Hill, New York.
6. Pawar, C.B (1999), Cell Biology, Himalaya Publishing House, Bombay.

**Bachelor of Science (Medical) (Semester-I)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: BIODIVERSITY-I**

**(PROTOZOA TO ANNELIDA)**

**Course Code: BSMM-1483 (II)**

**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

CO1. Familiarise with the non-chordate world that surrounds us.

CO2. Appreciate the process of evolution (unicellular cells to complex, multicellular organisms).

CO3. Identify the invertebrates and classify them up to the class level with the basis of systematic.

CO4. Understand the basis of life processes in the non-chordates and recognize the economically important invertebrate fauna.

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**ZOOLOGY**

**Course Title: BIODIVERSITY-I**  
**(PROTOZOA TO ANNELIDA)**  
**Course Code: BSMM-1483 (II)**  
**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**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.

**Detailed Type study of the following animals**

**UNIT-I**

Protozoa: *Amoeba proteus*,  
*Paramecium caudatum* (with special reference to Kappa particles in *P. aurelia*)  
*Plasmodium vivax*. Introduction to Parasitic Protozoans.

**UNIT-II**

Parazoa (Porifera): *Sycon*,  
Cnidaria (Coelentrata): *Obelia*

**UNIT-III**

Platyhelminthes: *Fasciola hepatica*,  
*Taenia solium*  
Larvae of *Fasciola hepatica* and *Taenia solium*

**UNIT-IV**

Aschelminthes: *Ascaris*, Parasitic adaptations in Helminthes  
Annelida: *Pheretima posthuma* (Earthworm)

**Suggested Readings:**

1. Barnes, R.D. (1999), Invertebrate Zoology. W.B. Saunder, Philadelphia.
2. Dhami, P.S. & Dhami, J. K(2001), Invertebrates, R. Chand & Co., New Delhi.
3. Barth, R. H. and Broshears, R. E (1982), The Invertebrate world. Holt Saunder, Japan.
4. Brusca, R. C. and Brusca, G. J. (2003), Invertebrates (2<sup>nd</sup> ed). Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.

5. Engemann, J. G. and Hegner, R. W. (1981), Invertebrate Zoology (3rd ed.) Macmillan, New York.
6. Gardiner, M. S. (1972), The Biology of Invertebrates, McGraw Hill, New York.
7. Meglitsch, P. A. and Schran, F. R. (1991), Invertebrate Zoology (3<sup>rd</sup> ed). Oxford University Press, New York.
8. Pechenik, A. Jan. (2000), Biology of the invertebrates, (4<sup>th</sup> ed), McGraw Hill Book Co. Singapore.

**Bachelor of Science (Medical) (Semester-I)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: PRACTICAL-I (RELATED TO CELL BIOLOGY & BIODIVERSITY-I)**

**Course Code: BSMM-1483 (P)**  
**(PRACTICAL)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

CO1. Familiarise with the Techniques like Paper Chromatography, Thin Layer Chromatography & Gel Electrophoresis.

CO2. Familiarise with the TEM & SEM.

CO3. Know about the Classification & Ecological note of Invertebrates.

**Bachelor of Science (Medical) (Semester-I)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: PRACTICAL-I (RELATED TO CELL BIOLOGY & BIODIVERSITY-I)**

**Course Code: BSMM-1483 (P)**

**Time: 3 Hrs.**

**Marks: 20**

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

**Guidelines for conduct of practical Examination:-**

- |  |   |
|--|---|
| 1. Identify and classify the specimens upto order. Write a note on their habit, habitat, special features and economic importance. | 4 |
| 2. Identify the slides/micrographs and give two reasons for identification.  | 4 |
| 3. Make a temporary mount of protozoa.   | 2 |
| 4. Draw a well labelled sketch of the given system of the organism and explain to the examiner.                                    | 3 |
| 5. Write down the theory and procedure of gel electrophoresis/ paper chromatography/thin layer chromatography/ SEM & TEM.          | 2 |
| 6. Report  | 2 |
| 7. Viva-voce & Practical file.   | 3 |

**I. Classification up to orders with ecological notes and economic importance (if any) of the following animals (Through Specimens or slides):**

**A. Protozoa.***Amoeba, Euglena, Trypanosoma, Noctiluca, Eimeria, Monocystis, Paramecium Opalina, Vorticella, Balantidium, Nyctotherus and Polystomella.*

**B. Parazoa.***Sycon, Grantia, Euplectella, Hyalonema, Spongilla, Euspongia.*

**C. Cnidaria.***Porpita, Velella, Physalia, Aurelia, Rhizostoma, Metridium, Millipora, Alcyonium, Tubipora, Zoanthus, Madrepora, Favia, Fungia and Astrangia.*  
*Hydra (W.M.), Hydra with buds, Obelia (colony and medusa), Sertularia, Plumularia, Tubularia, Bougainvillea and Aurelia*

**D. Platyhelminthes.**

*Dugesia, Fasciola, Taenia, Echinococcus.*

Miracidium, Sporocyst, Redia, Cercaria of *Fasciola*, scolex and proglottids of *Taenia* (mature and gravid).

**E. Aschelminthes.***Ascaris* (male and female), *Trichinella*, *Ancylostoma*.

**F. Annelida.***Pheretima, Nereis, Heteronereis, Polynoe, Eunice, Aphrodite, Chaetopterus, Arenicola, Tubifex and Pontobdella*

**2. Study of the following permanent stained preparations:**

- A. L.S. and T.S. *Sycon*, gemmules, spicules and spongin fibers of a sponge.
- B. T.S. *Hydra* (Testis and ovary region)
- C. T.S. *Fasciola* (Different regions)
- D. T.S. *Ascaris* (Male and Female)



- E. T.S. *Pheretima* (pharyngeal and typhlosolar regions), Setae, septal nephridia, spermathecae and ovary of *Pheretima* (Earthworm).

**3. Preparation of the following slides:**

Temporary permanent preparation of freshwater Protozoan culture.

- 4. Demonstration of** digestive, reproductive and nervous systems of earthworm with the help of charts/videos/models.

**5. Cell Biology:**

- A. Paper chromatography.
- B. Thin layers chromatography
- C. Gel electrophoresis through photographs or through research laboratories
- D. Familiarity with TEM & SEM.
- E. Study of different ultra structures of cell organelles through photographs.

**6. Visit to a vermi-composting unit and submission of report.**

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

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**MICROBIOLOGY**  
**Course Title: Fundamentals of Microbiology**  
**Course Code: BSMM-1343**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

**CO1:** Understand the history of microbiology and their characterization and identification.

**CO2:** Learn the different principles and applications of microscopy and methods of sterilization, preparation of a culture media, pure culture concept and different staining techniques of bacteria.

**CO3:** Understand the fine structure of bacterial cell and nutrition and nutritional requirements of microorganisms. Preparation of different types of media and control of microorganisms by physical and chemical agents.

**CO4:** Understand the Reproduction and Growth in Microorganisms and Epidemiology of common bacterial and viral diseases in humans.

**Bachelor of Science (Medical) (SEMESTER-I)**  
**SESSION 2020-21**  
**MICROBIOLOGY**  
**Course Title: Fundamentals of Microbiology**  
**Course Code: BSMM-1343**  
**(THEORY)**

**Examination Time: 3 Hrs.**

**Max Marks: 100**  
**Theory: 60**  
**Practical: 20**  
**CA: 20**

**Instructions for the Paper Setter:** Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

1. **Introduction and Scope of Microbiology:** Discovery of microorganisms, history of microbiology, controversy over spontaneous origin of microorganisms, discovery of anaerobic life, germ theory of fermentation as life without oxygen, germ theory of disease.
2. **Characterization and Identification of Microorganisms:** Place of microorganisms in living world, Haeckel's and Whittaker's system of classification, prokaryotic and eukaryotic cells, characteristics of main groups of microorganisms.

**UNIT-II**

3. **Microscopy:** Principles and applications of Bright field microscopy, Dark field phase contrast, Fluorescence and Immunofluorescence, Electron microscopy.
4. **Methods in Microbiology:** Methods of sterilization, preparation of a culture media, pure culture concept, staining of bacteria such as simple, negative and differential methods. Antibiotics, properties and mode of action: drug resistance and its significance, antibiotic sensitivity test.

**UNIT-III**

5. **Structure of Bacteria:** Fine structure of bacterial cell, cell wall, cell membrane, capsule, pili, flagella, ribosomes, Cytoplasmic inclusions, Bacterial movement, Endospore and physiology of endospore formation.
6. **Nutrition:** Nutritional requirements of microorganisms, nutritional types of bacteria, autotrophs, heterotrophs, parasites, types of culture media, differential media, and selective media enrichment media. Control of microorganisms by physical and chemical agents.

**UNIT-IV**

7. **Reproduction and Growth in Microorganisms:** Modes of cell division, growth curve of bacteria, continuous culture, synchronous growth, quantitative measurement of bacterial growth, Effect of various factors on growth of bacteria.
8. **Clinical Microbiology:** Epidemiology reservoirs and modes of transmission of infectious diseases. Pathogenesis, diagnosis and treatment of common bacterial and viral diseases (including COVID 19) in humans.

**Books Recommended:**

1. Pelczar, M.I., Chan, E.C.S. and Krieg, N.R. 2011, 5<sup>th</sup> edition, Microbiology. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
2. Stanier, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. 2005, 5<sup>th</sup> edition, General Microbiology, MacMillan Education Ltd. Publisher.
3. Powar, C.B. and Dagniwala, H.F. 2012, General Microbiology, Volume I and II, Himalaya Publishing House, Delhi.
4. Sharma, P.D. 2010, Microbiology, Rastogi Publications, Meerut. 142.
5. Clinical microbiology by Usman Waheed, Asim Ansari, Anwar Ullah and Ihsan Ali., 1<sup>st</sup> Edition, 2013. **(Online available)**
6. General Microbiology by Linda Bruslind, 1<sup>st</sup> Edition. **(Online available)**
7. General Microbiology by H.G. Schlegel, 6<sup>th</sup> Edition. **(Online available)**

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**MICROBIOLOGY**  
**Course Title: Practical- Fundamentals of Microbiology**  
**Course Code: BSMM-1343**  
**(PRACTICAL)**

**Time: 3 hrs**

**Marks: 20**

**Instructions for the practical examiner:** Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same may be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

**LIST OF PRACTICALS**

1. To study the essentials of a microbiology laboratory.
2. To study various parts of a laboratory microscope.
3. To study various sterilization techniques.
4. To prepare the cultures media for the cultivation of various microorganisms.
5. To study various laboratory techniques for the cultivation and isolation of pure cultures of microorganisms.
6. To perform the simple staining of bacterial cell.
7. To perform the differential staining of bacterial cell.
8. To study the typical growth curve of bacteria.

**Bachelor of Science (Medical) (Semester–I)**

**Session: 2020-21**

**CHEMISTRY**

**COURSE TITLE: Inorganic Chemistry–I**

**COURSE CODE: BSMM -1084 (I)**

**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to:

CO1: Predict electronic properties of atoms using current models and theories in chemistry.

CO2: Explains de-Broglie's dual behaviour of matter and Heisenberg's uncertainty principle and solve numerical problems

CO3: Explain the significance of quantum numbers

CO4: Sketch the probability density curves, boundary surface diagrams and shapes of s, p, d and f orbitals and write the electronic configuration of atoms.

CO5: Identify the periodic trends in physical and chemical properties of elements.

CO6: Describe VSEPR theory and predicts the geometry of simple molecules.

CO7: Explain the valence bond approach for the formation of covalent bonds and the different types of hybridization involving s, p and d orbitals of simple covalent molecules

CO8: Describe the molecular orbital theory of homonuclear diatomic molecules.

CO9: Explain the structures simple compounds.

CO10: Differentiate the types of van der Waals forces such as London forces, dipole – dipole interactions and dipole - induced dipole interactions and explain the concept of hydrogen bonding

**Bachelor of Science (Medical) (Semester-I)**  
**Session: 2020-21**  
**CHEMISTRY**  
**COURSE TITLE: Inorganic Chemistry-I**  
**COURSE CODE: BSMM -1084 (I)**  
**(THEORY)**

**Time: 3 Hrs**

**Max. Marks: 30**

**Instructions for the Paper Setter**

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**

**I. Atomic Structure**

Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of  $\psi^1$  and  $\psi^2$ , quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s,p,d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements and ions.

**UNIT-II**

**II. Periodic Properties**

Position of elements in the periodic table; effective nuclear charge and its calculations. Atomic and ionic radii, ionization energy, electron affinity and electronegativity –definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behaviour.

**UNIT-III**

**III. Chemical Bonding**

Covalent Bond –Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions.  $\text{BeF}_2$ ,  $\text{BF}_3$ ,  $\text{CH}_4$ ,  $\text{PF}_5$ ,  $\text{SF}_6$ ,  $\text{IF}_7$ ,  $\text{SnCl}_2$ ,  $\text{XeF}_4$ ,  $\text{BF}_4$ ,  $\text{SnCl}_6$ . Valence shell electron pair repulsion (VSEPR) theory to  $\text{NH}_3$ ,  $\text{H}_3\text{O}^+$ ,  $\text{SF}_4$ ,  $\text{ClF}_3$ ,  $\text{ICl}_2$  and  $\text{H}_2\text{O}$ . MO theory, homonuclear (elements and ions of 1st and 2nd row), and heteronuclear ( $\text{BO}$ ,  $\text{CN}^-$ ,  $\text{CO}$ ,  $\text{NO}^+$ ,  $\text{CO}^+$ ,  $\text{CN}^-$ ), diatomic molecules, multicenter bonding in electron deficient molecule (Boranes). Percentage ionic character from dipole moment and electronegativity difference.

**UNIT-IV**

**IV. Ionic Solids.**

Concept of close packing, Ionic structures, (NaCl type, Zinc blende, Wurtzite,  $\text{CaF}_2$  and antiferite, radius ratio rule and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born–Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule. Metallic bond– free electron, valence bond and band theories.

**Weak Interactions** –Hydrogen bonding, Vander Waals forces.

**Books Suggested:**

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



**Bachelor of Science (Medical) (Semester-I)**

**Session: 2020-21**

**CHEMISTRY**

**Course Title: Organic Chemistry-II**

**Course Code: BSMM -1084 (II)**

**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to:

CO1: Explain the bonding between different organic compounds

CO2: Explain the various reaction mechanisms and different electron displacement effects

CO3: Explain the various methods of formation and chemical reactions of alkanes, alkenes and alkynes

CO4: Compare the reactivities of various alkyl and aryl halide

CO5: Differentiate between aromatic, anti aromatic and non-aromatic compounds

CO6: Compare the stability of various cycloalkanes

CO7: Explain the effect of various substituents on the reactivity of aromatic compounds

**Bachelor of Science (Medical) (Semester-I)**

**Session: 2020-21**

**CHEMISTRY**

**Course Title: Organic Chemistry–II**

**Course Code: BSMM -1084 (II)**

**(THEORY)**

**Time: 3 Hrs.**

**Max.Marks:30**

**Instructions for the Paper Setter:**

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

**UNIT-I**

**I. Structure and Bonding**

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

**II. Mechanism of Organic Reactions**

Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates –Carbocations, carbanions, free radicals, carbenes, arenes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.

**UNIT-II**

**III. Alkanes**

Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey–House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity.

**IV. Alkenes and Alkynes**

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regioselectivity in alcohol dehydration. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, oxymercuration reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with  $\text{KMnO}_4$ . Substitution at the allylic and vinylic positions of alkenes.

Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reductions, oxidation and polymerization.

**UNIT-III**

## **V. Alkyl and Aryl Halides**

Nomenclature and classes of alkyl halides, chemical reactions. Mechanisms of nucleophilic substitution reaction of alkyl halides, SN2 and SN1 reactions with energy profile diagrams. Nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides.

## **VI. Cycloalkanes:**

Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring: banana bonds.

## **UNIT-IV**

## **VII. Arenes and Aromaticity**

Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: Molecular formula and Kekule structure. Stability and carbon carbon bond lengths of benzene, resonance structure, MO picture.

Aromaticity: the Huckel's rule, aromatic ions. Aromatic electrophilic substitution—general pattern of the mechanism, role of  $\sigma$  and  $\pi$  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.

### **Books suggested:**

1. Morrison, R.T., Boyd, R.N., Organic Chemistry; 6th edition, Pubs: Prentice-Hall, 1992.
2. Solomons, T.W., Fryhle, C.B., Organic Chemistry; 9th edition, Pubs: Wiley India, 2007.
3. Wade Jr., L.G., Singh, M.S., Organic Chemistry; 6th edition, Pubs: Pearson education, 2008.
4. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: New Age International, 1985.
5. Carey, F.A., Sundberg, R.J., Advanced Organic Chemistry Part B: Reactions and Synthesis.
6. Fundamentals of Organic Chemistry, Solomons, John Wiley.
7. Introduction to Organic Chemistry, Sireitwieser, Heathcock and Kosover, Macmilan.

**Bachelor of Science (Medical) (Semester-I)**

**Session: 2020-21**

**CHEMISTRY**

**Course Title: Chemistry Practical**

**Course Code: BSMM -1084 (P)**

**(PRACTICAL)**

**COURSE OUTCOMES:**

Students will be able to

CO1: separate and identify the various ions present in the mixture

CO2: accurately note down the melting and boiling point of organic compounds

**Bachelor of Science (Medical) (Semester-I)**

**Session: 2020-21**

**CHEMISTRY**

**Course Title: Chemistry Practical**

**Course Code: BSMM -1084 (P)**

**(PRACTICAL)**

**Time: 3½ Hrs.**

**Max.Marks: 20**

**Instruction for practical examiner:**

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

**Inorganic Chemistry:** Semi Micro analysis. Cation analysis, Separation and identification of ions from groups I, II, III, IV, V, and VI. Anionic analysis. Four ions with no interference.

**Organic Chemistry Laboratory Techniques**

**Determination of Melting Point**

Naphthalene 80–82 °C

Benzoic acid 121.5–122 °C

Urea 132.5–133°C

Succinic Acid 184.5–185 °C

P-dichlorobenzene 52°C

Cinnamic acid 132.5–133 °C

Salicylic acid 157.5–158°C

Acetanilide 113.5–114°C

m-dinitro benzene 90°C

Aspirin 135°C

**Determination of Boiling Point**

Ethanol 78°C

Benzene–80 °C

Cyclohexane 81.4°C

Toluene 110°C

**Practical Examination**

- |  |    |
|--|----|
| 1) Inorganic Mixture                                 | 12 |
| 2) Melting Point/Boiling point of organic substance. | 03 |
| 3) Viva–Voce   | 03 |
| 4) Note Book.  | 02 |

**Books suggested:**

1. Vogel's Qualitative Inorganic Analysis revised, Svehla, Orient Longman.
2. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge. Standard Methods of Chemical. Analysis, W.W. Scott: The Technical Press.
3. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.

4. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
5. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: DIVERSITY OF MICROBES**  
**Course Code: BSMM-1075 (I)**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

CO1: Understand diversity in microscopic living organisms and their associations with other organisms.

CO2: Understand evolutionary history and time scale of non-vascular plants.

CO3: Develop basic knowledge about the variations in life cycle pattern of different organisms.

CO4: Interpret the structure and functional anatomy of plants belonging to the principal groups of living and fossil land plants.

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: DIVERSITY OF MICROBES**  
**Course Code: BSMM-1075 (I)**  
**(THEORY)**

**Time: 3Hrs**

**Max. Marks: 30**

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

**UNIT-I**

Algae: General characters, classification and economic importance, range of thallus organization, important features and life history of Chlorophyceae– *Volvox*, *Oedogonium*, *Coleochaete*; Xanthophyceae– *Vaucheria*; Phaeophyceae– *Ectocarpus*, *Sargassum*; Rhodophyceae– *Polysiphonia*.

**UNIT-II**

General account of viruses and mycoplasma with special reference to SARS and Covid-19. Bacteria–structure, nutrition, reproduction and economic importance; general account of cyanobacteria.

**UNIT-III**

General account, classification and economic importance of fungi. Important features and life history of Mastigomycotina– *Pythium*, *Phytophthora*; Zygomycotina– *Mucor*, Ascomycotina– *Saccharomyces*, *Eurotium*, *Chaetomium*, *Peziza*.

**UNIT-IV**

Basidiomycotina– *Puccinia*, *Agaricus*; Deuteromycotina– *Cercospora*, *Colletotrichum*. General account of Lichens.

**Suggested Readings:**

- Dube, H.C., 2007, A Textbook of Fungi, Bacteria and Viruses (3rd edition), Scientific Publishers, India
- Dube, H.C., 2013, An Introduction to Fungi (4th edition), Scientific Publishers., India.
- James W. Brown. (2015). Principles of Microbial Diversity. ASM press, USA.
- Ogunseitan, O. (2008). Microbial Diversity: Form and function in Prokaryotes. Wiley Publishers, USA.
- Sharma, O.P., 2004, Text Book of Thallophytes. McGraw Hill Publishing Co., India.
- Sharma, P.D., 2004, The Fungi, (2nd Edition) Rastogi Publication, India
- Srivastava, H.N., 2018, Diversity of Microbes and Cryptogams, Vol. I, Pradeep's Publication.



**Bachelor of Science (Medical) (Semester-I)**

**Session 2020-21**

**BOTANY**

**Course Title: DIVERSITY OF CRYPTOGRAMS**

**Course Code: BSMM-1075 (II)**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course student will be able to:

CO1: Demonstrate knowledge of similarities and differences between vascular and nonvascular plants.

CO2: Build up a sound foundation in the subject of Cryptogamic Botany in general and Bryophytes in particular so that the students may be able to apply the acquired knowledge while interacting into the other fields of Botany.

CO3: Acquaint the students about the classification, morphology, biology and economic importance of various pteridophytic plants.

CO4: recognize different plants and flora that come under cryptogams.

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: DIVERSITY OF CRYPTOGRAMS**  
**Course Code: BSMM-1075 (II)**  
**(THEORY)**

**Time: 3Hrs**

**Max. Marks: 30**

**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 at least one question from each section. The fifth question may be attempted from any section.

**UNIT-I**

**Bryophyta:** Amphibians of plants kingdom displaying alternation of generations; structure, reproduction.

**UNIT-II**

**Classification of Hepaticopsida** (e.g. *Marchantia*); **Anthocerotopsida** (e.g. *Anthoceros*), **Bryopsida** (e.g. *Funaria*).

**UNIT-III**

**Pteridophyta:** The first vascular plant; important characteristics of Psilopsida, Lycopsidea, Sphenopsida and Pteropsida; Structure, reproduction in *Rhynia*

**UNIT-IV**

Structure and reproduction in *Lycopodium*, *Selaginella*, *Equisetum*, *Pteris* and *Marsilea*.

**Suggested Readings:**

- Goffinet B. (2008). Bryophyte Biology. Cambridge University Press, UK.
- Sambamurty, S.S. (2013). A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. I K International Publishing House Pvt Ltd., India
- Sharma, O.P. (2014). Bryophyta. McGraw Hill Education Pvt Ltd., India.
- Srivastava, H.N., 2018, Diversity of Microbes and Cryptogams, Vol. I, Pradeep's Publication.
- Vashishta, P.C, Sinha, A.K, Kumar, A., (2010). Botany for Degree Students Pteridophyta (Vascular cryptogams). S.S. Chand Publications

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: Practical – Related to Diversity of Microbes &**  
**Diversity of Cryptogams**  
**Course Code: BSMM-1075 (P)**  
**(PRACTICAL)**

**COURSE OUTCOMES:**

After passing this course student will be able to:

- CO 1: Ability to evaluate different sources of phylogenetic information (e.g. molecular sequence data, ultrastructure, morphology) for understanding algal, fungal.
- CO 2: Knowledge of the evolutionary history and time-scale of non-vascular plants, including the development of the first terrestrial plants from green algae.
- CO 3: Knowledge of the history and time-scale of land plant evolution, and evaluation of the principal types of evidence underlying.
- CO 4: Basic understanding of algal and fungal diversity (incl. morphology, cell structure and level of organization) to phylum level, and their association as lichens.

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: Practical – Related to Diversity of Microbes &**  
**Diversity of Cryptogams**  
**Course Code: BSMM-1075 (P)**  
**(PRACTICAL)**

**Time: 3 Hrs.**

**Marks: 20**

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

**Suggested Laboratory Exercises**

Teachers may select plants/material available in their locality/institution.

1. Gram staining of bacteria.
2. Observation of disease symptoms in hosts infected by fungi, viruses and mycoplasma. Section cutting of diseased material and identification of the pathogens as per the theory syllabus.
3. Study of the genera included under algae and fungi.
4. Study of morphology, reproductive structures and anatomy of the examples cited in theory under Bryophyta and Pteridophyta.
5. Types of Bacteria to be observed from temporary /permanent slides /electron micrographs.

**Suggested Readings:**

- Lee, R.E. (2018). Phycology, Fifth Edition, Cambridge University Press, USA.
- Agrios, G.N. (2005). Plant Pathology, 5th edition, Academic Press, U.K.

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: Food Chemistry and Nutrition**  
**Course Code: BSMM-1255**  
**(THEORY)**

**COURSE OUTCOMES:** After passing this course the student will be able to:

**CO1:** Understand food, its functions, food groups, malnutrition and nutrient requirement for adult men and women as per ICMR.

**CO2:** Understand the chemistry underlying the properties of various food components.

**CO3:** Understand digestion, absorption, transport and utilization of nutrients in the body.

**CO4:** Learn about the nomenclature, definition, specificity, catalysis of enzyme, factors influencing enzyme activity and role of enzymes in food processing.

**CO5:** Understand the composition and nutritional significance of cereals, milk and milk products, egg, meat, fruits and vegetables.

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: Food Chemistry and Nutrition**  
**Course Code: BSMM-1255**  
**(THEORY)**

**Examination Time: 3 Hours**

**Max. Marks: 100**

**Theory: 60**

**Practical: 20**

**CA: 20**

**Instructions for the Paper Setter:** Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT- I**

1. **Introduction to nutrition**—food as a source of nutrients, function of foods, definition of nutrition, nutrients, adequate, optimum and good nutrition, malnutrition.
2. **Inter-relationship between nutrition and health**—parameters of good health.
3. **Food guide**—basic five food groups – Importance, uses.
4. **Food Metabolism**—digestion, absorption, transport, utilization of nutrients in the body.
5. **Water**—function, sources, requirement, water balance, effect of deficiency on health.
6. **Carbohydrate**—composition, classification, food sources, storage in body, reaction, structure, functions of mono, oligo and poly-saccharides in foods.
7. **Fat and oils**—composition, saturated, unsaturated fatty acids, food sources, functions of fats. Nomenclature and classification, emulsions and emulsifiers, role of fat and oil in food processing.
8. **Proteins**—composition, essential and non-essential amino acids, sources of protein, functions, protein deficiency diseases, physico-chemical properties, modification of food protein during processing and storage.

**UNIT - II**

9. **Energy**- unit of energy, food as a source of energy, calorific value of food, need for energy, basic metabolic role, utilization of fat, energy requirement.
10. **Minerals**- function, sources, bio-availability and deficiency of macro and micro minerals.
11. **Vitamins**- classification, sources, functions and deficiency diseases of fat and water soluble vitamins.
12. **Recommended dietary Requirements**- Nutrient requirement for adult men and women as per ICMR.
13. **Enzymes**- Nomenclature, definition, specificity, catalysis, enzyme kinetics, factors influencing enzyme activity, controlling enzyme action, role of enzymes in food processing, modification of food by endogenous enzyme and enzyme inhibitors in foods.
14. **Flavors**—Types of flavors.

**UNIT- III**

15. **Cereals**: Composition and Nutritional aspects, breakfast cereals and cereal products: Bread and pasta.

16. **Milk and Milk Products:** Composition, classification, storage, uses, and nutritional significance of milk, curd, butter, paneer, khoa, cheese, ice-cream and various kinds of processed milk.

#### UNIT -IV

17. **Egg:** Composition and nutrition significance.
18. **Meat:** Structure, composition and nutritional significance, post mortem changes, changes in meat during cooking.
19. **Vegetables and Fruits:** Nutritive value of fruit and vegetables and their products- jam, jelly, marmalade and canned products.

#### Books Recommended:

1. Food Chemistry, 2007, 4<sup>th</sup> Edition, Owen R. Fennema. **(Online available)**
2. Food Chemistry, 2003, 2<sup>nd</sup> Edition, Connie M. Weaver, James R. Daniel.
3. Food Chemistry, 1974, 3<sup>rd</sup> Edition, Mian Hoagland Meyer.
4. Principles of Food Chemistry, 2018, 4<sup>th</sup> Edition, deMan.
5. Basic Food Chemistry, 2012, 4<sup>th</sup> Edition, Frank A. Lee.
6. Fundamentals of Foods and Nutritions, 2018, 6<sup>th</sup> Edition, Mudambi S.R., M.V. Rajgopal.
7. Advanced text book of Foods Nutrition, 1985, 2<sup>nd</sup> Edition, Swaminathan S.
8. Dairy technology: principles of milk properties and processes, 1995, 1<sup>st</sup> Edition, P. Walstra, T.J Guerts, A. Noomen, A. Jellema and M.A.J.S Van Boekel.
9. Cereal processing technology, 2001, 1<sup>st</sup> Edition, Gavin Owens.
10. Preservation of Fruit and Vegetables, Girdhari Lal, G.S. Siddappa and G.L. Tandon, ICAR, New Delhi.
11. Analysis and Quality Control for Fruit and Vegetable Products, S Ranganna, McGraw Hill Education (India) Private Limited, Chennai, India.
12. Essentials of Food Science, 2013, 4<sup>th</sup> Edition, Vickie A. Vaclavik, Elizabeth W. Christian. **(Online available)**
13. Food Chemistry, 2009, 4<sup>th</sup> Edition, H.-D. Belitz, W. Grosch, P. Schieberle. **(Online available)**

**Bachelor of Science (Medical) (Semester-I)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: Practical- Food Chemistry and Nutrition**  
**Course Code: BSMM-1255**  
**(PRACTICAL)**

**Examination Time: 3 Hours**

**Max. Marks: 20**

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

**List of Practicals**

1. Determination of moisture content of wheat flour.
2. Calculation of BMI and BMR
3. Determination of ash content of food sample.
4. Qualitative tests of proteins and lipids in different foods.
5. Estimation of Vitamin C.
6. Determination of salt content in food products.
7. Estimation of volatile and nonvolatile acids in vinegar.
8. Estimation of fat in food sample by Soxhlet apparatus.
9. Grading and quality evaluation of eggs.
10. Dehydration of common fruits and vegetables.



**Bachelor of Science (Medical) (Semester-I)**

**Session 2020-21**

**Course Title: DRUG ABUSE: Problem, Management and Prevention ( COMPULSORY)**

**Course code: AECD-1161**

**(THEORY)**

**COURSE OUTCOMES:**

- CO1.** This information can 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.** How to be supportive during the detoxification and rehabilitation process.
- CO3.** Main focus of substance abuse education is teaching individuals about drug and alcohol abuse and how to avoid,stop and get help for substance use disorder.
- CO4.** Substance abuse education is important for students alike;there are many misconceptions about commonly used legal and illegal substance,such as alcohol,marijuana etc.

**Bachelor of Science (Medical) (Semester-I)**

**Session 2020-21**

**Course Title: DRUG ABUSE: Problem, Management and Prevention ( COMPULSORY)**

**Course code: AECD-1161**

**(THEORY)**

**Time: 3 Hrs**

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

**UNIT-II**

**Consequences of Drug Abuse for:**

Individual : Education, Employment, Income.

Family : Violence.

Society : Crime

Nation : Law and Order problem.

**UNIT-III**

**Management of Drug Abuse**

Medical management : medication for treatment and to withdrawal effects.

**UNIT-IV**

**Psychiatric Management:** Counselling, Behavioural and Cognitive therapy. Social Management: Family, Group therapy and Environmental Intervention.

**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.

**Bachelor of Science (Medical) (Semester- I)**

**Session 2020-21**

**Course Title: Foundation Programme**

**Course code: SECF-1492**

**(THEORY)**

**Course intended for:** Semester I students of undergraduate degree programmes of all streams.

**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 benchmarks and inventors & discoverers who have impacted human life. For a student, the process of transformation from school to college is full of apprehension and intimidation of the 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

**Bachelor of Science (Medical) (Semester- I)**

**Session 2020-21**

**Course Title: Foundation Programme**

**Course code: SECF-1492**

**(THEORY)**

**Examination Time: 2 hours**

**Max. Marks: 25**

MODULE	TITLE	HOURS
I	Introduction & Initial Assessment	2
II	The Human Story	3
III	<i>The Vedas, The Gita</i> & Eastern Philosophy	2.5
IV	<i>The Holy Bible</i> & Genesis	2.5
V	Woman: A Journey through the Ages	2.5
VI	Changing Paradigms in Society, Religion & Literature	2.5
VII	Makers of Modern India	2.5
VIII	Racism & Martin Luther King Jr.	2.5
IX	Modern India at a Glance: Political & Economic Perspective	2.5
X	Technology & Human Life	2.5
XI	The KMV Experience	2.5
XII	Final Assessment, Feedback & Closure	2.5

**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, The Gita* & The Indian Philosophy**

- Origin, teachings and significance of *The Vedas*
- Upnishads and Puranas

- Karma Theory of *The Bhagwad Gita*
- Main tenets of Buddhism & Jainism
- Teachings of Guru Granth Sahib

#### **Module 4 *The Holy Bible & Genesis***

- Book of Genesis: Creation and Fall
- Noah's Ark
- Moses & The Ten Commandments
- Christ and His teachings
- Christianity and the world

#### **Module 5 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 6 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 7 Makers of Modern India**

- Early involvement 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.
- The way ahead

#### **Module 8 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 9 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 10 Technology and 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
- Harmonising technology with ethics and humaneness

#### **Module 11 The KMV Experience**

- Historical 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

## **SEMESTER-II**



**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**Course Title: PUNJABI COMPULSORY**

**Course Code- BSML-2421**

**COURSE OUTCOMES**

- **CO1:** d' ozr (ejkDh Gkr) Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo eftsk gqsh fdbu;gh, ;{M Bz{ g?dk eoBk j? sK fe T[j nkX[fBe d"o ftu uZb ojhnK ekft XkokoT ns/ ethnK pko/ frnkB jkf;b eo ;eD.
- **CO2:** fj; dk j'o wB'oE eftsk dh ftnkfynk, ftPb/PD s/ w[bzeD dh gqfefonk s'A ikD{ eokT[Dk th j? sK fe T[j ;wekbh ;wki dhnK ;wZf;nktK Bz{ ;wM ;eD ns/ nkb'uBkswe fdqPNh pDk ;eD.
- **CO3:** z;ko dhnK gqf;X j;shnK ihtBh dh ftXk Bz{ f;b/p; ftu Pkfwb eo e/ ftfdnkoEhnK nzdo ihtBh Bz{ gVQD dh o[uh Bz{ g?dk eoBk j? ns/ ihtBh irs Bkb i'VDk j?.
- **CO4:** Ppd pDso ns/ Ppd ouBk gVQD Bkb ftfdnkoEh fj;d/ w[ZYb/ ;zebgK B{z nkXko pDk e/ fjjBK ;zebgK s'A ikD{ j'Dr/ .
- **CO5:** Ppd Pq/DhnK Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo gzikph GkPk dh nwhoh dk ns/ pkohehnK Bz{ ;wMD bJh tZyo/ - tZyo/ f;XKsK dk ftek; eoBk j?.
- **CO6:** w[jktfonK dh tos'A Bkb rZbpks ftu gogZesk nkT[Adh j?.fj ftfdnkoEhnK dh rZbpks ftu fByko fbnkT[D dk ezw eoBr/.

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**Course Title: PUNJABI COMPULSORY**

**Course Code- BSML-2421**

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**Maximum Marks: 50**

**Theory: 40**

**CA: 10**

**gkm eqw ns/ gkm g[;seK**

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d' ozr (ejkDh Gkr) (;zghH jofizdo f;zx fYb'A ns/ gqhsW f;zx ;or'Xhnk),r[o{ BkBe d/t :{Bhtof;Nh, nzfwqs;o.

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**8 nze**

**:{fBN-II**

;z;ko dhNk gqf;ZX j;shNk (ihtBh BzL 10 s'A18 se) (;zghH fgqzH s/ik f;zx, joBkw f;zx Pkw), gzikph ;kfjs gqekPB, nzfwqs;o.

**(ਵਿਸ਼ਾ/ਸਾਰ)**

**8 nze**

**:{fBN-III**

(T) Ppd pDso ns/ Ppd ouBk L gfoGkPk, w[ZYb/ ;zebg.

(n) Ppd Pq/DhnK

**8 nze**

**:{fBN-IV**

(T) d|soh fuZmh gZso

(n) w[jkto/

**8 nze**

**nze tzv ns/ gohfyne bJh jdkfJsK**

1H gqPB gZso d/ uko ;?ePB j'Dr/.;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.

2H ftfdnkoEh B/ e[b gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzikK gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ 08 nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g gqPBK ftu eo ;edk j?.

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**Course Title: BASIC PUNJABI  
IN LIEU OF PUNJABI (COMPULSORY)**

**Course Code- BSML-2031**

**COURSE OUTCOMES**

- **CO1:** w[ZYbh gzikph gVQkT[D dk wB'oE ftdnkoEhnK B{z gzikph GkPk B{z f;ykT[D dh gqfefonk ftu gk e/ fJe j'o GkPk f;ZyD d/ w"e/ gqdkB eoBk j?.
- **CO2:** fJ; ftu ftdnkoEh B{z pkohephBh Bkb GkPk dk nfXn?B eotkfJnk ikt/rk.
- **CO3:** ftdnkoEhnK B{z gzikph Ppd ouBk s'A ikD{ eotkfJnk ikt/rk.
- **CO4:** Ppd Pq/DhnK Bz{ gVQkT[D dk wB'oE ftdnkoEhnK nzdo gzikph GkPk dh nwhoh dk ns/ pkohehnK Bz{ ;wMD bJh tZyo/ - tZyo/ f;XKsK dk ftek; eoBk j?.
- **CO5:** w[ZYbh gzikph gVQkT[D dk wB'oE ftdnkoEhnK dk Ppd x/ok ftPkb eoBk j?.
- **CO6:** ftdnkoEh tke dh gfoGkPk ns/ fJ;dh pDso s'A ikD{ j'Dr/ ns/ GkPk s/ geV wip{s j't/rh.
- **CO7:** g?oQk ouBk dk wB'oE ftdnkoEhnK dh p[ZXh B{z shyD eofdnK T[BK dh fbyD gqfsGk B{z T[ikro eoBk j?.
- **CO8:** ;zy/g ouBk eoB Bkb ftdnkoEh nkgDh rZb B{z ;zy/g ftu efjD dh iku f;ZyDr/ ns/ fJj fdwkrh e;os ftu ;jkJh j't/rh.
- **CO9:** xo/b{ ns/ d|soh fuZmh gZso fbyD dk wB'oE ftdnkoEhnK B{z fJ; ebk ftu fBg[zB eoBk j?.
- **CO10:** w[jktfonK dh tos'A Bkb rZbpks ftu gogZesk nkT[Adh j?.fJj ftdnkoEhnK dh rZbpks ftu fByko fbnkT[D dk ezW eoBr/.

**Course Title: BASIC PUNJABI  
IN LIEU OF PUNJABI (COMPULSORY)  
Course Code- BSML-2031**

**smW: 3 GMty**

**Maximum Marks: 50**

**Theory: 40**

**C.A: 10**

**gkm eqw**

**:{fBN-I**

Ppd P/qDhnK L gSkD ns/ tos'A (BKt, gVBKt, fefonk, ftP/PD, fefonk ftP/PD, ;pzXe,:ie ns/ ft;fwe)

**08 nze**

**:{fBN-II**

gzikph tke pDso L w[ZYbh ikD gSkD

(T) ;kXkoB tke, ;z:[es tke ns/ fwPos tke (gSkD ns/ tos'A)

(n) fpnkBhnk tke, gqPBtkue tke ns/ j[ewh tke (gSkD ns/ tos'A)

**08 nze**

**:{fBN-III**

g?oQk ouBk

;zy/g ouBk

**08 nze**

**:{fBN-IV**

fuZmh gZso (xo/b{ ns/ d|soh)

w[jkto/

**08 nze**

**nze tzv ns/ gohfyne bJh jdkfJsk**

1H gqPB gZso d/ uko ;?ePB j'Dr/.;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.

2H ftfdnkoEh B/ e[b gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzikK gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ 08 nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g gqPBK ftu eo ;edk j?.

**BACHELOR OF SCIENCE (Medical) (Semester II)  
Session 2020-21  
Course Title: PUNJAB HISTORY AND CULTURE (C. 320 TO 1000 B.C.)  
(Special paper in lieu of Punjabi Compulsory)**

**(For those students who are not domicile of Punjab)**  
**Course Code- BSML-2431**

**COURSE OUTCOMES:**

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

- **CO 1:** Analyse the emergence of Mauryan, Gupta empires during the classical age in India
- **CO 2:** To understand the various factors leading to rise and fall of empires and emergence of new dynasties and their Culture, society, administration, polity and religion specifically of Kushans and Vardhanas in the Punjab
- **CO 3:** Students will be adept in constructing original historical argument based on primary source material research
- **CO 4:** To have an insight on the existing Literature of this period and understand the past developments in the light of present scenario.
- **CO 5:** To enable students to have thorough insight into the various forms/styles of Architecture and synthesis of Indo - Muslim Art and Architecture in Punjab

**BACHELOR OF SCIENCE (Medical) (Semester II)**  
**Session 2020-21**  
**Course Title: PUNJAB HISTORY AND CULTURE (C. 320 TO 1000 B.C.)**  
**(Special paper in lieu of Punjabi Compulsory)**

(For those students who are not domicile of Punjab)

Course Code- BSML-2431

Examination Time: 3 Hrs

Max.Marks: 50

Theory: 40

CA: 10

Instructions for the Paper Setter:

5. Question paper shall consist of four Units
6. Examiner shall set 8 questions in all by selecting Two Questions of equal marks from each Unit.
7. Candidates shall attempt 5 questions in 600 words, by at least selecting One Question from each Unit and the 5<sup>th</sup> question may be attempted from any of the four Units.
8. Each question will carry 8 marks

#### UNIT-I

1. Alexander's Invasion's and Impact
2. Administration of Chandragupta Maurya and Ashoka.

#### UNIT-II

3. The Kushans: Gandhar School of Art.
4. Gupta Empire: Golden period (Science, Art and Literature)

#### UNIT-III

5. The Punjab under the Harshvardhana
6. Socio-cultural History of Punjab from 7<sup>th</sup> 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:

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

BACHELOR OF SCIENCE (Medical) (Semester II)

Session 2020-21

ENGLISH

**Course Title: ENGLISH (COMPULSORY)**

**Course Code- BSML-2212**

**COURSE OUTCOMES:**

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

- **CO 1:** appreciate the writings of various Indian and foreign story and prose writers and relate them to their socio-cultural milieu
- **CO 2:** comprehend the meaning of texts and answer questions related to situations, episodes, themes and characters depicted in them
- **CO 3:** change the narration and voice of sentences after understanding fundamental grammatical rules governing them
- **CO 4:** enrich their vocabulary and use new words in their spoken and written language
- **CO 5:** independently write personal letters to their family and friends on various issues

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**ENGLISH**  
**Course Title: ENGLISH COMPULSORY**  
**Course Code- BSML-2212**

**Examination Time: 3 Hrs**

**Max. Marks: 50**

**Theory:40**

**C.A:10**

**Instructions for the Examiner:**

**The question paper will consist of 4 sections & distribution of marks will be as under:**

**Section A:** The question will be set from Unit I of the syllabus. Fifteen sentences will be set and the students would be required to attempt any ten. Each sentence will carry one mark. **(10x1=10)**

**Section B:** Two questions will be set from Unit II of the syllabus. The students would be required to attempt one personal letter out of the given two. It will carry five marks (word limit 150 words). The second question will be based on vocabulary. The students would be required to write Antonyms or Synonyms for given words choosing any 5 out of 8 and each carrying one mark. **(2x5=10)**

**Section C:** This section will be divided into two parts. Two questions will be set from Unit III of the syllabus. Part one will have one essay type question with internal choice carrying six marks (word limit 300 words). The students would be required to attempt anyone. The second part will have three questions. The students would be required to attempt any two. Each question will carry two marks (50 words each). **(6+2x2=10)**

**Section D:** This section will be divided into two parts. Two questions will be set from Unit IV of the syllabus. Part one will have one essay type question with internal choice carrying six marks (word limit 300 words). The students would be required to attempt anyone. The second part will have three questions. The students would be required to attempt any two. Each question will carry two marks (50 words each). **(6+2x2=10)**

**UNIT I**

*English Grammar in Use*, 4<sup>th</sup> Edition by Raymond Murphy, CUP (Units: 42-52, 69-81)

**UNIT II**

Personal letter Writing and *The Students' Companion* (Section 9: Antonyms and Synonyms)

**UNIT III**

*Tales of Life* (Guru Nanak Dev University, Amritsar): Stories at Sr. No. 7, 9, 10, 11, 12

**UNIT IV**

*Prose for Young Learners*: Essays at Sr. No. 7,8, 9, 10, 11

**Texts Prescribed:**

1. *English Grammar in Use* (Fourth Edition) by Raymond Murphy, CUP
2. *The Students' Companion* by Wilfred D. Best
3. *Tales of Life* (Guru Nanak Dev University, Amritsar)
4. *Prose for Young Learners* (Guru Nanak Dev University, Amritsar)

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: ECOLOGY**

**Course Code- BSMM-2483 (I)**



**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

- **CO1.** Construct the food web.
- **CO2.** Familiarise with ecological adaptations.
- **CO3.** Know about the characteristics of population & biotic community.
- **CO4.** Know about the conservation of resources.

**Course Code- BSMM-2483 (I)**

**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**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**

Ecology: Definition, Subdivisions and scope of ecology.

Ecosystem: Components, ecological energetics, food web, major ecosystems of the world.

Ecological factors: Temperature, light and soil as ecological factors.

**UNIT-II**

Nutrients: Biogeochemical cycles and concept of limiting factors.

Ecological Adaptations: Morphological, physiological and behavioural adaptations in animals in different habitats.

**UNIT-III**

Population: Characteristics and regulations of population. Inter and Intra Specific relationship: Competition, Predation, Parasitism, Commensalism and Mutualism.

Biotic community: Characteristics, ecological succession, ecological niche.

**UNIT-IV**

Natural resources: Renewable and nonrenewable natural resources and their conservations.

Environmental Issues: Causes, impact and control of environmental pollution.

**Suggested Readings:**

Anderwartha, H.G. and Birch, L. C. (1970), The distribution and abundance of animals, University of Chicago Press, Chicago London.

Beeby, A. (1992), Applying Ecology, Chapman and Hall Madras.

Begon, M., Harper J. L. and Townsend, C. R. (1995), Ecology – Individuals, populations and communities, Blackwell Science, Cambridge UK.

Brewer, R. (1994), The science of Ecology, Saunders College of Publishing, New York.

Chapman, J. L. and Resis, M. J. (1995), Ecology- Principles and applications, Cambridge University Press, Cambridge UK.

Kaeighs, S. C. (1974), Ecology with special references to animal and Man, Prentice Hall Inc.

Kormondy, E.J. (1975), Concept of Ecology, Englewood Cliffs, N.J. Prentice Hall Inc.

Kreb C.J. (1982), Ecology, Harper & Row, New York.

Putmann, R. J. and Wratten, S. D. (1984), Principles of Ecology, Crown Helm, London.

**BACHELOR OF SCIENCE (Medical) (Semester II)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: BIODIVERSITY-II (ARTHROPODA TO HEMICHORDATA)**  
**Course Code: BSMM-2483 (II)**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

- **CO1.** Familiarize with the non-chordate world that surrounds us.
- **CO2.** Appreciate the process of evolution (unicellular cells to complex, multicellular organisms).
- **CO3.** Identify the invertebrates and classify them up to the class level with the basis of systematic.
- **CO4.** Understand the basis of life processes in the non-chordates and recognize the economically important invertebrate fauna.

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: BIODIVERSITY-II (ARTHROPODA TO HEMICHORDATA)**

**Course Code: BSMM-2483 (II)  
(THEORY)**

**Max. Time: 3 Hrs.**

**Max.Marks:30**

**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**

Arthropoda: Type study-Periplaneta americana (Cockroach), Social organizations in insects (Honey bee and Termite)

**UNIT-II**

Mollusca: Type study -Pila globosa, Tortion, Pearl formation

**UNIT-III**

Echinodermata: Type study - Asterias (Star fish), Study of Echinoderm larvae

**UNIT-IV**

Hemichordata: Type study-Balanoglossus (External characters only). Affinities of Hemichordates with Non-Chordates and Chordates

**Suggested Readings:**

Barnes, R.D.(1999), Invertebrate Zoology. W.B. Saunder, Philadelphia.

Dhami, P.S. & Dhami, J. K., Invertebrates, R. Chand & Co., New Delhi, 2001.

Barth, R. H. and Broshears, R. E (1982), The Invertebrate world. Holt Saunder, Japan.

Brusca, R. C. and Brusca, G. J. (2003), Invertebrates (2nd ed), Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.

Engemann, J. G. and Hegner, R. W. (1981), Invertebrate Zoology (3rd ed), Macmillan, New York.

Meglitsch, P. A. and Schran, F. R. (1991), Invertebrate Zoology (3rd ed), Oxford University Press, New York.

Pechenik, A. Jan. (2000), Biology of the invertebrates, (4th ed), McGraw Hill Book Co. Singapore

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: PRACTICAL-II- ECOLOGY AND BIODIVERSITY-II**

**Course Code: BSMM-2483 (P)**

**(PRACTICAL)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

- **CO1.** Know about the morphological, physiological & behavioural adaptations of different animals in different habitats.
- **CO2.** Familiarise with the classification & ecology of invertebrates.
- **CO3.** Identify different zoogeographical realms with fauna.
- **CO4.** Know about the different nest of birds.

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: PRACTICAL-II- ECOLOGY AND BIODIVERSITY-II**

**Course Code: BSMM-2483 (P)**

**(PRACTICAL)**

**Time: 3Hrs.**

**Marks: 20**

**Instructions for the Practical Examiners:**

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

**1. Classification up to orders with ecological notes and economic importance (if any) of the following animals :**

**Arthropoda:** Peripatus, Palaemon (prawn), Lobster, Cancer (crab), Sacculina, Eupagurus (hermit Crab), Lepas, Balanus, Cyclops, Daphnia, Lepisma, Periplaneta (cockroach), Schistocerca (locust), Poecilocus (ak grasshopper), Gryllus (cricket), Mantis (praying mantis), Cicada, Forficula (earwig), Dragonfly, Termite queen, Bug, Moth, Beetles, Polistes, (wasp), Apis (honey bee), Bombyx, Pediculus (body louse) Millipede and Centipede, Palamnaeus (scorpion), Aranea (spider) and Limulus (king Crab).

**Mollusca:** Anodonta, Mytilus, Ostrea, Cardium, Pholas, Solen (razor fish), Pecten, Haliotis, Patella, Aplysia, Doris, Limax, Loligo, Sepia, Octopus, Nautilus shell (Complete and T.S.), Chiton, Dentalium.

**Echinodermata:** Asterias, Echinus Ophiothrix, Antedon.

**Hemichordata:** Balanoglossus.

**2. Study of the following permanent stained preparations:**

Trachea and mouth parts of Insects

Radula and osphradium of Pila

T.S. Star fish (Arm).

**3. Demonstration of digestive and nervous systems of Periplaneta (cockroach) with the help of charts/models/videos.**

**4. Ecology:**

Study of animal adaptations with the help of specimens, charts and models.

Study of abiotic and biotic components of an ecosystem.

Study of different types of nests of birds.

Study and preparation of Zoogeographical charts.

## 5. Assignment

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

### Guidelines for conduct of practical Examination:-

- |    |   |   |
|----|---|---|
| 1. | Identify and classify the specimens upto order. Write a note on their habit, habitat, special features and economic importance. | 4 |
| 2. | Draw a well labelled sketch of the given system of the animal & explain it to the examiner.                                     | 3 |
| 3. | Identify the slides/models and give two reasons for identification.   | 3 |
| 4. | Identify the adaptive feature/nest.   | 2 |
| 5. | Mark the distribution of animals of a realm on the map.   | 2 |
| 6. | Assignment  | 2 |
| 7. | Viva-voce & Practical file.   | 4 |



**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

- **CO1:** Understand the intrinsic and extrinsic factors affecting the growth of various microorganisms in foods and microorganisms important in food microbiology.
- **CO2:** Learn about the origin and preparation of fermented foods (bread, dosa, idli, warri, tempeh, miso).
- **CO3:** Understand the Principles of food preservation and various methods of preservation (high temperature, low temperature, drying, chemical preservatives) and applications of prebiotics and probiotics.
- **CO4:** Understand the spoilage of food (milk and milk products, cereal and cereal products, vegetable and fruits, meat and meat products, canned foods) and food poisoning and infection.

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**MICROBIOLOGY**

**Course Title: BASIC FOOD MICROBIOLOGY**

**Course Code: BSMM-2343  
(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 100  
Theory Marks: 60  
Practical Marks: 20  
CA: 20**

**Instructions for the Paper Setters:**

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

**UNIT-I**

1. Food as a substrate for microorganisms, intrinsic and extrinsic factors affecting the growth of various microorganisms in foods. Microorganisms important in food microbiology—bacteria, yeasts and molds, sources of contamination in foods.

**UNIT-II**

2. Fermented foods, origin of fermentation as a method of preparing indigenous foods, bread, dosa, idli, warri, tempeh, miso

**UNIT-III**

3. Principles of food preservation and spoilage, asepsis, anaerobic conditions, aseptic packaging, preservation methods, high temperature, low temperature, drying, chemical preservatives. Applications of prebiotics and probiotics.

**UNIT-IV**

4. Spoilage of various milk and milk products, cereal and cereal products, vegetable and fruits, meat and meat products, canned foods. Food poisoning and food infection. *Staphylococcal*, *Clostridium* and *Salmonella* intoxications.

**Books Recommended:**

1. Frazier, W.C. and Westhoff, D.C. 2006, 26<sup>th</sup> edition, Food Microbiology, Tata McGraw Hill Publishing Co., Ltd., New Delhi.
2. Banwart, G.J., 2012, Basic Food Microbiology, Springer Verlag, New Delhi.
3. Powar, C.B. and Dagniwala, H.F. 2012, General Microbiology Volume II. Himalaya Publishing House, New Delhi. 128

**BACHELOR OF SCIENCE (Medical) (Semester II)  
Session 2020-21  
MICROBIOLOGY  
Course Title: BASIC FOOD MICROBIOLOGY**

**Course Code: BSMM-2343  
(PRACTICAL)**

**Time: 3 hrs**

**Marks: 20**

**Instructions for the practical examiner:**

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

**LIST OF PRACTICALS:**

1. To enumerate the total microbial cells in a suspension by serial dilution and pour plating.
2. To enumerate the total bacteria in milk by direct microscopic count.
3. To measure the size of microbial cells by ocular micrometer.
4. To study the morphology of bacteria, yeasts and molds.
5. To check the bacteriological quality of raw milk by methylene blue reduction test.
6. Baking of bread and making of dhokla & idli.
7. To study the spoilage of microorganisms present in spoiled bread and raw milk.

**Course Title: INORGANIC CHEMISTRY (I)**

**Course Code: BSMM-2084 (I)**

**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to

- **CO1:** explain the atomic, physical and chemical properties of alkali metals and alkaline earth metals
- **CO2:** recognise the anomalous properties of Li and compares the properties Li with those other alkali metals
- **CO3:** recognises the anomalous properties of Be and compares the properties of Be with those other alkaline earth metals
- **CO4:** explains the trends in atomic and physical properties of group 13, 14, 15, 16, 17 elements explains chemical properties of above group elements
- **CO5:** describe allotropic forms of elements
- **CO6:** exhaustive understanding of d-block elements belonging to 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> period.
- **CO7:** understand the simple concepts of pH and complete and balance simple acid-base reactions.

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**CHEMISTRY**  
**Course Title: INORGANIC CHEMISTRY (I)**  
**Course Code: BSMM-2084 (I)**  
**(THEORY)**

**Time: 3 Hrs.**

**Max.Marks:30**

**Instructions for the Paper Setter:**

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**

**I. p-Block Elements-I**  
**(10 Hrs)**

Comparative study (including diagonal relationship) of groups 13–17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13–16, hydrides of boron–diborane and higher boranes, Borazine, borohydrides, fullerenes.

**UNIT-II**

**II. s-Block Elements**  
**(5 Hrs)**

Comparative studies, diagonal relationship, salient features of hydrides, solvation and complexation tendencies.

**III. Acids and Bases**  
**(5 Hrs)**

Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases.

**UNIT-III**

**IV.p-Block Elements-II**  
**(10 Hrs)**

Carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalide, Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes

**UNIT-IV**

**V. Chemistry of Transition Elements**  
**(15 Hrs)**

Characteristic properties of *d*-block elements. Properties of the elements of the first transition series, their simple compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry. General characteristics of elements of Second and Third Transition Series, comparative treatment with their 3d analogues in respect of ionic radii, oxidation states, magnetic behaviour.

**Books Suggested:**

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

**Course Code: BSMM-2084 (II)**  
**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to

- **CO1:** acquire the knowledge of structure and intermolecular forces present between solids, liquids and gases.
- **CO2:** demonstrate an understanding of basic principles of colligative properties
- **CO3:** understand the basic concepts of colloidal state of matter and applications of colloids.
- **CO4:** explain various gaseous laws and their applications.

**Course Title: PHYSICAL CHEMISTRY (II)**  
**Course Code: BSMM-2084 (II)**  
**(THEORY)**

**Time: 3 Hrs.**

**Max.Marks:30**

**Note: Log table and Non-Programmable calculators are allowed**

**Instructions for the Paper Setter:**

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**

**I. Gaseous States**

**(11Hrs)**

Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waal's equation of state.

**Critical Phenomena:** PV isotherms of real gases, continuity of states, the isotherms of van der Waal's equation, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.

**Molecular Velocities:** Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquefaction of gases.

**UNIT -II**

**II. Liquid State**

**(11Hrs)**

Intermolecular forces, structure of liquids (a qualitative description). Structural differences between solids, liquids and gases. Liquid crystals: Difference between liquids crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.

**UNIT -III**

**III. Colloidal State**

**(11Hrs)**

Definition of colloids, classification of colloids. Solids in liquids (Sol): kinetic, optical and electrical properties, stability of colloids, protective action, Hardy Schulze law, gold number. Liquids in liquids (emulsions): Types of emulsions, preparation. Emulsifiers. general applications of colloids.

**UNIT -IV**



#### **IV.Solutions, Dilute Solutions and Colligative Properties (12Hrs)**

Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, Law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.

#### **Books suggested:**

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; 43rd edition, Pubs: Vishal Publishing Co., 2008.
3. Barrow, G.M., Physical Chemistry; 6th edition, Pubs: McGraw Hill Inc, 1996.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan India, 1985.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; 1st edition, Pubs: John Wiley & Sons Inc., 1992.
7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems; Pubs: Wiley Eastern Limited, 1991.
8. Levine, I.N., Physical Chemistry; 5th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd., 2002.
9. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd, 1983.
10. University General Chemistry, C.N.R. Rao, Macmillan.

**(PRACTICAL)**

**COURSE OUTCOMES:**

Students will be able to

- **CO1:** understand the technique of crystallisation
- **CO2:** compare the viscosity and surface tension of different liquids and solutions
- **CO3:** determine the rate of the reactions
- **CO4:** efficiently use of calorimeter in various experiments

**Course Code: BSMM-2084 (P)**  
**(PRACTICAL)**

**Time: 3½ Hrs.**

**Max.Marks:20**

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

**Crystallisation:**

Concept of indication of crystallisation. Phthalic acid from hot water (using fluted filter paper & stem less funnel)

Acetanilide from boiling water.

Naphthalene from Ethanol

Benzoic acid from water

**Physical Chemistry**

1. To determine the specific reaction rate of hydrolysis of ethyl acetate catalysed by Hydrogen ions at room temperature.
2. To study the effect of acid strength on hydrolysis of an ester.

**Viscosity, Surface Tension (Pure Liquids)**

3. To study the viscosity and surface tension of  $\text{CCl}_4$ , glycerine solution in water.
4. To determine the solubility of benzoic acid at different temperatures and to determine  $\Delta H$  of the dissolution process.
5. To determine the enthalpy of neutralisation of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionisation of the weak acid/weak base.
6. To determine the enthalpy of dissolution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

**Practical Examination:**

**Marks**

1)	Crystallisation	05
2)	Physical Experiment	10
3)	Viva–Voce	03
4)	Note Book	02

**Books suggested :**

1. Experimental Organic Chemistry, Vol. I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.

2. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
3. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
4. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.
5. Experiments in Physical Chemistry, R.C. Das and B. Behra, Tata McGraw Hill.
6. Advanced Practical Physical Chemistry, J.B. Yadav, Goel Publishing House.
7. Advanced Experimental Chemistry, Vol. I, Physical, J.N. Guru and R. Kapoor, S. Chand & Co.
8. Selected Experiments in Physical Chemistry, N.G. Mukherjee, J.N. Ghosh & Sons.
9. Experiments Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**BOTANY**

**Course Title: CELL BIOLOGY**

**Course Code: BSMM-2075 (I)**

**(THEORY)**

**COURSE OUTCOMES:**

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

- **CO1:** Explain cellular processes and mechanisms that lead to physiological functions as well as examples of pathological state.
- **CO2:** Describe the intricate relationship between various cellular structures and their corresponding functions.
- **CO3:** Describe cytological, biochemical, physiological and genetic aspects of the cell, including cellular processes common to all cells, to all eukaryotic cells as well as processes in certain specialized cells.
- **CO4:** Relate normal cellular structures to their functions.

**Course Code: BSMM-2075 (I)**  
**(THEORY)**

**Time: 3Hrs**

**Max. Marks: 30**

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

**UNIT-I**

An Overview: prokaryotic and eukaryotic cells, cell size and shape and *Escherichiacoli*. Structure and Function of Nucleus; Ultrastructure; nuclear membrane; nucleolus.

**UNIT-II**

Extranuclear Genome: Presence and function of mitochondrial and plastid DNA; plasmids. Structure and Function of other Organelles: Golgi bodies, Endoplasmic reticulum, Peroxisomes, Vacuoles.

**UNIT-III**

Chromosome Organization: Morphology; centromere and telomere; chromosome alterations; deletions, duplications, translocations, inversions; variations in chromosome number, aneuploidy, polyploidy; sex chromosomes.

**UNIT-IV**

The Cell Envelopes: Plasma membrane; bilayer lipid structure; functions; the cell wall.

**Suggested Readings:**

1. Gupta, P.K. (2017). A Text-book of Cell and Molecular Biology (5th edition). Rastogi Publications, Meerut, India
2. Johnson, A., Raff, L. and Walter, R. (2008). Molecular Biology of the Cell (5th Edition). Taylor and Francis Group, USA.
3. Karp, G. (2013). Cell and Molecular Biology: Concepts and Experiments (7th Edition). Wiley Publishers, USA.
4. Kleinsmith, L.J. and Kish, V.M. (1995). Principles of Cell and Molecular Biology (2<sup>nd</sup> edition). HarperCollins College Publishers, New York, USA.
5. Lodish, H., Berk, A., Kaiser, C. A., Krieger, M., Bretscher, A. and Ploegh, H. (2016). Molecular Cell Biology (5th edition), W.H. Freeman & Co., New York, USA.
6. Snustad, D.P. and Simmons, M.J. (2012). Principles of Genetics (8th Edition). John Wiley and Sons Inc., U.S.A.

**BACHELOR OF SCIENCE (Medical) (Semester II)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: GENETICS**  
**Course Code: BSMM-2075 (II)**

**(THEORY)**

**COURSE OUTCOMES: -**

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

- **CO1:** Comprehensive, detailed understanding of the chemical basis of heredity
- **CO2:** Comprehensive and detailed understanding of genetic methodology and how quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms.
- **CO3:** Understanding of how genetic concepts affect broad societal issues including health and disease, food and natural resources, environmental sustainability, etc.
- **CO4:** Understanding the role of genetic mechanisms in evolution. The knowledge required to design, execute, and analyze the results of genetic experimentation in animal and plant model systems.
- **CO5:** The ability to evaluate conclusions that are based on genetic data. Insight into the mathematical, statistical, and computational basis of genetic analyses that use genome-scale data sets in systems biology settings.

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**BOTANY**

**Course Title: GENETICS**

**Course Code: BSMM-2075 (II)**  
**(THEORY)**

**Time: 3Hrs**

**Max. Marks: 30**

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

**UNIT-I**

DNA the Genetic Material: DNA structure; replication; DNA–protein interaction; thenucleosome model; genetic code; satellite and repetitive DNA.

**UNIT-II**

Cell Division: Mitosis; meiosis.

Genetic Inheritance: Mendelism; laws of segregation and independent assortment; linkage analysis; allelic and non–allelic interactions.

**UNIT-III**

Gene expression: Structure of gene; transfer of genetic information; transcription, translation, protein synthesis, tRNA; ribosomes; regulation of gene expression in prokaryotes and eukaryotes; proteins, ID, 2D, and 3D structure.

**UNIT-IV**

Genetic Variations: Mutations, spontaneous and induced; transposable genetic elements; DNA, damage and repair.

**Suggested Readings:**

1. Brown, T.A. (2011). Genetics: A Molecular Approach (3rd Edition). BIOS Scientific Publishers, UK.
2. Fletcher, H., Hickey, I. and Winter, P. (2010). Instant Notes on Genetics (3rd edition) Taylor and Francis Group, USA.
3. Gardner, E.J., Simmons, M.J. and Snustad, D.P. (2012). Principles of Genetics (8th Edition). Wiley Sons, USA.
4. Gupta, P.K. (2017). Cell and Molecular Biology (5th edition), Rastogi Publications, Meerut, India.
5. Kleinsmith, L.J. and Kish, V.M. (1995). Principles of Cell and Molecular Biology (2<sup>nd</sup> Edition). Harper Collins College Publishers, New York, USA.



6. Krebs, B. E., Goldstein, E.S. and Kilpatrick, S.T. (2014). Lewin's Genes XI. Jones and Bartlett Publishers, LLC, UK.
7. Lodish, H., Berk, A., Kaiser, C. A., Krieger, M., Bretscher, A. and Ploegh, H. (2016).Molecular Cell Biology (5th edition), W.H. Freeman & Co., New York, USA.
8. Singh, B.D. (2018). Molecular Genetics.Kalyani Publishers, India.
9. Snustad, D.P. and Simmons, M.J. (2012). Principles of Genetics (5th Edition). John Wiley and Sons Inc., U.S.A.

**Course Title: PRACTICAL-II- GENETICS AND CELL BIOLOGY**  
**Course Code: BSMM-2075 (P)**  
**(PRACTICAL)**

**COURSE OUTCOMES: -**

After passing this course the student will develop:

- **CO1:** A critical awareness of how genetics techniques can be applied to biological problems.
- **CO2:** A critical awareness of current thinking in a specialist area of cell biology and genetics.
- **CO3:** the ability to evaluate methodologies in the design of experimental procedures.
- **CO4:** The ability to critically evaluate experimental data.
- **CO5:** The ability to synthesize hypotheses from a wide range of information sources.
- **CO6:** The ability to design and implement a wide range of experimental procedures.
- **CO7:** to be able to make sound judgments on the significance of incomplete data sets.
- **CO8:** Demonstration of independence and originality in solving problems.
- **CO9:** The ability to exercise initiative and personal responsibility.
- **CO10:** The development of independent learning skills required for continuing professional development.

**BOTANY**  
**Course Title: PRACTICAL-II- GENETICS AND CELL BIOLOGY**  
**Course Code: BSMM-2075 (P)**  
**(PRACTICAL)**

**TIME: 3Hrs**

**Max. Marks: 20**

**Instructions for the paper setter:**

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

**Suggested Laboratory Exercises**

Teachers may select plants/material available in their locality/institutions.

1. To study cell structure from onion leaf peels; demonstration of staining and mounting methods.
2. Comparative study of cell structure in onion cells, *Hydrilla* and *Spirogyra*. Study of cyclosis in *Tradescantia* Staminal Cells.
3. Study of plastids to examine pigment distribution in plants (e.g. *Cassia*, *Lycopersicon* and *Capsicum*).
4. Examination of electron micrographs of eukaryotic cells with special reference to organelles.
5. Study of electron micrographs of viruses, bacteria, cyanobacteria and eukaryotic cells for comparative cellular organization.
6. Microscopy- Theoretical knowledge of Light and Electron microscope.
7. Examination of various stages of mitosis and meiosis using appropriate plant material (e.g. onion root tips, onion flower buds).
8. Preparation of karyotypes from dividing root tip cells and pollen grains.
9. Cytological examination of special types of chromosomes: bar body, lampbrush and polytene chromosomes.
10. Working out the laws of inheritance using seed mixtures.
11. Working out the mode of inheritance of linked genes from test cross and/or F2 data.

**Suggested Readings:-**

1. Fukui, K. and Nakayama, S. 1996. Plant Chromosomes; Laboratory Methods, CRC Press, Boca Raton, Florida.
2. Gunning, B.E.S. and Steer, M.W. 1996. Plant Cell Biology; Structure and Function, Jones AndBarllett Publishers, Boston, Massachusetts.
3. Harns, N. and Oparka, K.J. 1994. Plant Cell Biology, A Practical Approach. IRL Press,at OxfordUniversity Press, Oxford, UK.

4. Sharma, A.K. and Sharma, A. 1999. Plant Chromosomes; Analysis. Manipulation and Engineering, Harwood Academic Publishers, Australia.
5. Plopper, G. (2016). Principles of Cell Biology. Jones and Barnett Learning, Boston, Massachusetts.

**BACHELOR OF SCIENCE (Medical) (Semester II)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: FOOD PLANT HYGIENE & SANITATION**  
**Course Code: BSMM-2255**

**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

- **CO1:** Understand hygiene, sanitation and importance of personal hygiene of food handler in food industries.
- **CO2:** Learn various methods, basic principles and practices of cleaning and sanitation in food processing industries.
- **CO3:** Understand requirements of waste management, waste disposal and treatment in food industries.
- **CO4:** Understand requirements of water utilization and hygiene of water used for processing.

**(THEORY)**

**Examination Time: 3 Hrs**

**Max. Marks: 100**  
**Theory Marks: 60**  
**Practical Marks: 20**  
**CA: 20**

**Instructions for the Paper Setter:**

Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT - I**

Importance of personal hygiene of food handler- habits, clothes, illness, education of handler in handling and service. Cleaning agents and disinfectants. Uses of different cleaning and sanitizing agents. GLP, GHP, CIP and COP.

**UNIT - II**

Cleaning methods– sterilization, disinfection, heat & chemicals, chemical tests for sanitizer strength.

**UNIT - III**

Food sanitation- principles & methods, control and inspection, sanitation in fruits & vegetables industry, cereals industry, dairy industry, meat, egg & poultry units.

**UNIT - IV**

Control of infestation, rodent control, vector control, use of pesticides, hygiene of water used for processing, analysis of total plate count and ecoli, planning & implementation of training programmes for health personnel, waste disposal and treatment.

**Books Recommended:**

1. Principles of Food Sanitation by Norman G. Marriott
2. Food Poisoning and Food Hygiene by Hobbs, B. C. and R. J. Gilbert
3. Quantity Food Sanitation by Longree K
4. Environmental Sanitation in India by Kawata K

**(PRACTICAL)**

**Time: 3 Hrs**

**Max. Marks: 20**

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

**List of Practicals:**

1. Sterilization of equipments used in the laboratory by using heat and chemicals.
2. Determination of B.O.D& C.O.D
3. Determination of sanitary status of plant equipment.
4. Chlorination of water.
5. To study the bacteriology of water.
6. Determination of Total dissolved solids (TDS) of water.
7. Determination of Hardness of water.
8. Determination of alkalinity and acidity of water.
9. Determination of organic matter of water.
10. Determination of chlorides and sulphates in water.

**BACHELOR OF SCIENCE (Medical) (Semester II)**

**Session 2020-21**

**Course Title: DRUG ABUSE:PROBLEM, MANAGEMENT AND PREVENTION (COMPULSORY)**

**Course Code- AECD-2161**

**(THEORY)**

**Time: 3 Hrs**

**Max. Marks: 50**

**Theory:40**

**C.A: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**

**Prevention of Drug abuse:** Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.

**UNIT-II**

**School:** Counselling, Teacher as role-model. Parent-teacher-Health Professional Coordination, Random testing on students.

**UNIT-III**

**Controlling Drug Abuse:** Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program

**UNIT-IV**

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

**References:**

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.



# **SEMESTER-III**

**Bachelor of Science (Medical) (Semester-III)**

**Session 2020-21**

**Course Title: Punjabi (Compulsory)**

**COURSE OUTCOMES:**

CO1: u'Dt/ gzikph fBpzX Bz{ gVQkT[D dk wB'oE ftdnkoEhnK nzdo ਵਾਰਤਕgqshfdbu;gh, ;{M Bz{ g?dk eoBk j?.

CO2: 'wK wzr eodk j?' fJeKrh ;zrqfj Bz{ f;b/p; ftu PkfwB eo e/ ftdnkoEhnK nzdo fJeKrh gVQD dh o[uh Bz{ g?dk eoBk j? ns/ fJ; ;kfjs o{g Bkb Bkb i'VDk j?.

CO3: ;zy/g ouBk eoB Bkb ftdnkoEh nkgDh rZb B{z ;zy/g ftu efjD dh iku f;ZyDr/ ns/ fJj fdwkrh e;os ftu ;jKjH j't/rh.

CO4: b/y ouBk dk wB'oE ftdnkoEhnK dh p[ZXh B{z shyD eofdnK T[BK dh fbyD gqfsGk B{z T[iKro eoBk j?.

CO5: w{b ftnkeoDe fJekJhnK L gfoGkPk ns/ tzBrhnK (GktzP, Ppd, tkezP, T[gtke ns/ tke)Bz{ gVQkT[D dk wB'oE ftdnkoEhnK nzdo GkPk dh nwhoh ns/ pkohehnK Bz{ ;wMD bJh tZyo/ - tZyo/ f;XKsK dk ftek; eoBk j?.

**Bachelor of Science (Medical) (Semester-III)**

**SESSION 2020-21**

**Course Title: PUNJABI (COMPULSORY)**

**Course Code- BSML -3421**

gkm eqw ns/ gkm g[;seK

:{fBN-I

u'Dt/ gzikph fBpzX ( i'frzdo f;zx g[nko,gowihs f;zx f;ZX{}), gzikph :{Bhtof;Nh,gfNnkbk.

xo dk fgnko, T[wo bzwh j' ;edh j?,nZEo{, g[okDk gzikp, fJzrb?Av dk ;'rh ;'wtko,fyvkoHnK d/ tfjw.

(gkmeqw dk fjZ;k jB)

(ftPk t;s{\$;ko)

8 nze

:{fBN-II

;wK wzr eodk j? (fJeKrh ;zrqfj) (ਸੰਪਾ. ਵੇਦਲਧਾਲੀਵਾਲ) u/sBk gqekPB,b[fXnkDk.

(ftPk t;s{ \$;ko)

8 nze

:{fBN-III

(T) ;zy/g ouBk (gq?;h)

(n) b/y ouBk

8 nze

:{fBN-IV

w{b ftnkeoDe fJekJhnK L gfoGkPk ns/ tzBrhnK (GktzP, Ppd, tkezP, T[gtke ns/ tke)

8 nze

nze tzv ns/ gohfyne bJh jdkfJsK

1H gqPB gZso d/ uko ;?ePB j'Dr/.;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.

2H ftfdnkoEh B/ e[b gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzikK gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ 08 nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g gqPBK

ftu eo ;edk j?.

**Bachelor of Science (Medical) (Semester- III)**

**Session 2020-21**

**Course Title-w[ZYbh gzikph  
(In lieu of Compulsory Punjabi)  
Course Code- BSML- 3031**

## COURSE OUTCOMES:

CO1: ivAwkrxk iekweIAW Bz{ gVQkT[D dk wB'oE ftdnkoEhnK nzdo gzikph GkPk dh nwhoh dk ns/ pkohehnK Bz{ ;wMD bJh tZyo/ - tZyo/ f;XKsK dk ftek; eoBk ns/ gzikph GkPk B{z f;ykT[D dh gqfefonk ftu gk e/ fJe j'o GkPk f;ZyD d/ w"e/ gqdkB eoBk j?.

CO2: g?oQk ouBk d/D dk wB'oE ftdnkoEhnK dh p[ZXh B{z shyD eofdNk T[BQK dh fbyD gqfsGk B{z T[iKro eoBk j?.

CO3: xo/b{ ns/ d|soh fuZmh gZso fbyD dk wB'oE ftdnkoEhnK B{z fJ; ebk ftu fBg[zB eoBk j? I

CO4: nykD ns/ w[jktfonK dh tos'A Bkb rZbpks ftu gogZesk nkT[Adh j?.fJj ftdnkoEhnK dh rZbpks ftu fByko fbNkT[D dk ezW eoBr/.

CO5: g?oQk gVQ e/ gqPBK d/ TZ[so d/D dk wB'oE ftdnkoEhnK dh p[ZXh B{z shyD eofdNk T[BK dh fbyD gqfsGk B{z T[iKro eoBk j?.

CO6: ;zy/g ouBk eoB Bkb ftdnkoEh nkgDh rZb B{z ;zy/g ftu efjD dh iku f;ZyDr/ ns/ fJj fdwkrh e;os ftu ;jklh j't/rh.

**Bachelor of Science (Medical) (Semester- III)**

**Session 2020-21**

**Course Title- w[ZYbh gzikph**

**(In lieu of Compulsory Punjabi)**

**Course Code- BSML- 3031**

**smW: 3 GMty**

**Maximum Marks: 50**

**Theory: 40**

gkm eqw

:{fBN-I

ivAwkrxk iekweIAW dI pCwx Aqy vrqoN; vwkMS, aupvwk Aqy vwk

:{fBN-II

gqekoih gzikph L g?oQk ouBk,fuZmh gZso

:{fBN-III

I.nykD

II. w[jkto/

:{fBN-IV

I.g?oQk ADwirq pRSn

II.sMKyp rcnw

nze tzv ns/ gohfyne bJh jdkfJsK

1H gqPB gZso d/ uko ;?ePB j'Dr/..;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo :{fBN ftu'A d' gqPB g[ZS/ ikDr/.

2H ftfdnkoEh B/ ea[Zb gzi gqPB eoB/ jB. jo Gkr ftu'A fJe gqPB bklwh j?. gzikK gqPB fe;/ th Gkr ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ nZm nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g-gqPBK ftu eo ;edk j?.

**Bachelor of Science (Medical) (Semester III)**  
**Session 2020-21**  
**Course Title: Punjab History & Culture (From 1000 -1605 A.D.)**  
**(Special paper in lieu of Punjabi Compulsory)**  
**(For those students who are not domicile of Punjab)**  
**Course code: BSML-3431**

After completing the paper the students will have a thorough insight into the origin of Sikh faith and its major institutions in Punjab

CO 1: To able to construct original historical arguments using a blend of primary and secondary source material

CO 2: To be able to demonstrate the significance of historical topics with reference to broader historical context and their contemporary relevance

CO 3: Students will develop an ability to convey verbally their historical knowledge

CO 4: students will *develop skills in critical thinking and reading*

*CO 5: To discuss understand and evaluate causes and results of the conflict with Mughals*

**Bachelor of Science (Medical) (Semester III)**  
**Session 2020-21**  
**Course Title: Punjab History & Culture (From 1000 -1605 A.D.)**  
**(Special paper in lieu of Punjabi Compulsory)**  
**(For those students who are not domicile of Punjab)**  
**Course code: BSML-3431**

**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 **5<sup>th</sup> question** may be attempted from any of the **four Units**.
4. Each question will carry 8 marks

**.Unit –I**

1. Society and Culture of Punjab duringTurko - Afghan Rule
2. The Punjab under the Mughals

**Unit-II:**

3. Bhakti Movement and Impact on Society of Punjab
4. Sufism in Punjab

**Unit-III:**

5. Guru Nanak: Early Life and Teachings
6. Concept of Sangat, and Pangat

**Unit-IV:**

7. Contribution of Guru AngadDev, Guru Amar Das and Guru Ram Das
8. Guru ArjunDev and Compilation of AdiGranth

**Suggested Readings:**

- Chopra, P. N., Puri, B.N., & Das. M.N. (1974). A Social, Cultural and Economic History of India, Vol. II. New Delhi : Macmillan India.
- Grewal, J.S. (1994) The Sikhs of the Punjab, Cambridge University Press, New Delhi.
- Singh, Fauja (1972), A History of the Sikhs, Vol. II, I. Patiala: Punjabi University.
- Singh, Khuswant (2011). A History of Sikhs- Vol. I (1469-1839), New Delhi: Oxford University Press.

**Bachelor of Science (Medical) (Semester III)**

**Session- 2020-21**

**Course Title: ENGLISH (COMPULSORY)**

**Course Code: BSML-3212**

**COURSE OUTCOMES:**

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

- CO 1:** Develop an understanding of the poems taught, relate to the socio-cultural background of England and be able to answer questions regarding situations, themes and characters depicted in them
- CO 2:** Comprehend the basics of grammatical rules governing adjectives and adverbs, conjunctions and prepositions and phrasal verbs
- CO 3:** Enhance their reading and analysing power of texts through guided reading
- CO 4:** Enrich their vocabulary and use new words in their spoken and written language
- CO 5:** Develop skills to write an essay on a given topic



**Bachelor of Science (Medical) SEMESTER-III (SESSION 2020-21)**

**Course Title: ENGLISH (COMPULSORY)**

**Course Code: BSML-3212**

**Time: 3 Hours**

**Max. Marks: 50**

**Theory: 40**

**CA: 10**

**Instructions for the Examiner:**

**(The paper setters should avoid questions of theoretical nature from *Making Connections*.)**

**Section A:** One question with sub-parts will be set from Unit I of the syllabus. Fifteen sentences will be set and the students would be required to attempt any ten. Each sentence will carry one mark. **(10x1=10)**

**Section B:** Two questions will be set from Unit II of the syllabus. The students would be required to attempt one essay out of the given two topics carrying six marks (word limit 300 words). The second question will be based on vocabulary. The students would be required to write single words for phrases and sentences choosing any four out of six and each carrying one mark. **(1x6+4x1=10)**

**Section C:** The students would be required to attempt two questions (with sub parts) based on exercises as given before and after reading essays in the prescribed text book *Making Connections*. **(2x5=10)**

**Section D:** This section will be divided into two parts. In part one, three questions based on central idea, theme, tone and style etc. of the poems from the prescribed textbook, *Moments in Time* from Unit IV of the syllabus will be set. The students would be required to attempt any two, each carrying three marks (100 words each). **(2x3=6)**

Part two will have one question (with internal choice) requiring students to explain a stanza with reference to context carrying four marks (word limit 200 words). The stanzas for explanation will be taken from the prescribed textbook, *Moments in Time* from Unit IV in the syllabus. **(1x4=4)**

**Unit I**

*English Grammar in Use*, 4<sup>th</sup> Edition by Raymond Murphy, CUP (Units 92-120)

**Unit II**

Essay Writing and *The Students' Companion* by Wilfred D. Best (Section 1: Single words for phrases and sentences: Words denoting Numbers and words denoting Places)

**Unit III**

*Making Connections* by Kenneth J. Pakenham, 2nd Edn. CUP: Unit-II

**Unit IV**

*Moments in Time*: Poems at Sr. No. 1-6

**Texts Prescribed:**

1. *English Grammar in Use* (Fourth Edition) by Raymond Murphy, CUP
2. *The Students' Companion* by Wilfred D. Best
3. *Making Connections* by Kenneth J. Pakenham, 2nd Edn. CUP
4. *Moments in Time: An Anthology of Poems*, GNDU, Amritsar

**Bachelor of Science (Medical) (Semester–III)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: EVOLUTION**

**Course Code: BSMM-3483 (I)**

**(THEORY)**

**COURSE OUTCOMES:**

- CO1. Familiar with ecological adaptations.
- CO2. Identify the contributions of various Evolutionists.
- CO3. Understanding the process and theories in evolutionary biology.
- CO4. Develop an interest in the debates and discussions taking place in the field of evolutionary biology.

**Bachelor of Science (Medical) (Semester–III)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: EVOLUTION**

**Course Code: BSMM-3483 (I)**

**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**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.

**Units I**

Introduction to evolution  
Evidences of organic evolution  
Theories of organic evolution

**Units II**

Origin of life  
Concept of micro, macro and mega-evolution  
Concept of Species  
Speciation

**Units III**

Fossils, its types and significance  
Evolutionary rate  
Origin & Extinction of reptiles  
Evolution of man (in Brief)

**Units IV**

Migration & Parental Care in Pisces  
Flight adaptation & Bird migration  
Adaptive radiations like scales & fins in fish, poison apparatus in snakes and dentition in Mammals.

**Suggested Readings:**

1. Avers, C. J.(1989). Evolution Process and Pattern in Evolution, New York Oxford Oxford university press.
2. Bhamarah, H.S.(1993), Juneka K., Cytogenetics & Evolution, Anmol Publication Pvt. Ltd.
3. Brookfield, A. P. (1986). Modern aspects of Evolution. Nelson Thornes publishers
4. Colbert. E.H.(2002), Evolution of Vertebrates, cbspd publishers
5. Freeman, S. and Herron, Jon C. (2007). Evolutionary analysis, Pearson Prentice Hall, New Jersey.
6. Futuyma, D. J. (1998), Evolutionary Biology, Sinauer Assoc. Inc. Pub. USA.
7. Meglitsch, P. A. (1991), Invertebrate Zoology (3<sup>rd</sup>ed), Oxford University Press.
8. Wen-Hsiung Li (1997), Molecular Evolution, Sinauer associatesInc.Pub. USA.
9. Rastogi, V.B(2003) Organic evolution, Medtech publishers
10. Strickberger, M.N(2000) Evolution , Jones and Bartlett publishers.
11. Tomar, B.S. and S.P.Singh(2000)Evolutionary Biology, Rastogi publishers.

**Bachelor of Science (Medical) (Semester–III)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: Biodiversity-III(Chordates)**  
**Course Code: BSMM-3483 (II)**  
**(THEORY)**

**COURSE OUTCOMES:**

- CO1. Describe the diversity in form, structure and habits of vertebrates.
- CO2. Explain general characteristics and classification of different classes of vertebrates.
- CO3. Positive attitude towards Biodiversity Conservation.

**Bachelor of Science (Medical) (Semester–III)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: BIODIVERSITY-III (Chordates)**  
**Course Code: BSMM-3483(II)**  
**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**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.

**Units I**

Brief Introduction to Protochordata

Urochordata: Type study- *Herdmania*

Cephalochordata: External features and affinities of *Amphioxus*

**Units II**

Cyclostomata: External Characters of *Petromyzon*

Affinities of Cyclostomata

Pisces: Type study-*Labeo*

**Units III**

Amphibia: Type study-Frog

Reptilia: Type study-*Uromastix*

**Units IV**

Aves: Type study-Pigeon

Mammals: Type study-Rat

**Suggested Reading Material.**

1. Dhami, P.S. & Dhami J.K. (1998), Vertebrates, R. Chand & Co., New Delhi.
2. Hildebrand, M. and Goslow. Jr. G.E. (2001), Analysis of Vertebrates Structure, John Wiley, N. Y.
3. Jollie, M. (1968), Chordate Morphology, Reinhold, New York.
4. Kardong, K. V. (1995), Vertebrates – Comparative Anatomy, Function, Evolution. W.B.C. Pub. , Oxford.
5. Kent, G. C. and Carr, R. K. (2001), Comparative Anatomy of the Vertebrates (9<sup>th</sup>ed), McGraw Hill Higher Education, New York.
6. Linzey, D. (2001), Vertebrate Biology, McGraw Hill Publishing Company, New York.
7. Pough, F. H., Heiser, J. B. and McFarland, W. N. (1990), Vertebrate Life (3<sup>rd</sup> ed), Macmillan Pub. Co., New York.
8. Young, J. Z. (1982), The Life of Vertebrates, New York.
9. Parker, T.J. and Haswell, W.A (1981) Text Book of Zoology, Vol. II (Vertebrates), ELBS and Macmillan Press Ltd.

**Bachelor of Science (Medical) (Semester–III)**  
**Session 2020-21**  
**Course Title: Practical-III (Related to Evolution and Biodiversity-III)**  
**Course code: BSMM-3483(P)**

**COURSE OUTCOMES:**

- CO1. Familiarize organ systems.
- CO2. Aware about economically important specimens(preserved).
- CO3. Understanding of evolutionary phenomena.

**Bachelor of Science (Medical) (Semester–III)**

**Session 2020-21**

**Course Title: Practical-III (Related to Evolution and Biodiversity-III)**

**Course code: BSMM-3483(P)**

**Time: 3 hrs.**

**Marks: 20**

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

**Guidelines for conduct of Practical Examination:**

1. Draw a labelled sketch of the system of the given animal & explain it to the Examiner. 3
2. Identify and classify the specimens upto order level. Write a short note on habitat, special features, feeding, habits and economic importance of the specimens. 8
3. Identify and write a note on the evolutionary phenomenon in the given specimen. 2
4. Identify the slides/specimens, give two reasons for identification. 3
5. Viva-voce & Practical file. 4

**I. Classification up to order level, except in case of Pisces and Aves where classification up to subclass level, habits, habitat, external characters and economic importance (if any) of the following animals is required :**

- Urochordata** : *Herdmania, Molgula, Pyrosoma, Doliolum, Salpa & Oikopleura*.
- Cephalochordata** : *Amphioxus*. Study of the following prepared slides:  
T.S. *Amphioxus* through various regions, Pharynx of *Amphioxus*
- Cyclostomata** : *Myxine, Petromyzon & Ammocoetes* Larva.
- Chondrichthyes** : *Zygaena* (hammer head shark), *Pristis* (saw fish), *Narcine* (electric ray), *Trygon*, *Rhinobatus* and *Chimaera* (rabbit fish).
- Actinoptergii** : *Polypterus, Acipenser, Lepidosteus, Muraena, Mystus, Catla, Hippocampus, Syngnathus, Exocoetus, Anabas, Diodon, Tetradon, Echeneis* and *Solea*.
- Dipneusti (Dipnoi)** : *Protopterus* (African lung fish)
- Amphibia** : *Uraeotyphlus, Necturus, Amphiuma, Amblystoma* and its Axolotl Larva, *Triton, Salamandra, Hyla, Rhacophorus*
- Reptilia** : *Hemidactylus, Calotes, Draco, Varanus, Phrynosoma, Chamaeleon, Typhlops, Python, Eryx, Ptyas, Bungarus, Naja, Hydrus, Vipera, Crocodilus, Gavialis, Chelone* (turtle) and *Testudo* (tortoise), Differences in nonpoisonous and poisonous snakes.
- Aves** : *Casuaris, Ardea, Anas, Milvus, Pavo, Eudynamis, Tyto* and *Alcedo*.
- Mammalia** : *Ornithorynchus, Echidna, Didelphis, Macropus, Loris, Macaca, Manis, Hystrix, Funambulus, Panthera, Canis, Herpestes, Capra, Pteropus*.

**II. Study of the following systems with the help of charts/models/videos:**

- Herdmania*** : General anatomy

***Labeo*** : Digestive and reproductive systems, heart, afferent and branchial arteries, cranial nerves and internal ear.

**Pigeon** : Digestive, arterial, venous and urino-genital systems.

**WhiteRat** : Digestive, arterial, venous and urino-genital systems.

Study of permanent slides of whole mount of Pharynx of *Herdmania* and *Amphioxus*.

Cycloid scales of *Labeo*, blood smear of mammal, Histology of rat/rabbit (compound tissues)

Demonstration of evolutionary phenomena like homology, analogy, mimicry, crypsis.

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



**Bachelor of Science (Medical) (Semester–III)**  
**Session 2020-21**  
**MICROBIOLOGY**  
**Course Title: Microbial Nutrition and Metabolism**  
**Course Code: BSMM-3343**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

- CO1:** Understand the nutrition and requirements for growth of microorganisms, medium designing and types of microorganisms on the basis of nutrition.
- CO2:** Understand the transport of nutrients across the cell membrane.
- CO3:** Learn about the laws of thermodynamics and electron transport chain of bacteria. Also understand the growth and metabolic pathways for breakdown of glucose (glycolysis, Krebs's cycle fermentation, pentose phosphate pathways) and gluconeogenesis.
- CO4:** Learn about the enzymes, kinetics and biosynthesis of nucleic acids.

**Bachelor of Science (Medical) (Semester–III)**  
**Session 2020-21**  
**MICROBIOLOGY**  
**Course Title: Microbial Nutrition and Metabolism**  
**Course Code: BSMM-3343 (I)**  
**(THEORY)**

**Examination Time: 3 Hours**

**Max. Marks: 100**

**Theory: 60**

**Practical: 20**

**CA: 20**

**Instructions for the Paper Setter:** Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT–I**

1. Nutrition, requirements for growth of microorganisms, nutrients and accessory constituents, medium designing. Nutritional types of microorganisms (photolithotrophs, photoorganotrophs, chemolithotrophs and chemoorganotrophs)

**UNIT–II**

2. Transport of nutrients across the cell membrane, diffusion, passive transport, active transport, and group translocation for the transport of nutrients across the membrane.

**UNIT–III**

3. Bioenergetics; Laws of thermodynamics, entropy, enthalpy and free energy of reaction standard, oxidative phosphorylation, electron transport, respiratory chains of bacteria, energy metabolism in aerobic and anaerobic microorganisms, pathways for breakdown of glucose (glycolysis, Krebs's cycle fermentation, pentose phosphate pathways), gluconeogenesis, metabolism of starch & cellulose by bacteria.

**UNIT–IV**

4. Assimilation of nitrogen, biosynthesis of nucleic acids, for synthesis of purine and pyrimidine nucleotides. Enzymes, kinetics, MichaelisMenten equation and allosteric enzyme.

**Books Recommended:**

1. Pelczar, M.I., Chan, E.C.S. and Krieg, N.R. 2011, 5<sup>th</sup> edition, Microbiology. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
2. Stanier, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. 2005, 5<sup>th</sup> edition, General Microbiology, MacMillan Education Ltd. Publisher.
3. Powar, C.B. and Dagniwala, H.F. 2012, General Microbiology, Volume I and II, Himalaya Publishing House, Delhi.
4. Sharma, P.D. 2010, Microbiology, Rastogi Publications, Meerut. 142.
5. Bacterial physiology and metabolism by Byung Hong Kim and Geoffrey Michael Gadd. **(Online available)**

**Bachelor of Science (Medical) (Semester–III)**  
**Session 2020-21**  
**MICROBIOLOGY**  
**Course Title: Practical- Microbial Nutrition and Metabolism**  
**Course Code: BSMM-3343 (P)**  
**(PRACTICAL)**

**Time: 3 hours**

**Marks: 20**

**Instructions for the practical examiner:** Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same may be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

**LIST OF PRACTICALS**

1. Isolation and enumeration of total bacteria from soil by pour plating and spread plating.
2. Comparison of growth on complex medium and defined or minimal medium.
3. Distinction between fermenting and non-fermenting microorganisms.
4. Effects of various concentrations of carbon source on bacterial growth.
5. Effects of various concentrations of nitrogen source on bacterial growth.
6. Effect of temperature on bacterial growth.
7. Effect of pH on bacterial growth.

**Bachelor of Science (Medical) (Semester–III)**

**Session: 2020-21**

**Course Title: Organic Chemistry–I**

**Course Code: BSMM -3084 (I)**

**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to

CO1: To resolve the different enantiomers and differentiate between dextrorotatory and leavorotatory compounds

CO2: Understand the concept of isomerism

CO3: Differentiate between chiral and achiral compounds, configuration and conformation

CO4: Understand the concept of axial and equatorial bonds and draw the various projection formulae

CO5: Understand the methods of formation, chemical reactions, acidic character of alcohols

CO6: Understand structure and bonding, preparation of phenols, acidic character of phenols

CO7: Understand structure and bonding in phenols and carbonyl compounds

CO8: Compare reactivity of aliphatic and aromatic aldehydes and ketones

CO9: Understand the various reactions given by carbonyl compounds

**Bachelor of Science (Medical) (Semester–III)**

**Session: 2020-21**

**Course Title: Organic Chemistry–I**

**Course Code: BSMM -3084 (I)**

**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 30**

**Instructions for the Paper Setter**

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**

**Stereochemistry of Organic Compounds**

Concept of isomerism, types of isomerism, Optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism—determination of configuration of geometric isomers. E & Z system of nomenclature. Conformational isomerism—conformational analysis of ethane and n-butane; conformation of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Difference between configuration and conformation.

**Unit–II**

**Alcohols**

Classification and nomenclature. Monohydric alcohols—nomenclature, Acidic nature, Reactions of alcohols, Dihydric alcohols—nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage  $[\text{Pb}(\text{OAc})_4]$  and  $[\text{HIO}_4]$  and pinacol-pinacolone rearrangement.

**Unit–III**

**Phenols**

Nomenclature, structure and bonding, preparation of phenols, physical properties and acidic character, Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols—electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Reimer Tiemann reaction.

**Unit–IV**

**Aldehydes and Ketones**

Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis

of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction. Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of Ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff-Kishner,  $\text{LiAlH}_4$  and  $\text{NaBH}_4$  reductions. Halogenation of enolizable ketones. Halogenation of enolizable ketones

**Books suggested:**

1. Morrison, R.T., Boyd, R.N., Organic Chemistry; 6th edition, Pubs: Prentice-Hall, 1992.
2. Wade Jr., L.G., Singh, M.S., Organic Chemistry; 6th edition, Pubs: Pearson Education, 2008.
3. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: Wiley Eastern Limited, 1985, Vol. I, II, III.
4. Solomons, T.W., Fryhle, C.B., Organic Chemistry; 9th edition, Pubs: Wiley India, 2007.
5. Carey, F.A., Organic Chemistry; 4th edition, Pubs: McGraw-Hill, 2000.
6. Streitwieser, A., Clayton, Jr., Heathcock, H., Introduction to Organic Chemistry; 3rd edition, Pubs: Macmillan Publishing Company, 1989.
7. University General Chemistry, C.N.R. Rao, Macmillan.

**Bachelor of Science (Medical) (Semester–III)**

**Session: 2020-21**

**Course Title: Physical Chemistry–II**

**Course Code: BSMM -3084 (II)**

**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to

CO1: Understand and evaluate thermodynamic property of any system and its applications to various systems.

CO2: Acquire the knowledge of phase equilibria of various systems.

CO3: Understand completely miscible, partially miscible and immiscible liquids.

CO4: Understand concept of spontaneity of a reaction in terms of free energy change.

CO5: Demonstrate Vant' Hoff equation and relationship between equilibrium constants.

CO6: Demonstrate Clausius-Clapeyron equation.



**Bachelor of Science (Medical) (Semester–III)**  
**Session: 2020-21**  
**Course Title: Physical Chemistry–II**  
**Course Code: BSMM -3084 (II)**  
**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 30**

**Instructions for the Paper Setter**

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**

**Thermodynamics-I**

Definition of thermodynamic terms: System, surroundings etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.

**First Law of Thermodynamics:**

Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law-Joule-Thomson coefficient and inversion temperature, Calculation of  $w$ ,  $q$ ,  $dU$  &  $dH$  for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.

**Thermochemistry:**

Standard state, standard enthalpy of formation-Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchhoff's equation.

**Unit–II**

**Thermodynamics-II**

Second Law of Thermodynamics: Need for the law, different statements of the law, Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature.

Concept of Entropy: Entropy as a state function, entropy as a function of  $V$  &  $T$ , entropy as a function of  $P$  &  $T$ , entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.

**Unit–III**

**Thermodynamics-III**

Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function ( $G$ ) and Helmholtz function ( $A$ ) as thermodynamic

quantities,  $\Delta A$  &  $\Delta G$  as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change, Variation of  $\Delta G$  and  $\Delta A$  with  $P, V$  and  $T$ .

### Chemical Equilibrium

Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Determination of  $K_p$ ,  $K_c$ ,  $K_a$  and their relationship, Clausius-Clapeyron equation, applications.

## Unit-IV

### Introduction to Phase Equilibrium

Statement and meaning of the terms-phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system-water,  $\text{CO}_2$  and S systems. Phase equilibria of two component systems-solid-liquid equilibria, simple eutectic-Bi-Cd, Pb-Ag systems, desilverisation of lead. Solid solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point, ( $\text{NaCl-H}_2\text{O}$ ), ( $\text{FeCl}_3\text{-H}_2\text{O}$ ) and  $\text{CuSO}_4\text{-H}_2\text{O}$  system. Freezing mixtures, acetone-dry ice. Non-ideal system-azeotropes-HCl- $\text{H}_2\text{O}$  and ethanol-water system. Partially miscible liquids Phenol-water, triethylamine-water, Nicotine-water System. Lower and upper consolute temperature, Effect of impurity on consolute temperature, immiscible liquids, steam distillation. Nernst distribution law-thermodynamic derivation and applications.

### Books suggested:

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; 43rd edition, Pubs: Vishal Publishing Co., 2008.
3. Barrow, G.M., Physical Chemistry; 6th edition, Pubs: McGraw Hill Inc, 1996.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan India, 1985.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; 1st edition, Pubs: John Wiley & Sons Inc., 1992.
7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems; Pubs: Wiley Eastern Limited, 1991.
8. Levine, I.N., Physical Chemistry; 5th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd., 2002.
9. Moore, W. J., Basic Physical Chemistry; Pubs: Prentice Hall of India Pvt. Ltd, 1983.
10. Metz, C.R., Theory and Problems of Physical Chemistry; Schaum's outline series, 2nd edition, Pubs: McGraw-Hall Book company, 1989.

**Bachelor of Science (Medical) (Semester–III)**

**Session: 2020-21**

**Course Title: Chemistry Practical**

**Course Code: BSMM -3084 (P)**

**(PRACTICAL)**

**COURSE OUTCOMES:**

Students will be able to

CO1: Understand and master the technique of volumetric analysis

CO2: To understand and analyze an acidic & alkali content in different samples.

CO3: To understand and analyze the calcium content in various samples permanganometrically

CO4: To understand the concept of hardness of water and its analysis by EDTA method

CO5: Understand and master the technique of gravimetric analysis

CO6: To understand the concept of TLC and its applications.

**Bachelor of Science (Medical) (Semester–III)**  
**Session: 2020-21**  
**Course Title: Chemistry Practical**  
**Course Code: BSMM -3084 (P)**  
**(PRACTICAL)**

**Duration: 3½ Hrs.**

**Max. Marks: 20**

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

**Quantitative Analysis**

**Volumetric Analysis**

- a. Determination of acetic acid in commercial vinegar using NaOH.
- b. Determination of alkali content-antacid tablet using HCl.
- c. Estimation of calcium content in chalk as calcium oxalate by permanganometry.
- d. Estimation of hardness of water by EDTA.
- e. Estimation of ferrous and ferric by dichromate method.
- f. Estimation of copper using sodiumthiosulphate.

**Gravimetric Analysis**

Analysis of Cu as CuSCN and Ni as Ni (dimethylgloxime)

**Organic Chemistry Laboratory Techniques**

**Thin Layer Chromatography**

Determination of  $R_f$  values and identification of organic compounds.

- (a). Separation of green leaf pigments (spinach leaves may be used).
- (b). Preparation and separation of 2, 4. dinitrophenylhydrazones of acetone, 2-butanone, 2-Butanone, hexan-2 and 3-one using toluene and light petroleum (40 : 60).
- (c). Separation of a mixture of dyes using cyclohexane and ethyl acetate (8.5:1.5).

**Practical Examination**

1) Volumetry / Gravimetry	11
2) Thin Layer chromatography	04
3) Viva-Voce	03
4) Note Book	02

**Books suggested:**

1. Vogel's Textbook of Quantitative Inorganic Analysis (revised), J. Bassett, R.C. Denney, G.H. Jeffery and J. Mandham, ELBS.
2. Standard Methods of Chemical. Analysis, W.W. Scott: The Technical Press.
3. Experimental Inorganic Chemistry, W.G. Palmer, Cambridge.
4. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.

5. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
6. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.
7. Experimental Organic Chemistry, Vol. I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill

**Bachelor of Science (Medical) (Semester-III)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: Structure, Development and Reproduction in Flowering Plants-I**  
**Course Code: BSMM-3075 (I)**  
**(THEORY)**

**COURSE OUTCOMES: -**

After passing this course the student will develop:

- CO1: Understanding of basic body plan of a flowering plant, Diversity in plant form branching pattern and canopy architecture trees.
- CO2: Understanding of shoot apical meristem and its histological organization. Cambium and its function and formation of secondary xylem.
- CO3: Understanding of wood in relation to water and minerals, growth rings and structure of secondary phloem and periderm.
- CO4: Understanding of origin, development, arrangement and diversity in size and shape of leaf, internal structure in relation to photosynthesis and water loss, senescence and abscission.

**Bachelor of Science (Medical) (Semester-III)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: Structure, Development and Reproduction in Flowering Plants-I**  
**Course Code: BSMM-3075 (I)**  
**(THEORY)**

**Time: 3 Hrs**

**Max. Marks: 30**

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

**Unit I**

The basic body plan of a flowering plant-modular type of growth. Diversity in plant form in annuals, biennials and perennials; trees-largest and longest-lived, branching pattern; monopodial and sympodial growth; canopy architecture.

**Unit II**

The Shoot System: The shoot apical meristem and its histological organization; meristematic and permanent tissue, formation of internodes. Cambium and its functions; formation of secondary xylem.

**Unit III**

A general account of wood structure in relation to conduction of water and minerals; characteristics of growth rings, sapwood and heart wood; role of woody skeleton; secondary phloem-structure function relationships; periderm.

**Unit IV**

Leaf: Origin, development, arrangement and diversity in size and shape; internal structure in relation to photosynthesis and water loss; adaptations to water stress; senescence and abscission.

**Suggested Readings:**

- Beck, C.B. (2010). An Introduction to Plant Structure and Development: Plant anatomy for the Twenty First Century (2nd Edition). Cambridge University Press, UK.
- Cutler, D. F., Botha, T. and Stevenson, D. M. (2007). Plant Anatomy: An Applied Approach. Blackwell Publishing, Oxford, UK.
- Dickison, W.C. (2000). Integrative Plant Anatomy. Academic Press, California, USA.
- Mauseth, J.D. (1988). Plant Anatomy, The Benjamin/Cummings Publishing Company Inc., Menlo Park, California, USA.
- Raven, P.H., Evert, R.F. and Eichhorn, S.E. (1999). Biology of Plants, 5th edition. W.H. Freeman and Co., Worth Publishers, New York.

- Rudall, P. J. (2007). *Anatomy of Flowering Plants: An Introduction to Structure and*
- *Development* (3rd Edition). Cambridge University Press, UK.
- Thomas, P. (2000) *Trees: Their Natural History*, Cambridge University Press, Cambridge.
- Srivastava, H.N. (2018) *Diversity of Seed Plants and Their Systematics*, Vol. III, Pradeep's Publication.



**Bachelor of Science (Medical) (Semester-III)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: Structure, Development and Reproduction in Flowering Plants-II**  
**Course Code: BSMM-3075 (II)**  
**(THEORY)**

**COURSE OUTCOMES: -**

After passing this course the student will be able to:

CO1: Recognize the major groups of vascular plants and their phylogenetic relationships.

CO2: Know the structure and development of monocot and dicot embryos.

CO3: Understand different means of vegetative reproduction.

CO4: Understand physiology of seed germination.

**Bachelor of Science (Medical) (Semester-III)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: Structure, Development and Reproduction in Flowering Plants-II**  
**Course Code: BSMM-3075 (II)**  
**(THEORY)**

**Time: 3 Hrs**

**Max Marks. 30**

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

**Unit I**

The Root System: The root apical meristem; differentiation of primary and secondary tissues and their roles; structural modification for storage, respiration, reproduction and for interaction with microbes.

**Unit II**

Vegetative Reproduction: various methods of vegetative propagation. Detailed study and types of grafting and budding, economic aspects. Flower: A modified shoot; structure, development and varieties of flower; functions

**Unit III**

Structure of anther and pistil; the male and female gametophytes; types of pollination; attractions and reward for pollinators; (sucking and foraging types); pollen-pistil interaction self incompatibility.

**Unit IV**

Double fertilization: formation of seed endosperm and embryo: fruit development and maturation Significance of Seed: Suspended animation; ecological adaptation; unit of genetic recombination with reference to reshuffling of genes and replenishment; dispersal strategies.

**Suggested readings:**

- Bhojwani, S.S., Bhatnagar, S.P. and Dantu P.K. (2015). The Embryology of Angiosperms, 6th edition. Vikas Publishing House, Delhi.
- Hartmann, H.T. and Kestler, D.E. (1976). Plant Propagation: Principles and Practices, 3<sup>rd</sup> edition, Prentice Hall of India Pvt. Ltd., New Delhi.
- Mauseth, J.D. (1988). Plant Anatomy, The Benjamin/Cummings Publishing Company Inc., Menlo Park, California, USA.
- Peau, K. (1977). Anatomy of Seed Plants, 3rd edition. John Wiley & Sons, New York.
- Pegeri, K. and Vander Pijl (1979). The Principles of Pollination Biology, Pergamon Press, Oxford.
- Raven, P.H., Evert, R.F. and Eichhorn, S.E. (1999). Biology of Plants, 5th edition. W.H. Freeman and Co., Worth Publishers, New York.
- Srivastava, H.N. (2018) Diversity of Seed Plants and Their Systematics, Vol. III, Pradeep's Publication.

**Bachelor of Science (Medical) (Semester-III)**

**Session 2020-21**

**BOTANY**

**Course Title: Practical III – Structure, Development and Reproduction in Flowering Plants (I & II)**

**Course Code: BSMM-3075 (P)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

CO1: Develop knowledge about the role of herbarium techniques in plant identification.

CO2: Understand different life forms exhibited by flowering plants.

CO3: Understand anatomy of different plant parts using free hand razor technique.

CO4: Examine flower and their mode of pollination.

**Bachelor of Science (Medical) (Semester-III)**

**Session 2020-21**

**BOTANY**

**Course Title: Practical – Structure, Development and Reproduction in Flowering Plants (I & II)**

**Course Code: BSMM-3075 (P)**

**TIME: 3 Hours**

**Practical: 20**

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

**Suggested Laboratory Exercises**

1. Study of any commonly occurring dicotyledonous plant (for example *Solanum nigrum* or Kalanchoe) to the body plan, organography and modular type of growth.
2. Life forms exhibited by flowering plants (by a visit to a forest or a garden, Study of tree like habit in cycads, bamboo, banana, traveller's tree (*Revenala madagascariensis*) and Yucca and comparison with true trees as exemplified by conifers and dicotyledons.
3. L.S. Shoot tip to study the cytohistological zonation and origin of leaf primordia.
4. Monopodial and sympodial types of branching in stems (especially rhizomes).
5. Anatomy of primary and secondary growth in monocots and dicots using free hand razor technique (*Solanum*, *Boerhavia*, *Helianthus*, *Mirabilis*, *Nyctanthus*, *Draceana*, Maize) hand sections (or prepared slides). Structure of secondary phloem and xylem. Growth rings in wood, Microscopic study of wood in T.S., T.L.S. and R.L.S.
6. Field study of diversity in leaf shape, size, thickness, surface properties. Internal structure of leaf. Structure and development of stomata (using epidermal peels of leaf).
7. Anatomy of the root. Primary and secondary structure.
8. Examination of a wide range of flowers available in the locality and methods of their pollination.
9. Structure of anther, microsporogenesis (using slides) and pollen grains (using whole mounts). Pollen viability using in vitro pollen germination.
10. Structure of ovule and embryo sac development using serial sections from permanent slides.
11. Nuclear and cellular endosperm. Embryo development in monocots and dicots (using permanent slides/dissections).
12. Simple experiments to show vegetative propagation (leaf cuttings in *Bryophyllum*, *Sansevieria*, *Begonia*; stem cuttings in rose, *Salix*, money plant, Sugarcane and *Bougainvillea*).
13. Germination of non-dormant and dormant seeds.

**Suggested Readings (for laboratory exercises):**

1. Bhojwani, S.S. and Bhatnagar, P. (2000). The Embryology of Angiosperms (4<sup>th</sup> revised and enlarged edition), Vikas Publishing House, New Delhi.
2. Mauseth, J.D. (1988). Plant Anatomy, The Benjamin/Cumminas Publishing Co., Inc., Mehlo Park, California, USA.
3. Raven, P.H., Evert, R.F. and Eichhorn, S.E. (1992). Biology of Plants (5<sup>th</sup> Edition). Worth Publishers, New York.
4. Steeves, T.A. and Sussex, I.M. (1989). Patterns in Plant Development (2<sup>nd</sup> Edition). Cambridge University Press, Cambridge

**Bachelor of Science (Medical) (Semester-III)**

**Session 2020-21**

**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**

**Course Title: Food Processing and Packaging**

**Course Code: BSMM-3255 (I)**

**(THEORY)**

**COURSE OUTCOMES:** After passing this course the student will be able to:

**CO1:** Understand the reasons of spoilage and basic principles of food preservation methods.

**CO2:** Understand packaging materials, characteristics and machinery used for packaging food.

**CO3:** Understand processing of fats, oils, sugar, salt, tea, coffee, chocolate and cocoa powder, spices and flavor and extruded foods.

**CO4:** Learn manufacturing of fermented products: wine, vinegar, beer, fermented milks, yoghurt, etc.

**CO5:** Understand techniques that can be used to monitor quality of raw materials, manufacturing process and testing of the finished products.

**Bachelor of Science (Medical) (Semester-III)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: Food Processing and Packaging**  
**Course Code: BSMM-3255**  
**(THEORY)**

**Examination Time: 3 Hours**

**Max. Marks: 100**

**Theory: 60**

**Practical: 20**

**CA: 20**

**Instructions for the Paper Setter:** Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

1. Physical principles underlying food processing operations including thermal processing, ionizing radiation, refrigeration, freezing, dehydration.
2. Chemical preservation in food processing, chemical changes in food that affect the texture, color, flavor, odor, stability and nutritive quality during processing and storage.
3. Fats and Oils: Types and sources of fats and oils (animal and vegetable), processing, uses, storage and nutritional aspects.
4. Sugar and Sugar Products: Different forms of sugar (sugar, jaggery, honey syrup), manufacture, selection, storage and use.

**UNIT-II**

5. Salt: preparation of brine and pickling.
6. Processing of: Tea, coffee, chocolate and cocoa powder.
7. Quality control in food industry-methods of evaluation and control of the various aspects of quality of raw materials, manufacturing process and the testing of finished products.

**UNIT-III**

8. Fermentation technology, manufacturing of fermented products: Wine, vinegar, beer, fermented milks, yoghurt, etc.
9. Processing of Spices and flavor.
10. Food additives, classes of food additives, role in food processing.
11. Manufacturing process: Extruded foods.

**UNIT-IV**

12. Definition and functions of Packaging
13. Types of packaging materials: metal, glass, wood, paper and plastics and their importance.
14. Types of packages and their evaluation: bottle, pouch, tetra-pack and cans.

15. Packaging machinery
16. Food and food package interaction.
17. Shelf life testing.

#### **Books Recommended**

1. Post Harvest Technology of Cereals, Pulses and Oilseeds, 2019, 3<sup>rd</sup> Edition, Amalendu Chakraverty.
2. Technology of Cereals, 1994, 4<sup>th</sup> Edition, Norman Leslie Kent and A.D. Evers.
3. Preservation of Fruits & Vegetables, 2009, Girdhari Lal, G.S Siddappa and G.L Tandon.
4. Principles of Food Packaging, 1980, 2<sup>nd</sup> Edition, Stanley Sacharow and Roger C. Griffin.
5. Chemistry of food additives and preservatives, 2012, 1<sup>st</sup> Edition, Titus A.M. Msagati.
6. Food Preservation, 2<sup>nd</sup> Edition, M. Shafiur Rahman. **(Online available)**
7. Food Packaging – Principles and practice , 3<sup>rd</sup> Edition, 2012, Gordon L. Robertson. **(Online available)**

**Bachelor of Science (Medical) (Semester-III)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: Practical- Food Processing and Packaging**  
**Course Code: BSMM-3255**  
**(PRACTICAL)**

**Examination Time: 3 hours**

**Max. Marks: 20**

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

**List of Practicals:**

1. Determination of physical characteristics of cereals.
2. Milling of wheat into flour.
3. Determination of wet and dry gluten contents.
4. Identification of packaging materials.
5. To estimate the shelf life of packaged food.
6. To determine grease resistance of packaging material.
7. To find out the tin coating weight.
8. To find out the uniformity and amount of wax on wax paper.
9. To see the chemical resistance of packaging materials.
10. Adequacy of blanching.
11. Visit to various industries dealing with food packaging material like paper, board and metal.



**Bachelor of Science (Medical) (Semester-III)**  
**Session 2020-21**  
**Course Title: Environmental Studies (Compulsory)**  
**Course Code: AECE-3221**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

- CO1: Demonstrate and Understand the ecological relationships between organisms and their environment.
- CO2: Present an overview of diversity of life forms in an ecosystem.
- CO3: Explain and identify the role of the organism in energy transfers.
- CO4: Understand the Environmental Pollution and their management.
- CO5: Understanding and awareness for wildlife conservation.
- CO6: Knowledge of conservation of threatened animal species

**Bachelor of Science (Medical) (Semester-III)**  
**Session 2020-21**  
**Course Title: Environmental Studies (Compulsory)**  
**Course Code: AECE-3221**  
**(THEORY)**

**Time: 3 Hours.**

**Max. Marks: 100**  
**Theory: 60**  
**Field 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 (Medical) (Semester- III)**

**Session 2020-21**

**Course Title: PERSONALITY DEVELOPMENT PROGRAMME**

**Course code: SECP-3512**

**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.

**Bachelor of Science (Medical) (Semester- III)**

**Session 2020-21**

**Course Title: PERSONALITY DEVELOPMENT PROGRAMME**

**Course code: SECP-3512**

**Examination Time: 2 Hours**

**Max Marks: 25**

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

**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 Résumés for Different Posts

### **(v) Group Discussion**

- Differences 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. Everyday Etiquette: How to navigate 101 common and uncommon social situations by Patrica Rossi.
2. Building career success skills by Theodore Pietrzak, Mike Fraum.
3. Creative problem solving: An Introduction by Donald J Treffinger, Scott G.Isaksen, K. Brian.
4. Positive Psychology: The science of happiness and human strengths by Alan Carr
5. Speech craft: An Introduction to public speaking by Brent C Oberg.
6. Effective communication skills: The foundations for change by John Nielsen.
7. Conflict Resolution smarts: How to communicate, negotiate promise and more by Matt Doeden.
8. What you wear can change your life by Trinnywoodall, Susannah Constantine.
9. World Famous Personalities by Dr. B.R. Kishore.
10. Personality Development by John Aurther.

11. World Famous Leaders who reshaped the World! by Dr. Gagan Jain, D.Litt.
12. Personality Development by Elizabeth B. Hurlock
13. Personality Plus by Divya Chopra

**Bachelor of Science (Medical) (Semester-III)**  
**Session 2020-21**  
**Course Title: Gender Sensitization Programme**  
**Course Code: SECG- 3531**  
**(Theory)**

The program has been designed to inculcate value of gender equality among students so that they can identify the areas of gender discrimination and raise their voice against gender discrimination and work towards making the society gender neutral.

**INSTRUCTIONAL OBJECTIVES:**

1. To sensitize students about gender rights, gender roles and relations.
2. To make students aware and capable of realizing their true potential.
3. To ensure equal participation of men and women in all economic, social and political processes.
4. To develop gender prospective to transform the mind set of society.

**Bachelor of Science (Medical) (Semester-III)**

**Session 2020-21**

**Course Title: Gender Sensitization Programme**

**Course Code: SECG- 3531**

**(Theory)**

**Examination Time: 2 Hours**

**Max Marks: 25**

MODULE	TITLE	HOURS
1	Introduction and Initial Assessment	2 Hrs
2	Workshop in Self Defense Techniques	10 Hrs
3	Open House (An Inter-active Session)	2 Hrs
4 I	Cultural Roles and Gender Sensitivity	2 Hrs
4II	Gender Concerns in Leadership and Political Participation	2 Hrs
4 III	Gender Dimensions in Economic Participation and wage Gap	2 Hrs
4 IV	Gender Rights: Constitutional Rights & Legal Rights	2 Hrs
4 V	Social problems and Ethos : Gender Prospective with focus on Indian Society	2 Hrs
4VI	Gender Issues and Health care system	2 Hrs
4VII	Champions of Gender Equality from Punjab Or Voices On Gender Equality From Punjab	2 Hrs
5	Final Assessment Feedback and Closure	2 Hrs

## **SEMESTER-IV**

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**Course Title: PUNJABI (COMPULSORY)**

**Course Code- BSML-4421**

**COURSE OUTCOMES:**

**CO1:** ‘grvzvhnK’ (ਸਵੈਜੀਵਨੀ) Bz{ gVQkT[D dk wB'oE ftdnkoEhnK nzdo ਸਵੈਜੀਵਨੀ fJ; ;kfjs o{g gqshfdbu;gh, ;{M Bz{ g?dk eoBk j?.

**CO2:** ‘ਫ਼ਾਸਲੇ’ (ਨਾਟਕ) Bz{ f;b/p; ftu PkfwB eo e/ ftdnkoEhnK nzdo ਨਾਟਕ Bz{ gVQD dh o[uh Bz{ g?dk eoBk j? ns/ ਨਾਟਕ irs Bkb i'VDk j?.

**CO3:** d|soh fuZmh gZso fbyD dk wB'oE ftdnkoEhnK B{z fJ; ebk ftu fBg[zB eoBk j? I

**CO4:** Ppd i'VK d/ fB:w B{z f;b/p; ftu PkfwB eoB dk we;d ftdnkoEhnK d[nkok fb\s ftu ehshnK ikD tkbhnK rbshnK B{z ;[XkoBk j?.

**CO5:** r[ow[yh fbgh dhNk ftP/PsktK Bz{ gVQkT[D dk wB'oE ftdnkoEhnK nzdo gzikph GkPk dh nwhoh dk ns/ pkohehnK Bz{ ;wMD bJh tZyo/ - tZyo/ f;XKsK dk ftek; eoBk j?.

Course Code- BSML-4421

;wK L 3 xzN/

Maximum Marks: 50

Theory: 40

CA: 10

gkm eqw ns/ gkm g[;seK

:{fBN-I

grvzvhnK (ਸਵੈਜੀਵਨੀ) : ਡਾ. pfuzs e"o

8 nze

(;ko /ftPk t;s{)

:{fBN-II

ਫ਼ਾਸਲੇ (ਨਾਟਕ) : ifszdo pokV

8 nze

(;ko /ftPk t;s{)

:{fBN-III

d|soh fuZmh gZso

8 nze

:{fBN-IV

ftnkeoD

(T) Ppd i'VK d/ fB:w

(n) r[ow[yh fbgh dhNk ftP/PsktK

8 nze

nze tzv ns/ gohfyne bJh jdkfJsK

1H gqPB gZso d/ uko ;?ePB j'Dr/.;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.

2H ftfdnkoEh B/ e[b gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzik gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ 08 nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g gqPBK ftu eo ;edk j?.

BACHELOR OF SCIENCE (Medical) (Semester IV)

Session 2020-21

Course Title: BASIC PUNJABI  
IN LIEU OF PUNJABI (COMPULSORY)

**Course Code: BSML-4031**

**COURSE OUTCOMES:**

**CO1:** 'wzu xo' fJeKrh Bz{ f;b/p; ftu PkfwB eo e/ ftfdnkoEhnK nzdo fJekrh Bz{ gVQD dh o[uh Bz{ g?dk eoBk j? ns/ fJeKrh irs Bkb i'VDk j?.

**CO2:** nYiqk is`iKAw nwl sMbMDq khwxIAW pVHwauX dw mnorQ ivedAwrQIAW dI bu`DI nUM qIKx kridAW aunHW iv`c smwjK smJ aujwgr krnw hY[

**CO3:** ieSiqhwr ilKx dw mnorQ ivedAwrQIAW nUM ies klw iv`c inpuMn krnw hY[

**CO4:** ivAwkrn pVHwauX dw mnorQ ivedAwrQIAW AMdr pMjwbl BwSw dI Amlrl dw Aqy bwrlkIAW nUM smJx lel v`Kry-v`Kry isDwqW dw ivkws krnw Aqy pMjwbl BwSw nUM isKwauX dI pRikirAw iv`c pw ky ie`k hor BwSw is`Kx dy mOkY pRdwn krnw hY[

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**Course Title: BASIC PUNJABI  
IN LIEU OF PUNJABI (COMPULSORY)**



Course Code: BSML-4031

smW: 3 GMty

Maximum Marks: 50

Theory: 40  
CA: 10

gkm eqw

:{fBN-I

wzu xo (fJeKrh ;zfrqj)(;zgkH e[bdhg f;zx Xho ns/ fjod/ihs f;zx G'rb), r[o{ BkBe d/t :{Bhtof;Nh, nzfwqs;o.

d{ik ftnkj,wB dhNk wB ftu,pqjw G'i(fJeKrhNk f;b/p; dk fjZ;k jB)

(सच)

08nze

:{fBN-II

nYiqk is`iKAw nwl sMbMDq khwxIAW:

1. AMgUr K`ty hn
2. lwlc burl blw hY
3. eykqw iv`c bl hY
4. ij`Qy cwh, au~Qy rwh
5. AMq Bly dw Blw

08nze

:{fBN-III

ieSiqhwr

- 1.vpwr sMbMDI
- 2.ivAwh sMbMDI
- 3.vsqUAW dl ^rld-vyc sMbMDI
- 4.AswmlIAW dw ieSiqhwr
- 5.is`iKAw pRwpql sMbMDI

08nze

:{fBN-IV

svr: svrW dl pirBwSw,svrW dw vrglkrn

ivAMjn: ivAMjnW dl pirBwSw,ivAMjnW dw vrglkrn

08nze

nze tzv ns/ gohfyne bJh jdkfJsK

- 1H gqPB gZso d/ uko ;?ePB j'Dr/.;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.
- 2H ftfdnkoEh B/ eZb gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzik gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ 08 nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g  
gqPBKftu eo ;edk j?.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**Course Title: PUNJAB HISTORY & CULTURE (From 1605 to 1849 A.D.)**

**(Special paper in lieu of Punjabi Compulsory)**

**(For those students who are not domicile of Punjab)**

**Course Code- BSML-4431**

**COURSE OUTCOMES:**

After completing the paper the students will have a thorough insight into the origin of Sikh faith and its major institutions in Punjab.

**CO 1:** To able to construct original historical arguments using a blend of primary and secondary source material.

**CO 2:** To be able to demonstrate the significance of historical topics with reference to broader historical context and their contemporary relevance.

**CO 3:** Students will develop an ability to convey verbally their historical knowledge.

**CO 4:** Students will develop skills in critical thinking and reading.

**CO 5:** To discuss understand and evaluate causes and results of the conflict with Mughals.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**Course Title: PUNJAB HISTORY & CULTURE (From 1605 to 1849 A.D.)**

**(Special paper in lieu of Punjabi Compulsory)**

**(For those students who are not domicile of Punjab)**

**Course Code- BSML-4431**

**Examination Time: 3 Hours**

**Max. Marks: 50  
Theory: 40**

### 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 5<sup>th</sup> question may be attempted from any of the four Units.
4. Each question will carry 8 marks

### UNIT- I

1. Transformation of Sikhism under Guru Hargobind.
2. Martyrdom of Guru Teg Bahadur

### UNIT-II

3. Creation of Khalsa
4. Khalsa and its impact on the Punjab

### UNIT-III

5. Banda Bahadur and his achievements
6. Rise of Misls.

### UNIT-IV

7. Maharaja Ranjit Singh:- Civil, Military and Land Revenue Administration.
8. Fair, Festivals and Folk Music in the Punjab during the medieval period (Jarag, Baisakhi and Diwali)

### Suggested Readings

1. Chopra P.N., Puri, B.N., & Das, M.N.( 1974), *A Social, Cultural & Economic History of India*. Vol.II, Macmillan India Limited, New Delhi.
2. Grewal, J.S. (1994). *The Sikhs of the Punjab*, Cambridge University Press, New Delhi.
3. Singh, Fauja (1972). *A History of the Sikhs*, Vol. III, Patiala: Punjabi University.
4. Singh, Kushwant (2011). *A History of the Sikhs- Vol. I (1469-1839)*. New Delhi: Oxford University Press.
5. Singh, Kirpal (1990). *History and Culture of the Punjab-Part II (Medieval Period)*. Patiala: Publication Bureau, Punjabi University.

### BACHELOR OF SCIENCE (Medical) (Semester IV)

Session 2020-21

ENGLISH

Course Title: ENGLISH (COMPULSORY)

Course Code- BSML-4212

### COURSE OUTCOMES:

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

- CO 1:** develop an understanding of the poems taught and be able to answer questions regarding situations, themes and characters depicted in them
- CO 2:** comprehend the basics of grammatical rules governing prepositions and phrasal verbs
- CO 3:** enhance their reading and analysing power of texts through guided reading
- CO 4:** enrich their vocabulary and use newly learnt words in both spoken and written language
- CO 5:** develop skills to write an essay on a given topic

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**ENGLISH**  
**Course Title: ENGLISH (COMPULSORY)**  
**Course Code- BSML-4212**

**Time: 3 Hrs.**

**Max. Marks: 50**  
**Theory: 40**

**Instructions for the Examiner**

The paper setters should avoid questions of theoretical nature from *Making Connections*.

**Section A:** One question with sub-parts will be set from Unit I of the syllabus. Fifteen sentences will be set and the students would be required to attempt any ten. Each sentence will carry one mark. **(10x1=10)**

**Section B:** Two questions will be set from Unit II of the syllabus. The students would be required to attempt one essay out of the given two topics carrying six marks (word limit 300 words). The second question will be based on vocabulary. The students would be required to write single words for phrases and sentences choosing any four out of six and each carrying one mark. **(1x6+4x1=10)**

**Section C:** The students would be required to attempt two questions (with sub parts) based on exercises as given before and after reading essays in the prescribed text book *Making Connections*. **(2x5=10)**

**Section D:** This section will be divided into two parts. In part one, three questions based on central idea, theme, tone and style etc. of the poems from the prescribed textbook, *Moments in Time* from Unit IV of the syllabus will be set. The students would be required to attempt any two, each carrying three marks (100 words each). **(2x3=6)**

Part two will have one question (with internal choice) requiring students to explain a stanza with reference to context carrying four marks (word limit 200 words). The stanzas for explanation will be taken from the prescribed textbook, *Moments in Time* from Unit IV in the syllabus. **(1x4=4)**

**UNIT I**

*English Grammar in Use*, 4<sup>th</sup> Edition by Raymond Murphy, CUP (Units 121-145)

**UNIT II**

Essay Writing and *The Students' Companion* by Wilfred D. Best (Section 1: Single words for phrases and sentences: Words pertaining to Government, words pertaining to Marriage, Opposites and Negatives)

**UNIT III**

*Making Connections* by Kenneth J. Pakenham, 2nd Edn. CUP: Unit-IV

**UNIT IV**

*Moments in Time*: Poems at Sr. No. 7-12

**Texts Prescribed:**

1. *English Grammar in Use* (Fourth Edition) by Raymond Murphy, CUP
2. *The Students' Companion* by Wilfred D. Best
3. *Making Connections* by Kenneth J. Pakenham, 2nd Edn. CUP
4. *Moments in Time: An Anthology of Poems*, GNDU, Amritsar

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: BIOCHEMISTRY**

**Course Code- BSMM-4483 (I)**

**(THEORY)**

**COURSE OUTCOMES:**

**CO-1.**Familiar with various biochemical pathways.

**CO-2.** Understand the chemical nature of life and life process.

**CO-3.** Get an idea on structure and functioning of biologically important molecules.

**CO-4.** Help to explore new developments in biochemistry.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: BIOCHEMISTRY**

**Course Code- BSMM-4483 (I)**

**(THEORY)**

**Max. Time: 3 Hrs.**

**Max. Marks: 30**

**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**

**Biochemistry and its scope**

**Classification and functions of:**

- Carbohydrates
- Proteins
- Lipids
- Nucleic acids

**UNIT II**

**Enzymes:**

- Nature and their classification
- Coenzymes.

**Lipid Metabolism:**

- B-Oxidation of fatty acid
- Ketosis

**UNIT III**

**Carbohydrate Metabolism:**

- Glycolysis
- Tricarboxylic acid cycle
- Hexose monophosphate shunt
- Glycogenesis
- Glycogenolysis
- Gluconeogenesis
- Oxidative Phosphorylation

**UNIT IV**

**Protein Metabolism:**

- Metabolism of amino acids
- Oxidative deamination
- Transamination
- Decarboxylation
- Hydrolysis of proteins
- Ornithine cycle

**Suggested Reading Material:-**



1. Conn, E.E., Stump. P.K. Bruening, S. and Doi R.H. (2006), Outlines of Biochemistry (5th ed), John Wiley and Sons Inc., New York.
2. Fischer, J. and Arriold, J.R.P. (2001). Instant notes in Chemistry for Biologists, Viva Books Pvt. Ltd.
3. Harper, H.A. (2018): Harper's Biochemistry (31<sup>st</sup> ed).
4. Holde, K.E.V., Johnson, W.C. and Shing, P. (2005). Principles of Physical Biochemistry Prentice Hall, Inc., USA.
5. Lehninger, A (2017). Principles of Biochemistry, (7<sup>th</sup> ed).
6. Morris, H. Best, L.R., Pattison, S., Arena, S. (2013). Introduction to General Organic Biochemistry, (11<sup>th</sup> ed), Wadsworth Group.
7. Robert, K., Murray, Mayes Daryl, K. Granner, Victor, W., Woodwell (1990), Harper's Biochemistry, 22nd Edition, Prentice Hall International Inc.
8. Sheehan, D (2013). Physical Biochemistry: Principles and Applications – John Wiley & Sons Ltd., England.
9. Stryer, L. (2019). Biochemistry (9<sup>th</sup> ed), San Francisco W.H. Freeman.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: ANIMAL PHYSIOLOGY**

**Course Code- BSMM-4483 (II)**

**(THEORY)**

**COURSE OUTCOMES:**

**CO1.**Understand the functioning of various systems.

**CO2.**Apply the knowledge to lead a healthy life.

**CO3.**Familiarize with various biochemical pathways.

**CO4.** Compare the functioning of organ systems across the animal world.

**CO5.** Learn more about human physiology and anatomy.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: ANIMAL PHYSIOLOGY**

**Course Code- BSMM-4483 (II)**

**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**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**

- Digestion** : Digestion of dietary constituents, regulation of digestive processes and absorption. Extra and intra cellular digestion, enzymatic digestion and symbiotic digestion.
- Respiration** : Transport of O<sub>2</sub> and CO<sub>2</sub>, Oxygen dissociation curve of haemoglobin, Bohr effect, chloride (-) shift, Haldane effect and control of breathing.m

**UNIT- II**

- Heart** : Origin and regulation of heart beat, cardiac cycle, electrocardiogram, cardiac output, Blood pressure and micro-circulation.
- Blood** : Composition and functions of blood and lymph. Blood clotting. Blood groups including Rh factor, haemopoiesis
- Excretion** : Urine formation and osmoregulation.

**UNIT- III**

- Muscles** : Ultrastructure, chemical and physical basis of skeletal muscle contraction.
- Neural Integration:** Structure of neuron, resting membrane potential, Origin and propagation of impulse along the axon, synapse and myoneural function.

**UNIT- IV**

**Physiology of Behavior:** Taxes and reflexes, instinctive and motivate learning and reasoning

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

**Suggested Reading Material:**

1. Guyton, and Hall, (2015), Text Book of Medical Physiology, 15th Edition, Elsevier.

2. Hill, R. W., Wyse, G. K. and Anderson, N. 3<sup>rd</sup> ed (2012), Animal physiology, Sinauer Associate, INC. Pub. Saunderland, Massachusettes, USA.
3. Hoar, W. S. (1984), General and Comparative Physiology, Prentice Hall of India Pvt. Limited, New Delhi, India.
4. Prosser, C.L. 4<sup>th</sup> Ed (1991), Comparative Animal Physiology, Satish Book Enterprise Books seller & Publishers, Agra.
5. Purves, W. K., Oriane, G. H., Space, H. C. and Salava, D. (2001), Life – The Science of Biology (6<sup>th</sup> ed), Sinauer Assoc. Inc., USA.
6. Randall, D., Burggren, K.L. and French, K. (2002), Eckert Animal Physiology: Mechanisms and Adaptations, W.H. Freeman and Company, New York.
7. Taneja, S.K. (1997), Biochemistry & Animal Physiology, Trueman Book Co.
8. Willmer, P. Stone, G. and Johnston, I (2000). Environmental Physiology of Animals, Blackwell Science.
9. Withers, P.C. (1992), Comparative Animal Physiology, Saunder College Publishing, New York.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: PRACTICAL-IV- BIOCHEMISTRY AND ANIMAL PHYSIOLOGY**  
**Course Code- BSMM-4483 (P)**  
**(PRACTICAL)**

**COURSE OUTCOMES:**

**CO-1.** Learn clinical procedures for blood & urine analysis.

**CO-2.** Develop skill in simple biochemical laboratory procedures.

**CO-3.** Skill in observing and to some extent in analysing various Biological Data.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: PRACTICAL-IV- BIOCHEMISTRY AND ANIMAL PHYSIOLOGY**  
**Course Code- BSMM-4483 (P)**  
**(PRACTICAL)**

**Time: 3 hrs.**

**Max. Marks: 20**

**Instructions for the Practical Examiners:**

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

1. Study of the skeleton of *Scoliodon*, *Rana*, *Varanus*, *Gallus* and *Oryctolagus*.
2. Identification of food stuffs: starch, glucose, proteins and fats in solution.
3. Demonstration of osmosis and diffusion.
4. Demonstrate the presence of amylase in saliva, denaturation by pH and temperature.
5. Determination of coagulation and bleeding time of blood in man/rat/rabbit.
6. Determination of blood groups of human blood sample.
7. Recording of blood pressure of man.
8. Analysis of urine for urea, chloride, glucose and uric acid.
9. Estimation of haemoglobin content.
10. Field study: Visit to a fossil Park/Lab/ Science City and submit a report /  
Familiarity with the local vertebrate fauna.

**Guidelines for conduct of Practical Examination:**

- |   |   |
|---|---|
| 1. Identify the given bones, make labeled sketches of their respective-views          | 8 |
| 2. Write down the steps and determine the constituents in the given sample.           | 3 |
| 3. Write the procedure and perform the given physiology experiment.                   | 3 |
| 4. Report on visit to a fossil park/lab/Science City/study of local vertebrate fauna. | 2 |
| 5. Viva-voce & Practical file.  | 4 |

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

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**MICROBIOLOGY**

**Course Title: MICROBIAL ECOLOGY**

**Course Code- BSMM-4343 (T)**

**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

**CO1:** Understand the Diversity of various microbial habitats.

**CO2:** Understand the various microbial interactions and competition for survival in nature (for nutrients, space and oxygen).

**CO3:** Understand the role of microorganisms in geochemicals cycles, concept of microbial toxins, biofertilizers and bioinsecticides.

**CO4:** Understand the microbiological aspects of pollution and concept of BOD and COD, effluent treatment, bioremediation and bioleaching.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**MICROBIOLOGY**

**Course Title: MICROBIAL ECOLOGY**

**Course Code- BSMM-4343 (T)**

**(THEORY)**

**Time: 3 Hrs.**

**Max Marks:100**

**Theory Marks: 60**

**Practical Marks: 20**

**CA: 20**

**Instructions for the Paper Setters**

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

**UNIT-I**

1. Diversity of microbial habitats: Environmental selecting factors:- physical, chemical and biological types of microbial habitats:- atmospheric, aquatic and terrestrial environments.

**UNIT-II**

2. Microbial interactions, antagonism, commensalism, symbiosis, parasitism miscellaneous associations in nature. Competition for survival in nature (for nutrients, space, oxygen).

**UNIT-III**

3. Role of microorganisms in geochemicals cycles: Carbon cycle, nitrogen cycle, phosphorus cycle and sulphur cycle, microbial toxins in the environment: Types of Microbial toxins, ecological consequences of microbial toxins as insecticidal agents, bioinsecticides, biofertilizers.

**UNIT-IV**

4. Concept of BOD and COD, Sewage and effluent treatment by primary, secondary and tertiary methods. Role of microbes in bioremediation of persistent pollutants and bioleaching of metals.

**Books Recommended: (Edition of books updated)**

1. Edmonds, P., 1978, Microbiology: An Environmental Perspective, MacMillan Publishing Co., Inc., New York.
2. Powar C.B. and Danganwala, H.F., 2017, General Microbiology, Volume II, 2<sup>nd</sup> ed. Himalaya Publishing House, New Delhi.
3. Sharma, P.D., 2010, Microbiology, Rastogi Publication, Meerut.
4. Pleczar, M.J., Chan, E.C.S. and Krieg N.R., 2011 (reprint), Microbiology, 2<sup>nd</sup> ed. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
5. Patel, A.H., 2011, Industrial Microbiology, 2<sup>nd</sup> ed. Macmillan India Ltd., Delhi.



**Session 2020-21**  
**MICROBIOLOGY**  
**Course Title: MICROBIAL ECOLOGY**  
**Course Code- BSMM-4343 (P)**  
**(PRACTICAL)**

**Time: 3 hrs**

**Max. Marks: 20**

**Instructions for the practical examiner**

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

**LIST OF PRACTICALS:**

1. Isolation and enumeration of fungi from air and soil by pour plating and spread plating.
2. Determination of dissolved oxygen content (DO) of the given water sample by Titrimetric method.
3. Determination of COD of the given water sample by Titrimetric method.
4. To conduct bacteriological examination of water sample by MPN method.
5. To isolate symbiotic nitrogen bacteria from root nodules.
6. To perform crowded plate method for studying microbial interactions.
7. Determination of B.O.D.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**CHEMISTRY**

**Course Title: INORGANIC CHEMISTRY-(I)**

**Course Code- BSMM-4084**

**(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

**CO2:** Understand the magnetic properties of coordination compounds by using CFT.

**CO3:** Describe the shapes and structures of coordination complexes with coordination numbers ranging from 4 to 12.

**CO4:** Do nomenclature of coordination compounds.

**CO5:** Write both reduction and oxidation half reactions for a simple redox reaction

**CO6:** Identify the oxidation number (charge) on a neutral metal, metal and non-metal ion

**CO7:** Carry out the common applications of the activity series of metals

**CO8:** Understand the Latimer, Frost and Pourbaix diagram.

**CO9:** Understand the positions, electronic configurations, relative stability, preparation, properties, structures and characteristics of the f-block elements in the periodic table;

**CO10:** Understand the role of metal ions and other inorganic elements in biological systems.

**CO11:** Understand the properties and reactions of non-aqueous solvents.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**CHEMISTRY**  
**Course Title: INORGANIC CHEMISTRY-(I)**  
**Course Code- BSMM-4084**  
**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 30**

**Instructions for the Paper Setter**

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**

**Coordination Compounds**

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes

**Non-Aqueous Solvents**

Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH<sub>3</sub> and liquid SO<sub>2</sub>.

**UNIT-II**

**Oxidation and Reduction**

Use of redox potential data-analysis of redox cycle, redox stability in water, Frost, Latimer and Pourbaix diagrams

**Chemistry of Lanthanide Elements**

Electronic structure, oxidation states and ionic radii and lanthanide contraction. Electronic absorption and magnetic properties of lanthanides

**UNIT-III**

**Chemistry of Actinides**

General features and chemistry of actinides, similarities between the later actinides and the later lanthanides. Electronic and magnetic properties of actinides and their general comparison with the lanthanide elements.

**UNIT-IV**

**Bioinorganic Chemistry**

Essential and trace elements in biological processes, metalloporphyrins and special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca<sup>2+</sup>.

**Books Suggested:**

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

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**CHEMISTRY**

**Course Title: ORGANIC CHEMISTRY-(II)**

**Course Code- BSMM-4084**

**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to

**CO1:** understand structure and bonding in carboxylic acids and carboxylic acid derivatives

**CO2:** Compare the acidity of alcohols, phenols and acids

**CO3:** understand the effect of various substituents on the acidity of acids

**CO4:** describe preparations, physical properties, and reactions of carboxylic acids and carboxylic acid derivatives

**CO5:** understand preparations and reactions of ethers and epoxides

**CO6:** understand various cleavages in ethers

**CO7:** understand the ring opening reactions of epoxides

**CO8:** understand preparation and reactions of nitroalkanes and nitroarenes

**CO9:** understand nomenclature, structural features, and methods of formation and chemical reactions of Organomagnesium, Organolithium, Organozinc and Organocopper compounds.

**CO10:** know the various methods of synthesis and compare electrophilic substitution, reactions of pyrrole, furan, thiophene and nucleophilic substitution reactions of pyridine.

**CO11:** compare the basicity of pyridine, piperidine and pyrrole.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**CHEMISTRY**

**Course Title: ORGANIC CHEMISTRY-II**

**Course Code- BSMM-4084 (II)**

**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 30**

**Instructions for the Paper Setter**

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**

**Carboxylic Acids**

Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation.

**Carboxylic Acids Derivatives**

Structure and nomenclature of acid chlorides, esters, amides and acid anhydrides, Relative stability & reactivity of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic acid derivatives, chemical reactions. Mechanisms of esterification and hydrolysis (acidic and basic).

**UNIT-II**

**Ethers and Epoxides**

Nomenclature of ethers and methods of their formation, physical properties. Chemical reaction- cleavage and autoxidation, Ziesel's method. Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

**UNIT-III**

**Organic Compounds of Nitrogen**

Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes, Mechanisms of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline media. Reactivity, Structure and nomenclature of amines, Methods of preparation of amines by Reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction and Hoffmann bromamide reaction. Physical properties. Stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Amine salts as phase-transfer catalysts.

**UNIT-IV**

**Organometallic Compounds**

Organomagnesium Compounds: The Grignard reagents formation, structure and chemical reactions. Organolithium Compounds: Formation and chemical reactions. Organozinc and Organo copper Compounds: Nomenclature, structural features, Methods of formation and chemical reactions.

**Heterocyclic Compounds**

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.

**Book Suggested:**

1. Morrison, R.T., Boyd, R.N., Organic Chemistry; 6th edition, Pubs: Prentice-Hall, 1992.
2. Wade Jr., L.G., Singh, M.S., Organic Chemistry; 6th edition, Pubs: Pearson Education, 2008.
3. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: Wiley Eastern Limited, 1985, Vol.I, II, III.
4. Solomons, T.W., Fryhle, C.B., Organic Chemistry; 9th edition, Pubs: Wiley India, 2007.
5. Carey, F.A., Organic Chemistry; 4th edition, Pubs: McGraw-Hill, 2000.
6. Streitwieser, A., Clayton, Jr., Heathcock, H., Introduction to Organic Chemistry; 3rd edition, Pubs: Macmillan Publishing Company, 1989.
7. Introduction to Organic Chemistry, Sireitwieser, Heathcock and Kosover, Macmilan.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**

**Session 2020-21**

**CHEMISTRY**

**Course Title: CHEMISTRY PRACTICAL**

**Course Code- BSMM-4084 (P)**

**(PRACTICAL)**

**COURSE OUTCOMES:**

Students will be able to analyze the given organic compound through

**CO1:** detection of elements (N, S and halogens) in organic compounds.

**CO2:** detection of functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and anilide) in simple organic compounds.

**CO3:** preparation of their derivatives.



**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**CHEMISTRY**  
**Course Title: CHEMISTRY PRACTICAL**  
**Course Code- BSMM-4084 (P)**  
**(PRACTICAL)**

**Duration: 3½ hrs.**

**Max. Marks: 20**

**Instructions for practical examiner**

Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE office, KanyaMahaVidyalaya, Jalandhar.

**Qualitative Analysis**

**Detection of elements:** N, S and halogens

**Detection of functional groups:** phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and anilide in simple organic compounds and preparing their derivatives.

**Practical Examination**

1) Detection of Elements, functional group and derivative preparation	15
2) Viva-Voce	03
3) Note Book	02

**Book Suggested:**

1. Experimental Organic Chemistry, Vol. I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai, Tata McGraw Hill.
2. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.
3. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V. Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.
4. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS-I**  
**Course Code- BSMM-4075 (I)**  
**(THEORY)**

**COURSE OUTCOMES: -**

After passing this course the student will develop:

**CO1:** Understanding of characters of seed plants, origin and evolution of seed habit, angiosperms and gymnosperms

**CO2:** Understanding of general characters of gymnosperms, their classification and evolution including fossil and living gymnosperms.

**CO3:** Understanding of morphology of vegetative and reproductive parts of *Pinus* and *Cycas*.

**CO4:** Understanding of morphology of vegetative and reproductive parts of *Ephedra* and *Ginkgo*.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS-I**  
**Course Code- BSMM-4075 (I)**  
**(THEORY)**

**Time: 3Hrs**

**Max. Marks: 30**

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

**UNIT-I**

Characteristics of seed plants; Evolution of the seed habit; Distinguishing features of angiosperms and gymnosperms. Angiosperms: Origin and evolution. Some examples of primitive angiosperms.

**UNIT-II**

General features of gymnosperms and their classification; evolution and diversity of Gymnosperms including fossil and living gymnosperms; Geological time scale and fossilization.

**UNIT-III**

Morphology of vegetative and reproductive parts; Anatomy of root, Stem and leaf; reproduction and life cycle of *Pinus*, *Cycas*.

**UNIT-IV**

Morphology of vegetative and reproductive parts; Anatomy of root, Stem and leaf; reproduction of life cycle of *Ephedra* and *Ginkgo*.

**Suggested Readings:-**

1. Sporne, K.R. (1965). The Morphology of Gymnosperms, Hutchinson & Co. (Publishers) Ltd., London.
2. Gifford, E.M. and Foster, A.S. (1988). Morphology and Evolution of Vascular Plants, W.H.Freeman& Company, New York.
3. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms, New Age International Limited, New Delhi.
4. Pellant, C. (1994). Fossils, Dragon's World, Great Britain.
5. Taylor, T. N., Taylor, E. L. and Krings, M. (2008). Paleobotany: The Biology and Evolution of Fossil Plants (2nd Edition). Elsevier Inc. Netherlands.
6. Vashistha, P. C. (2016). Botany for degree students. S.Chand and Company, New Delhi.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS-II**  
**Course Code- BSMM-4075 (II)**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

**CO1:**Describe the morphological and reproductive structure of plant and also identify different families.

**CO2:**Understand Botanical Nomenclature, classification of angiosperms, salient features of the systems proposed by Bentham & Hooker and Engler & Prantl.

**CO3:**Understand diversity of flowering plants in families like Ranunculaceae, Brassicaceae, Rutaceae, Fabaceae, Apiaceae, Acanthaceae.

**CO4:** Understand diversity of flowering plants in families like Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Chenopodiaceae, Euphorbiaceae, Liliaceae, Orchidaceae and Poaceae.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS-II**  
**Course Code- BSMM-4075 (II)**  
**(THEORY)**

**Time: 3Hrs**

**Max. Marks: 30**

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

**UNIT-I**

Angiosperm taxonomy; Brief history, Aims and fundamental components (alpha-taxonomy, Omega-taxonomy, Holotaxonomy); Identification keys and Taxonomic literature.  
Botanical nomenclature: Taxonomic ranks; Type concept.

**UNIT-II**

Botanical nomenclature: Principle of priority. Major contribution of cytology, Phytochemistry and taximetrics to taxonomy. Classification of angiosperms; Salient features of the systems proposed by Bentham and Hooker, Engler and Prantl

**UNIT-III**

Diversity of flowering plants as illustrated by members of the families Ranunculaceae, Brassicaceae, Rutaceae, Fabaceae, Apiaceae, Acanthaceae.

**UNIT-IV**

Diversity of flowering plants as illustrated by members of the families Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Chenopodiaceae, Euphorbiaceae, Liliaceae, Orchidaceae and Poaceae.

**Suggested Readings:-**

1. Bendre, A. (2007). Practical Botany, Rastogi Publications, Meerut.
2. Davis, P.H. and Heywood, V.H. (1963). Principles of Angiosperm Taxonomy, Oliver and Boyd, London.
3. Gifford, E.M. and Foster, A.S. (1988). Morphology and Evolution of Vascular Plants, W.H. Freeman & Company, New York.
4. Jeffrey, C. (1982). An Introduction to Plant Taxonomy, Cambridge University Press, Cambridge, London.
5. Jones, S.B., Jr. and Luchsinger, A.E. (1986). Plant Systematics (2nd edition). McGraw- Hill Book Co., New York.
6. Radford, A.E. (1986). Fundamental of Plant Systematics, Harper and Row, New York.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: PRACTICAL-IV- DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS-(I & II)**  
**Course Code- BSMM-4075 (P)**  
**(PRACTICAL)**

**COURSE OUTCOMES:**

After passing this course the student will able to:

**CO1:** Identify different plants from different families through their vegetative and reproductive characters.

**CO2:** Understand different types of placentation system.

**CO3:** Understand anatomy of different genus from Gymnosperm.

**Co4:** Identify different parts of a flower.

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: PRACTICAL-IV- DIVERSITY OF SEED PLANTS AND THEIR SYSTEMATICS-(I & II)**  
**Course Code- BSMM-4075 (P)**  
**(PRACTICAL)**

**TIME: 3Hours**

**Max. Marks: 20**

**Instructions for the paper setter**

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

**Suggested Laboratory Exercises**

1. Angiosperms: The following species are suitable for study.
2. This list is only indicative. Teachers may select plants available in their locality. Teachers may select plants/material available in their locality/institution.
1. Ranunculaceae: *Ranunculus*, *Delphinium*
2. Brassicaceae: *Brassica*, *Alyssum*, *Iberis*, *Coronopus*.
3. Malvaceae: *Hibiscus*, *Abutilon*.
4. Rutaceae: *Murraya*, *Citrus*.
5. Fabaceae: Faboideae: *Lathyrus*, *Cajanus*, *Melilotus*, *Trigonella*, Caesalpinioideae: *Cassia*, *Caesalpinia*, Mimosoideae: *Prosopis*, *Mimosa*, *Acacia*.
6. Apiaceae: *Coriandrum*, *Foeniculum*, *Anethum*.
7. Acanthaceae: *Adhatoda*, *Peristrophe*.
8. Apocynaceae: *Vinca*, *Thevetia*, *Nerium*.
9. Asclepiadaceae: *Calotropis*.
10. Solanaceae: *Solanum*, *Withania*, *Datura*.
11. Euphorbiaceae: *Euphorbia*, *Phyllanthus*.
12. Lamiaceae: *Ocimum*, *Salvia*.
13. Chenopodiaceae: *Chenopodium*, *Beta*.
14. Liliaceae: *Asphodelus*, *Asparagus*.
15. Poaceae: *Avena*, *Triticum*, *Hordeum*, *Poa*, *Sorghum*.

The Students should be made familiar with the use of identification keys including use of computers in taxonomy. The teachers should prevent students from collecting plants from the wild and submitting them for the practical examination. Instead, the student should be asked to prepare field reports.

**Gymnosperms:**

***Cycas*:**

- (i) Habit, armour of leaf bases on the stem (if specimen is not available show photography), very young leaf (circinate vernation) and old foliage leaves, scale leaf, bulbils, male cone (specimen); Microsporophyll, megasporophyll mature seed.
- (ii) Study through permanent slides—normal root (T.S.), stem (T.S.) (if sections are not available show photographs), ovule (L.S.). (iii) Study through hand sections or dissections—coralloid root (T.S.), rachis (T.S.), leaflet (V.S.), microsporophyll (V.S.) pollen grains (W.M.).

***Pinus*:**

- (i) Habit, long and dwarf shoot showing cataphylls and scale leaves, T.S. wood showing growth rings, male cone, 1st year, 2nd year and 3rd year female cones, winged seeds.

- (ii) Study through permanent slides-root (T.S.), female cone (L.S.) ovule (L.S.), embryo (W.M.) showing polycotyledonous condition. (iii) Study through hand sections or dissections-young stem (T.S.), old stem (wood) (T.L.S. and R.L.S.), needle (T.S. male cone (L.S.), male cone (T.S.), Pollen grains (W.M.).

***Ephedra:***

- (i) Habit and structure of whole and female cones.
- (ii) Permanent slides-female cone (L.S.).
- (iii) Hand sections/dissections-node (L.S.), inter node (T.S.), macerated stem to see vessel structure; epidermal peel mount of vegetative parts to study stomata, male cone (T.S. and L.S.), pollen grains.

***Ginkgo:***

- (i) Habit and structure of whole plant.
- (ii) Permanent slides-male and female reproductive parts.
- (iii) Pollen grains

**Suggested Readings:**

1. Angiosperm Phylogeny Group (2003). An update of the Angiosperm Phylogeny Group Classification for the orders and families of the flowering plants: APG
2. Cronquist, A. (1981). An Integrated System of Classification of Flowering Plants. Columbia University Press, New York.
3. Simpson, M.C. (2006). Plant Systematics. Elsevier, Amsterdam



**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: QUALITY ASSURANCE**  
**Course Code- BSMM-4255 (T)**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

**CO1:** Understand principles and methods of quality control and quality attributes(Colour, texture, size, shape and flavour).

**CO2:** Understand principles of HACCP and GMP.

**CO3:** Understand the principles of sensory evaluation, sampling.

**CO4:** Learn food laws and regulations (FSSAI, PFA, AGMARK, FPO, MFPO, BIS, ISO)

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: QUALITY ASSURANCE**  
**Course Code- BSMM-4255 (T)**  
**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 100**  
**Theory Marks: 60**  
**CA: 20**

**Instructions for the Paper Setter**

Eight questions of equal marks(12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

1. Objectives, importance and functions of quality control.
2. Quality attributes.

**UNIT-II**

3. Methods of quality assessment of food materials: fruits, vegetables, cereals, dairy products, meat, egg and processed products.
4. Color: Definition, importance, different color measuring instruments used in food industries.
5. Texture: Definition, importance, different texture analyzing instruments used in food industries to analyze texture.

**UNIT-III**

6. Sampling, specifications of raw materials and finished products
7. Sensory evaluation.

**UNIT-IV**

8. Concept of HACCP and GMP.
9. Food Laws and Regulations- FSSAI, AGMARK, FPO, PFA, MFPO, BIS, ISO.

**Recommended Books:**

1. Quality Control for Food Industry by A. Kramer and B.A. Twigg
2. Handbook of analysis and quality control for fruits and vegetable products by S. Ranganna
3. Food Science by N.N. Potter

**BACHELOR OF SCIENCE (Medical) (Semester IV)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: QUALITY ASSURANCE**  
**Course Code- BSMM-4255 (P)**  
**(PRACTICAL)**

**Time:3 hrs**

**Max. Marks: 20**

**Instructions for the practical examiner**

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

**List of Practicals:**

1. Determination of acidity and pH of milk.
2. Platform tests for determining the quality of milk.
3. Determination of cooking quality of rice.
4. Determination of iodine value of oil/fat.
5. Determination of saponification value of oil/fat.
6. Determination of reducing and non-reducing sugars.
7. Determination of interior and exterior quality of eggs.
8. Determination of alcoholic acidity of flour.
9. Adulterants in milk, cereals, oils and fats and their detection.
10. Cut out analysis of canned fruits and vegetable.

## **SEMESTER-V**

**Bachelor of Science (Medical) (Semester-V)**

**Session 2020-21**

**Course Title: PUNJABI (COMPULSORY)**

**Course Code- BSML- 5421**

**COURSE OUTCOMES:**

**CO1:** u'DthnK gzikph ejkDhnK Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo ejkDhnKgqshfdbu;gh, ;{M Bz{ g?dk eoBk j?.

**CO2:**Bktb J/j[ jwkok ihtDk (dbhg e"o fNtkDk)Bz{ f;b/p; ftu Pkfwb eo e/ ftfdnkoEhnK nzdo BktbgVQD dh o[uh Bz{ g?dk eoBk j? ns/ fj; ;kfjs o{g Bkb Bkb i'VDk j?.

**CO3:** g?oQk ouBk eoB Bkb ftfdnkoEh nkgDh rZb B{z efjD dh iku f;ZyDr/ ns/ fj fdwkrh e;os ftu ;jkJh j't/rh.

**CO4:**ob nzro/lh g?oQ/ dk gzikph ftu nB[tkd dk wB'oE ftfdnkoEhnK dh p[ZXh B{z shyD eofdN T[BK dh fbyD gqfsGk B{z T[ikro eoBk j?.

**CO5:** gzikph X[Bh ftTaa[As, tkekswe i[rsK L w/b s/ nfXeko,ekoe s/ ekoeh ;zpzX Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo GkPk dh nwhoh ns/ pkohehnK Bz{ ;wMD bJh tZyo/ - tZyo/ f;XKsK dk ftek; eoBk j?.

**Bachelor of Science (Medical) (Semester-V)**

**Session 2020-21**

**Course Title: PUNJABI (COMPULSORY)**

**Course Code- BSML- 5421**

**;wK L 3 xzN/**

**Maximum Marks: 50**

**Theory: 40**

**CA: 10**

**gkm eqw ns/ gkm g[;seK**

**:{fBN-I**

**u'DthnK gzikph ejkDhnK**

**(;zgkH vkH ofwzdo e"o, gpbhe/PB fpT{o', r[o{ BkBe d/t :{Bhtof;Nh, nzfwqs;o, 2018)**

<b>b/ye</b>	<b>ejkDh</b>	<b>ejkDh ;zrqfj</b>
<b>nihs e"o</b>	<b>fBT{ :hno</b>	<b>w"s nbh pkp/ dh</b>
<b>fizdo</b>	<b>;"oh i\w</b>	
<b>;[yihs</b>	<b>jlko ejkDhnK dk pkg</b>	<b>w? fJzi[nk]/ eodh jK</b>
<b>ifszdo jK;</b>	<b>okj{ e/s{</b>	<b>JhPto dk iBw</b>
<b>gq/w gqekP</b>	<b>noiB S/V rvhoBk</b>	<b>e[M nDfejk th</b>
<b>uzdB B/rh</b>	<b>joy ;'r</b>	<b>joy ;'r</b>
<b>i;ftzdo f;zx</b>	<b>y{ j yks/</b>	<b>y{ j yks/</b>
<b>r[od/t f;zx o[gkDk</b>	<b>PhPk</b>	<b>PhPk ns/ j'o ejkDhnK</b>

**(ਵਿਸ਼ਾ-ਵਸਤੂ/ਸਾਰ)**

**8 nze**

**:{fBN-II**

**Bktb L J/j[ jwkok ihtDk (dbhg e"o fNtkDk)**

**(ਵਿਸ਼ਾ-ਵਸਤੂ/ਸਾਰ)**

**8 nze**

**:{fBN-III**

**brgr 200 PpdK ftu g?oQk ouBk**

**;ob nzro/lh g?oQ/ dk gzikph ftu nB[tkd**

**8 nze**

**:{fBN-IV**

**ftnkeoD L**

**(T) BKt tkezP**

**(n) w/b s/ nfXeko**

**8 nze**

**nze tzv ns/ gohfyne bJh jdkfJsK**

**1H gqPB gZso d/ uko ;?ePB j'Dr/. ;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.**

2H       ftfdnkoEh B/ e[b gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzikK gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H       jo/e gqPB d/ 08 nze jB.

4H       g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g gqPBK ftu eo  
;edk j?.

**Bachelor of Science (Medical) (Semester–V)**

**Session 2020-21**

**Course Title: Basic Punjabi**

**(In lieu of Punjabi Compulsory )**

**Course Code- BSML- 5031**

**COURSE OUTCOMES:**

CO1: 'kfjs d/ ozr' g[[[;se d/ eftsk Gkr Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo eftsk gqsh fdbu;gh, ;{M Bz{ g?dk eoBk j? sK fe T[j nkX[fBe d"o ftu ub ojhnK ekft XkokoK ns/ ethnK pko/ frnkB jk;b eo ;eD. fJ; dk j'o wB'oE eftsk dh ftnkfynk, ftPb/PD s/ w[bzeD dh gqfefonk s'A ikD{ eokT[Dk th j? sK fe T[j ;wekbh ;wki dhnK ;wZf;nktK Bz{ ;wM ;eD ns/ nkb'uBkswe fdqPNh pDk ;eD.

CO2: 'kfjs d/ ozr' g[[[;se d/ ejkDh Gkr B{z f;b/p; ftu PkfwB eo e/ ftfdnkoEhnK nzdo ejkDh gVQD dh o[uh Bz{ g?dk eoBk j? ns/ ejkDh irs Bkb i'VDk j?.

CO3: pj[s/ PpdK dh EK fJe Ppd ns/ pj[nkoEe Ppd Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo ftnkeoD gqsh fdbu;gh, ;{M Bz{ g?dk eoBk j?.

CO4: ;wkBoEe Ppd, fto'XkoEe Ppd Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo ftnkeoD gqsh fdbu;gh, ;{M Bz{ g?dk eoBk j?.



**Bachelor of Science (Medical) (Semester-V)**  
**Session 2020-21**  
**Course Title: Basic Punjabi**  
**(In lieu of Punjabi Compulsory )**  
**Course Code- BSML- 5031**

;wK L 3 xzN/

**Maximum Marks: 50**

**Theory: 40**

**CA: 10**

gkm eqw

:{fBN-I

;kfjs d/ ozr (;zgkHvk wfjb f;zx),Gkr gfjbk(eftsk ),oth ;kfjs gqekPB,nzfwqs;o.  
 GkJh tho f;zx(;wK,uPwk)  
 gq'Hg{oB f;zx(gzikip B{z e{eK w?A,jb tkj[D tkb/)  
 gq'Hw'jB f;zx(wK,e'Jh nkfJnk ;kv/ ftjV/)  
 (eftsktK f;b/p; dk fjZ;k jB)

(;ko)

**08 nze**

:{fBN-II

;kfjs d/ ozr (;zgkHvk wfjb f;zx),Gkr gfjbk(ejKDh),  
 oth ;kfjs gqekPB,nzfwqs;o.  
 g/wh d/ fBnkD/,e[bch,x'NDk (ejkDhnK f;b/p; dk fjZ;k jB)

(;ko)

**08 nze**

:{fBN-III

(T) pj[s/ PpdK dh EK fJe Ppd

(n) pj[nkoEe Ppd

**08 nze**

:{fBN-IV

(T) ;wkBoEe Ppd

(n) fto'XkoEe Ppd

**08 nze**

nze tzv ns/ gohfyne bJh jdkfJsK

1H gqPB gZso d/ uko ;?ePB j'Dr/.;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.

2H ftfdnkoEh B/ e[b gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzitK gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ 08 nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g gqPBK

ftu eo ;edk j?.

**Session 2020-21**

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

**(Special paper in lieu of Punjabi Compulsory)**

**(For those students who are not domicile of Punjab)**

**Course Code: BSML-5431**

**COURSE OUTCOMES:-**

After completing the course student have understanding of Punjab in the pre-independence phase

**CO 1:** Students will understand major changes in the Punjab during British Rule

**CO 2:** They will also know about important agitations and their outcomes on the politics of the Punjab.

**CO3:** They will gain knowledge about the society and economy of Punjab

**CO4:** They will be able to evaluate the socio-religious reforms movements of Punjabi Society

**CO5:** They will have insights into the details of the partition of Punjab

**Bachelor of Science (Medical) (Semester-V)  
Session 2020-21**

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

**(Special paper in lieu of Punjabi Compulsory)**

**(For those students who are not domicile of Punjab)**

**Course Code: BSML-5431**

**Examination 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 **600 words** by selecting **Two Questions** of equal marks from each Unit.
3. Candidates shall attempt **5 questions** in all, by at least selecting **One Question** from each Unit and the **5<sup>th</sup> question** may be attempted from any of the **four Units**.
4. Each question will carry 8 marks

**Unit- I**

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

**Unit-II**

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

**Unit-III**

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

**Unit-IV**

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

**Suggested Readings**

- Singh, Fauja, *History and Culture of the Punjab*, Part II, Publication Bureau, Punjabi University, Patiala, 1987.
- Singh, Fauja, *Freedom Struggle in the Punjab*, Publication Bureau, Punjabi University, Patiala, 1974.
- Grewal, J.S., *The Sikhs of the Punjab*, New Cambridge House, New Delhi, 2005.
- Singh, Kushwant, *A History of the Sikhs*. Vol. II (1839-1998), Oxford University Press, Delhi, 1991.
- Rai, Satya. M (1978), *Heroic Tradition in the Punjab (1900-1947)*. Punjabi University, Patiala, 1978.
- Chopra, P.N. & Das, M.N. (1974), *A Social, Cultural & Economic History of India*. Vol.III, Macmillan India, 1974.
- Saini B. S, *The Social & Economic History of the Punjab 1901-1939*, EssEss Publications, Delhi, 1975.
- Mittal, S.C, *Freedom Movement in the Punjab (1905-29)*, Concept Publishing Company Delhi, 1977.

**Bachelor of Science (Medical) (Semester-V)**

**Session 2020-21**

**ENGLISH**

**Course Title: English (Compulsory)**

**Course Code: BSML-5212**

**(Theory)**

**COURSE OUTCOMES**

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

- CO 1:** Widen their knowledge about various literary devices used in poetry such as tone, style, imagery, figures of speech, symbolism etc.
- CO 2:** Develop power of imagination and appreciate the beauty, rhyme, and style of a poem
- CO 3:** Analyze and appreciate the dramatic technique, plot development and art of characterisation in the prescribed play
- CO 4:** Develop an understanding of the insights, genres, conventions and experimentations associated with English Drama
- CO 5:** Develop the knowledge, skills and capabilities for effective business writing such as letter writing and resume writing

**Bachelor of Science (Medical) (Semester–V)**

**Session 2020-21**

**ENGLISH**

**Course Title: English (Compulsory)**

**Course Code: BSML-5212**

**(Theory)**

**Examination Time: 3 Hrs**

**Max. Marks: 50**

**Theory: 40**

**CA: 10**

**Instructions for the Examiner:**

**Section A:** Three questions from the play *All My Sons* from Unit I and three questions from *Poems of Nature and Culture* from Unit II requiring very short answers will be set. The students would be required to answer any five, each carrying two marks (50 words each). **(5x2=10)**

**Section B:** Four questions requiring brief descriptive answers based on character, tone, plot and theme(s) in the play *All My Sons* from Unit I will be set and the students would be required to attempt any two, each carrying five marks (250 words each). **(2x5= 10)**

**Section C:** Four questions based on the central idea, theme, tone or style etc. of the prescribed poems from the textbook, *Poems of Nature and Culture* from Unit II will be set for the students to attempt any two of these, each carrying five marks (250 words each). The questions can also be set based on stanzas with reference to context. **(2x5= 10)**

**Section D:** Two questions with internal choice will be set based on (a) formal letter (b) Job application and Resume Writing, each carrying five marks. **(2x5=10)**

**Unit I**

*All My Sons* by Arthur Miller

**Unit II**

*Poems of Nature and Culture*

William Wordsworth: The World is Too Much with Us

Gordon Lord Byron: She Walks in Beauty

P.B. Shelly: Ozymandias

Alfred Lord Tennyson: In Memoriam

Mathew Arnold: Dover Beach

Wilfred Owen: Strange Meeting

Robert Graves: The Portrait

W.H. Auden: The Unknown Citizen

Ted Hughes: The Thought-Fox

Sylvia Plath: Mirror

Rabindranath Tagore: False Religion

Nissim Ezekiel: Night of Scorpion

**Unit III**

Formal letter, Job Application and Resume Writing

**Texts Prescribed:**

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

**Bachelor of Science (Medical) (Semester-V)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: Developmental Biology**  
**Course Code: BSMM-5483 (I)**  
**(THEORY)**

**COURSE OUTCOMES:**

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

CO1: Identify the developmental stages.

CO2: Describe the key events in early and systematic embryological development.

CO3: Describe the process of gametogenesis.

CO4: Describe the chick development up to 96 hours of incubation and extra embryonic membranes.

CO5: Explain the theories of preformation, and concepts like growth, differentiation and reproduction.

CO6: Explain the principles and process of fertilization and cleavage.

**Bachelor of Science (Medical) (Semester–V)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: Developmental Biology**  
**Course Code: BSMM-5483 (I)**  
**(THEORY)**

**Examination Time: 3 Hrs.**

**Max Marks: 30**

**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**

Gametogenesis with particular reference to differentiation of spermatozoa, vitellogenesis; role of follicle/subtesticular cells in gametogenesis  
Egg maturation; egg membranes; polarity of egg  
Parthenogenesis  
Fertilization

**UNIT-II**

Cleavage and its patterns  
Gastrulation  
Determination and differentiation  
Tissue interactions, basic concepts of organizers and inductors and their role  
Embryonic development of Herdmania

**UNIT-III**

Development upto three germinal layers and their fate in frog and chick  
Fate maps of chick and frog embryos  
Metamorphosis in Frog

**UNIT-IV**

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



**Suggested Readings:**

1. Balinsky, B.I. (2007), An Introduction to Embryology, Saunders, Philadelphia.
2. Bellairs, R. (1971), Development Processes in Higher Vertebrates, University of Miami Press, Miami.
3. Berrill, N.J. (1971), Developmental Biology. McGraw Hill, New Delhi.
4. Gilbert, F. (2017), Developmental Biology, Sinaur.
5. Goel, S.C. (1984), Principles and Animal Developmental Biology, Himalaya, Bombay.
6. Karp, G. & Berrill, M.J. (1981), Development. McGraw Hill, New Delhi.
7. Pritchard, D.J. (1986), Foundation of Development Genetics, Taylor and Francis, London.
8. Saunders, J.W. (1982), Developmental Biology, Patterns, Principles, Problems, MacMillan, New York.
9. Waddington CH. (1966), Principles of Development and Differentiation, MacMillan, New York.
10. Miller, W.A. (1997), Developmental Biology Springer Verlag, New York.

**Bachelor of Science (Medical) (Semester-V)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: Genetics**  
**Course Code: BSMM-5483 (II)**  
**(THEORY)**

**COURSE OUTCOMES**

Upon successful completion, students will have the knowledge and skills to:

CO1: Comprehensive, detailed understanding of the chemical basis of heredity.

CO2: Comprehensive and detailed understanding of genetic methodology and how quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms.

CO3: Understanding of how genetic concepts affect broad societal issues including health and disease, food and natural resources, environmental sustainability, etc.

CO4: Understanding the role of genetic mechanisms in evolution.

CO5: The knowledge required to design, execute, and analyze the results of genetic experimentation in animal and plant model systems.

CO6: Explain the key concepts in population,

CO7: Evolutionary and quantitative **genetics** including: the basis of **genetic** variation; heritability; Hardy-Weinberg Equilibrium, roles of migration, mutation

CO8: The ability to evaluate conclusions that are based on genetic data.

CO9: Insight into the mathematical, statistical, and computational basis of genetic analyses.

**Bachelor of Science (Medical) (Semester-V)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: Genetics**  
**Course Code: BSMM-5483 (II)**  
**(THEORY)**

**Examination Time: 3 Hrs.**

**Max Marks: 30**

**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**

**Modification of Mendelian Ratios:** Non-allelic gene interaction, Modified F<sub>2</sub> ratios.

(9:7;9:3:4;12:3:1;13:3;15:1;9:6:1), Gene modifications due to incomplete dominance; lethal factors(2:1); Pleiotropic genes.

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

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

**Linkage:** Linkage, sex-linked characters

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

**UNIT-II**

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

**Replication & transcription of DNA**

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

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

**UNIT-III**

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

**Regulation of gene expressions** in prokaryotes (Operon model) in eukaryotes.

**Extranuclear inheritance:** Chloroplast with special reference to *Mirabilis jalapa* and kappa particles in *Paramecium*.

**UNIT-IV**

**Population genetics:** Equilibrium of gene frequencies and Hardy-Weinberg law.

**Genetic recombination** in bacteria (conjugation, transduction and transformation) and in plasmids.

**Applied Genetics:** Recombination DNA, Genetic cloning and its applications in medicine and agriculture, DNA finger printing.

**Suggested Readings:**

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

**Bachelor of Science (Medical) (Semester–V)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: PRACTICAL–V (Related to Developmental Biology and Genetics)**  
**Course Code: BSMM-5483 (P)**

**COURSE OUTCOMES:**

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

CO2: Knowledge of process of gametogenesis.

CO3: Understanding of pedigree analysis and preparation of family charts

CO4: Understanding of inheritance of morphogenetic human characters.

CO5: Understanding of finger tip patterns.

**Bachelor of Science (Medical) (Semester-V)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: PRACTICAL-V (Related to Developmental Biology and Genetics)**  
**Course Code: BSMM-5483 (P)**

**Examination Time: 3 Hrs.**

**Marks: 20**

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

**Guidelines for Conduct of Practical Examination:-**

- |   |   |
|---|---|
| 1. Two Numericals based on Mendel/Hardy Weinberg Law.                     | 6 |
| 2. Perform the experiment for Dermatoglyphics/ Random mating/ Pod Length. | 3 |
| 3. Identification of given spots/slides.                                  | 3 |
| 4. Make a pedigree chart from the given data.                             | 2 |
| 5. Chart/Assignment.  | 2 |
| 6. Viva-voce and practical file.  | 4 |
- 
1. Demonstrate the Law of segregation and independent assortment (use of coloured beads capsules etc.).
  2. Numericals for Segregation, Independent assortment, Epistasis & Hardy-Weinberg Law.
  3. Demonstration of segregation in preserved material (Maize).
  4. Demonstration of cytoplasmic inheritance in snails.
  5. Inheritance of human characteristics.
  6. Comparison of variance in respect of pod length and number of seeds/pods.
  7. Calculation of gene frequencies and random mating (Coloured beads, capsules).
  8. Pedigree analysis
  9. Dermatoglyphics: Palm print and Finger tip patterns.
  10. Study of the following permanent slides :
    - Polytene Chromosomes of *Chironomus*.
    - Stages of gametogenesis, structure of egg and sperm of a mammal.
    - Larva of *Herdmania*.
    - Developmental stages offrog-upto tadpole, chick-upto 96 hr.
  11. Preparation of slide for Barr body from cheek cells.
  12. **Assignment:** Preparation of charts showing developmental stages of any vertebrate.

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

**Bachelor of Science (Medical) (Semester–V)**

**Session 2020-21**

**MICROBIOLOGY**

**Course Title: Applied Microbiology-I**

**Course Code: BSMM-5343**

**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

**CO1:** Understand the history and scope of industrial microbiology, culture collection and preservation of stock cultures.

**CO2:** Understand the screening methods of isolation, fermentation media, its composition and characteristics of ideal production medium.

**CO3:** Learn about the fermentation processes, types of fermentation, design of fermentor and batch, fedbatch and continuous culture.

**CO4:** Understand the principles of recovery and purification of fermentation products, fermentation economics and patent.

**Bachelor of Science (Medical) (Semester–V)**

**Session 2020-21**

**MICROBIOLOGY**

**Course Title: Applied Microbiology-I**

**Course Code: BSMM-5343**

**(THEORY)**

**Examination Time: 3 Hours**

**Max. Marks: 100**

**Theory: 60**

**Practical: 20**

**CA: 20**

**Instructions for the Paper Setter:** Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT- I**

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

**UNIT- II**

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

**UNIT- III**

Fermentation and Fermentation processes: Fermentation as biological activity, Types of industrial fermentations (submerged, solid state and continuous fermentation). Design of fermentor (body construction, aeration, agitation and control of septic conditions), Basics of batch culture, fedbatch culture and continuous culture.

**UNIT- IV**

Recovery and Purification of Fermentation Products: General principles of separation of fermentation products, solid particles, foam separation, separation by filtration, centrifugation, cell disruption, liquid - liquid chromatography, ion exchange chromatography. Fermentation economics; planning, fermentation designing, process designing, market potential and recovery costs for the industrial set up. Patent (composition, subject matter, characteristics, protection of rights of inventor, cost).



**Books Recommended:**

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

**Bachelor of Science (Medical) (Semester–V)**  
**Session 2020-21**  
**MICROBIOLOGY**  
**Course Title: Practical- Applied Microbiology-I**  
**Course Code: BSMM-5343**  
**(PRACTICAL)**

**Time: 3 Hrs.**

**Marks: 20**

**Instructions for the practical examiner:** Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same may be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

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

**Bachelor of Science (Medical) (Semester–V)**  
**Session: 2020-21**  
**CHEMISTRY**  
**Course Title: Inorganic Chemistry–I**  
**Course Code: BSMM -5084 (I)**  
**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to:

- CO1: Understand structure and bonding in molecules / ions and predict the structure of molecules / ions.
- CO2: Use Crystal Field Theory to understand the structure, hybridisation, geometry and predict the colour of the complexes.
- CO3: Describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them.
- CO4: To describe the magnetic properties of coordination compounds.
- CO5: Familiar with applications of coordination compound.
- CO6: To draw Orgel diagrams for  $d^1$  to  $d^{10}$  systems and predict the possible transitions.
- CO7: To calculate number of microstate and ground state term symbols.
- CO8: Understand preparations, properties and applications of alkyls aryls of lithium and aluminium, bonding in metal-ethylenic complexes, mechanism of homogeneous hydrogenation.

**Bachelor of Science (Medical) (Semester-V)**  
**Session: 2020-21**  
**CHEMISTRY**  
**Course Title: Inorganic Chemistry-I**  
**Course Code: BSMM -5084 (I)**  
**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 30**

**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**

**1. Metal-ligand Bonding in Transition Metal Complexes**

Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

**Unit-II**

**2. Magnetic Properties of Transition Metal Complexes**

Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of  $\mu_s$  and  $\mu_{\text{eff}}$  values, orbital contribution to magnetic moments, application of magnetic moment data for characterization of 3d-metal complexes.

**3. Thermodynamic and Kinetic Aspects of Metal Complexes**

A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

**Unit-III**

**4. Electronic Spectra of Transition Metal Complexes**

Term Symbols for  $p^2$  &  $d^2$  systems, spectroscopic ground states for  $d^1$ - $d^{10}$  electronic configurations. Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, Orgel diagram for  $d^1$ - $d^5$ .

**Unit-IV**

**5. Organometallic Compounds**

Definition, nomenclature and classification of organometallic compounds. EAN rule, preparation, properties, and applications of alkyls aryls of lithium and aluminium, bonding in metal-ethylenic complexes, Mechanism of homogeneous hydrogenation reactions.

**Books Suggested:**

1. Cotton, F.A., Wilkinson, G., Gaus, P.L., Basic Inorganic Chemistry; 3rd edition, Pubs: John Wiley Sons. 1995.
2. Lee, J.D., Concise Inorganic Chemistry; 4th edition, Pubs: Chapman Hall Ltd., 1991.
3. Shriver, D.E., Alkins, P.W., Langford, C.H., Inorganic Chemistry; 4th edition, Oxford Publisher: Oxford University Press, 2006.
4. Porterfield, W.W., Wesley, A., Inorganic Chemistry; Pubs: Addison-Wesley Publishing Company, 1984.
5. Miessler, G.L., Larr, D.A., Inorganic Chemistry; 3rd edition, Pubs: Pearson Education Inc., 2004.
6. Puri, B.R., Sharma, L.R., Kalia, K.C., Principles of Inorganic Chemistry; 30th edition, Pubs: Milestones Publisher, 2006-07.

**Bachelor of Science (Medical) (Semester-V)**

**Session: 2020-21**

**CHEMISTRY**

**Course Title: Physical Chemistry-II**

**Course Code: BSMM -5084 (II)**

**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to:

CO1: Get knowledge about various electrochemical phenomena.

CO2: Get the theoretical knowledge of the various spectroscopic methods on the basis of the examples from the science and industry.

CO3: Use spectroscopic equipment such as MS, IR, NMR spectrometers.

CO4: Identify organic compounds by analysis and interpretation of spectral data.

CO5: Explain common terms in NMR spectroscopy such as chemical shift, coupling constant, and anisotropy and describe how they are affected by molecular structure.

CO6: Identify and define various types of nuclear transmutation including fission, fusion and decay reactions.

CO7: Define binding energy and mass defect and be able to calculate each for a given nucleus.

CO8: Understand and explain the concept of ionizing radiation and distinguish between the three different types of radiation.

CO9: Understand the concept of rate of change and half-life in the context of nuclear decay.

CO10: Understand the basics of nuclear chemistry applications.

CO11: identify an oxidation – reduction (redox) reaction based on changes in oxidation numbers across the chemical change.

CO12: Recognize degrees of reactivity based on an activity series table or a standard reduction potential table.

CO13: Describe fully the relationship between the free energy and the cell potential.

CO14: Explain thermodynamically the operation of a concentration cell and be able to predict the concentration in the cell based on the cell potential.

**Bachelor of Science (Medical) (Semester-V)**  
**Session: 2020-21**  
**CHEMISTRY**  
**Course Title: Physical Chemistry-II**  
**Course Code: BSMM -5084 (II)**  
**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 30**

**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**

**1. Electrochemistry-I**

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

**Unit-II**

**2. Electrochemistry – II**

Types of reversible electrodes-gas metal ion, metal ion, metal insoluble salt-anion and redox electrodes. Electrode reactions. Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells - reversible and irreversible cells, conventional representation of electrochemical cells.

EMF of a cell and its measurements. Computation of cell. EMF, Calculation of thermodynamic quantities of cell reactions ( $\Delta G$ ,  $\Delta H$  and  $K$ ), polarization, over potential and hydrogen overvoltage. Concentration cells with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient, potentiometric titrations. Definition of pH and  $pK_a$ , determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods. Buffers-mechanism of buffer action, Henderson-Hassel equation, Hydrolysis of salts. Corrosion-types, theories and methods of combating it.

**Unit-III**

**3. Nuclear Chemistry**

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

**Unit-IV**

#### **4. Spectroscopy**

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

#### **5. Rotational Spectrum**

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

#### **6. Vibrational Spectrum**

Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

#### **7. Electronic Spectrum**

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

#### **Books Suggested: -**

1. Atkins, P., Paula, J.de, Atkins Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; 43rd edition, Pubs: Vishal Publishing Co., 2008.
3. Barrow, G.M., Physical Chemistry; 6th edition, Pubs: McGraw Hill Companies Inc, 1996.
4. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.
5. Albert, R.A., Silbey, R.J., Physical Chemistry; 1st edition, Pubs: John Wiley & Sons Inc., 1992.
6. Levine, I.N., Physical Chemistry; 5th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd, 2002.

**Bachelor of Science (Medical) (Semester–V)**

**Session: 2020-21**

**CHEMISTRY**

**Course Title: Chemistry Practical**

**Course Code: BSMM -5084 (P)**

**(PRACTICAL)**

**COURSE OUTCOMES:**

Students will be able to

CO1: Synthesize and analyse the coordination compounds

CO2: Determine the end point of various conductometric titrations

CO3: Know the principle and working of Abbe's Refractometer

CO4: Determine the composition of unknown mixture of two liquids by refractive index measurements.

CO5: Learn the technique of Rast's methods

CO6: Learn phenomenon of adsorption of acetic acid and oxalic acid on charcoal

CO7: Learn distribution coefficient of iodine between  $\text{CCl}_4$  and water



**Bachelor of Science (Medical) (Semester-V)**

**Session: 2020-21**

**CHEMISTRY**

**Course Title: Chemistry Practical**

**Course Code: BSMM -5084 (P)**

**(PRACTICAL)**

**Duration: 3½ Hrs.**

**Max. Marks: 20**

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

**(I) Synthesis and Analysis**

- (a) Preparation of Sodium trioxalatoferrate (III)
- (b) Preparation of Ni-DMG Complete
- (c) Preparation of Copper tetrammine complex
- (d) Preparation of cis-bisoxalatodiaquachromate (III) ion

**(II) Physical Chemistry**

**(a) Conductometric Titrations**

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

Strong acid-Strong base

Strong acid-Weak base

Weak acid-Strong base

Weak acid-Weak base

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

**(b)** (i) Molecular Weight Determination of acetanilide, naphthalene, using camphor as solvent

**(Rast's methods).**

- (ii) To determine the molecular weight of a polymer by viscosity measurements.

**(c) Adsorption**

- (i) To study the adsorption of acetic acid oxalic/acid from aqueous solutions by charcoal.

**(d) Phase Equilibria**

- (i) To determine the distribution coefficient of iodine between CCl<sub>4</sub> and water.

**(e) Refractometry**

- (i) Determination of refractive index of a liquid by Abbe refractometer, and hence the specific and molar refraction.
- (ii) To determine the composition of unknown mixture of two liquids by refractive index measurements.

**Practical Examination**

- 1) Inorganic Synthesis 07
- 2) Physical experiment 08
- 3) Viva- Voce 03
- 4) Note Book 02

**Books Suggested: -**

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

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**Bachelor of Science (Medical) (Semester-V)**

**Session 2020-21**

**BOTANY**

**Course Title: Plant Physiology**

**Course Code: BSMM-5075 (I)**  
**(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 process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways.

CO3. Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.

CO4. Learn about the movement of sap and absorption of water in plant body

**Bachelor of Science (Medical) (Semester-V)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: Plant Physiology**  
**Course Code: BSMM-5075 (I)**  
**(THEORY)**

**Examination Time: 3Hrs**

**Max. Marks: 30**

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

**Unit-I**

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

**Unit-II**

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

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

**Unit-III**

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

**Unit-IV**

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

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

**Suggested Readings:-**

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

9. Taiz, L. and Zeiger, E. (2010). Plant Physiology (5th Edition).Sinauer Associates Inc. USA.

**Session 2020-21**  
**BOTANY**  
**Course Title: Biochemistry & Biotechnology**  
**Course Code: BSMM-5075 (II)**  
**(Theory)**

**COURSE OUTCOMES: -**

After passing this course the student will be able to:

- CO1. Understand the properties of Monosaccharide, Oligosaccharides and Polysaccharides.
- CO2. Understand the Properties of saturated and unsaturated fatty acids.
- CO3. Understand lipid metabolism and its significance in plants.
- CO4. Understand structure and classification and protein biosynthesis in prokaryotes and eukaryotes. They will learn about the nucleic acid metabolism.
- CO5. Understand the fundamentals of Recombinant DNA Technology. Know about the Genetic Engineering. Understand the principle and basic protocols for Plant Tissue Culture.

**Bachelor of Science (Medical) (Semester-V)**  
**Session 2020-21**  
**BOTANY**  
**Course Title: Biochemistry & Biotechnology**  
**Course Code: BSMM-5075 (II)**  
**(Theory)**

**Examination Time: 3Hrs**

**Max. Marks: 30**

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

**Unit-I**

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

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

**Unit-II**

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

**Unit-III**

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

**Unit-IV**

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

**Suggested Readings:-**

1. Bhojwani, S.S. (1996). Plant Tissue Culture: Applications and Limitations. Elsevier Science Publishers, New York, USA.
2. Dennis, D.T., Turpin, D.H. Lefebvre, D.D. and Layzell (eds.) (1997). Plant Metabolism (2<sup>nd</sup> Edition). Longman, Essex, England.
3. Galston, A.W. (1994). Life Processes in Plants. Scientific American Library, Springer-Verlag, New York, USA.
4. Glick, B.R., Pasternak, J.J. (2010). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
5. Lea, P.J. and Leegood, R.C. (1999). Plant Biochemistry and Molecular Biology. John Wiley Sons, Chelichester, England.
6. Old, R.W. and Primrose, S.B. (2006). Principles of Gene Manipulation, Blackwell Scientific Publishers, Oxford, UK.
7. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics (5th Edition). John Wiley and Sons Inc., U.S.A.
8. Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques And Applications. John Wiley & Sons Inc. U.S.A.
9. Vasil, I.K. and Thorpe, T.A. (2012). Plant Cell and Tissue Culture. Kluwer Academic Publishers, The Netherlands

**Bachelor of Science (Medical) (Semester-V)**

**Session 2020-21**

**BOTANY**

**Course Title: PRACTICAL- Related to Plant physiology, Biochemistry & Biotechnology**

**Course Code: BSMM-5075 (P)**

**COURSE OUTCOMES: -**

After passing this course the student will be able:

CO 1: determine the osmotic potential of cell sap by plasmolytic method.

CO2: determine the Diffusion Pressure Deficit (DPD) of plant cells.

CO3: determine the effect of time period on the rate of imbibition in different types of seeds.

CO4: determine the relation between absorption and transpiration.



**Bachelor of Science (Medical) (Semester-V)**

**Session 2020-21**

**BOTANY**

**Course Title: PRACTICAL- Related to Plant physiology, Biochemistry & Biotechnology**

**Course Code: BSMM-5075 (P)**

**TIME: 3 Hours**

**Practical: 20**

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

**Suggested Laboratory Exercises**

1. To study the permeability of plasma membrane using different concentrations of organic solvents.
2. To study the effects of temperature on permeability of plasma membrane.
3. To prepare the standard curve of protein and determine the protein content in unknown samples.
4. To study the enzyme activity of catalase and peroxidase as influenced by pH and temperature.
5. Separation of chloroplast pigments by solvent method.
6. Determining the osmotic potential of vacuolar sap by plasmolytic method.
7. Determining the water potential of any tuber.
8. Separation of amino acids in a mixture by paper chromatography and their identification by comparison with standards.
9. Bioassay of auxin, cytokinin, GA, ABA and ethylene using appropriate plant material.
10. Demonstration of the technique of micropropagation by using different explants, e.g. axillary buds, shoot meristems.
11. Demonstration of the technique of another pollen culture.
12. Demonstrate the ascent of sap using a dye.
13. Demonstration of root and shoot formation from the apical and basal portion of stem segments in liquid medium containing different hormones.
14. Demonstrate the transpiration pull by mercury method.
15. Demonstration of osmosis by potato osmoscope.
16. Comparison of loss of water from two surfaces of leaf by  $\text{CoCl}_2$  method/four leaf method.
17. Demonstration of imbibition by plaster of Paris method.
18. Demonstration that  $\text{O}_2$  is evolved during photosynthesis.
19. Separation of pigments by paper chromatography/TLC method.
20. Demonstration of phototropism movements.
21. Demonstration the measurements of growth by arc auxanometer.
22. Requirements for setting up the tissue culture laboratory.
23. Preparation of nutrient medium.
24. Sterilization of glassware and plant material.
25. Preparation of explant for aseptic manipulation.

### **Suggested Readings (For Laboratory Exercises)**

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

**Bachelor of Science (Medical) (Semester–V)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: Food Analysis**  
**Course Code: BSMM- 5255**  
**(THEORY)**

**COURSE OUTCOMES:** After passing this course the student will be able to:

**CO1:** Understand the nutritional importance of food.

**CO2:** Understand the chemical and biochemical composition of foods and their importance for health, well being and safety of consumers

**CO3:** Understand physical characteristics of foods with special reference to rheological behavior and textural characteristics.

**CO4:** Understand the basics of chromatography techniques to separate and identify various biological molecules with special reference to amino acids, carbohydrates, lipids, nucleic acid, and proteins.

**CO5:** Understand the importance of legal standard, quality assurance, nutritional value determination and adulterants detection.

**Bachelor of Science (Medical) (Semester–V)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: Food Analysis**  
**Course Code: BSMM- 5255**  
**(THEORY)**

**Examination Time: 3 Hours**

**Max. Marks: 100**  
**Theory: 60**  
**Practical: 20**  
**CA: 20**

**Instructions for the Paper Setter:** Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT: I**

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

**UNIT: II**

3. Analysis of Micro nutrients and minerals.

**UNIT: III**

4. General physical methods of analysis of foods: Refractrometry, polarimetry and polarography.
5. Introduction and principles of Food rheology, types of viscosity, equipments used to check the viscosity.

**UNIT: IV**

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

**Reference Books:**

1. Manuals of Food Quality Control additions contaminants techniques, 1980.
2. The Chemical Analysis of Food and Food Products by Morris B Jacob, 3rd Edition., Roberte, Krieger. **(Online available)**
3. Food Analysis, 2019, 5<sup>th</sup> Edition, S. Suzanne Nielsen. **(Online available)**
4. Analysis and Quality Control for Fruit and Vegetable Products, S Ranganna, McGraw Hill Education (India) Private Limited, Chennai, India.

**Bachelor of Science (Medical) (Semester–V)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: Practical- Food Analysis**  
**Course Code: BSMM- 5255**  
**(PRACTICAL)**

**Time: 3 hours**

**Max. Marks: 20**

**Instructions for the practical examiner:** Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same may be submitted for the record to COE Office, KanyaMahaVidyalaya, Jalandhar.

**List of Practicals:**

1. Lactometric determination
2. Refractrometry
3. Polarimetry and polarography
4. Food Rheology
5. Proximate composition of food.
6. Estimation of different minerals in food.
7. Estimation of vitamins in food.

**Bachelor of Science (Medical) (Semester-V)**  
**Session 2020-21**  
**BIOINFORMATICS (VOCATIONAL)**  
**Course Title: Computational Methods for Sequence Analysis**  
**Course Code: BSMM- 5046**  
**(Theory)**

**Time: 3 Hrs.**

**Max. Marks: 100**

**Theory: 60**

**Practical: 20**

**CA: 20**

**Instructions for the Paper Setters and Candidates: -**

Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

**Sequence Alignment:** Local and Global alignment concepts, dynamic programming methodology (Needleman and Wunsch algorithm, Smith Waterman algorithm),

Statistics of alignment score, Database searches for homologous sequences (Fast and Blast versions), Multiple Sequence alignment (Progressive alignment).

**UNIT-II**

**Genome mapping, assembly and comparison:** Introduction to Genome mapping, Genome sequencing, Genome sequence assembly, Genome Annotation,

**Gene finding methods:** Concept and signal methods, Background of transform techniques, Fourier Transform and Gene Prediction, Pattern and Motif searching, Analysis and prediction of regulatory regions.

**UNIT-III**

**Profiles and Hidden Markov Models:** Position specific scoring matrices, Profiles, Markov Model (Random walk), Hidden Markov Model, Neural Network concepts and secondary structure prediction, Applications of Hidden Markov model.

**UNIT-IV**

**Evolutionary analysis:** Basics of evolution: Rooted and unrooted trees, molecular clock theory, molecular markers used in studying evolution. Multiple Substitution and statistical model. Distance based methods and Clustering Methods of evolution, Optimally Based Methods, Bootstrapping strategies.

**List of Books:**

1. Jin Xiong . Essential Bioinformatics. Cambridge University Press (2006).
2. Arthur M. Lusk . Introduction to Bioinformatics . Oxford University Press (2014).
3. P. Shanmughavel . Principles of Bioinformatics. Pointer Publishers Jaipur (2005).

4. Vidya Kothekar and TannisthaMandi .An introduction to Bioinformatics.Duckworth Press (2007)
- 5.Dan E.Krane,Michael L. Rayner.Fundamentals Of Bioinformatics.Pearson Education Inc (2003).
6. Irfan Ali Khan,AtiyaKhanun. Essential Bioinformatics.Ukaaz Publication, Hyderabad.(2003).
7. ATTWOOD T K. Introduction to Bioinformatics. Pearson India Publishers (2007).

**Bachelor of Science (Medical) (Semester–V)**  
**Session 2020-21**  
**BIOINFORMATICS (VOCATIONAL)**  
**Course Title: Lab in Computational Methods for Sequence Analysis**  
**Course Code: BSMM- 5046**  
**(Practical)**

**Time: 3 Hrs.**

**Marks: 20**

- To Study and perform Homologous Sequence alignment Searches by FastA.
- To Study and perform Blast and its types: Blastn, Blastp, tBlastn, Blastx, tBlastx.
- To study multiple sequence alignment using Clustal-W, Clustal Omega.
- To study multiple sequence alignment using T-COFFEE
- To study gene prediction in Eukaryotes and Prokaryotes using Gene ID, GLIMMER, GenMark.
- To study the ORF FINDER.
- Evolutionary analysis using Phylip.



# **SEMESTER-VI**

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**Course Title: PUNJABI (COMPULSORY)**

**Course Code- BSML-6421**

**COURSE OUTCOMES:**

**CO1:** u'DthnK gzikph ejkDhnK Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo ejkDhnKgqshfdbu;gh, ;{M Bz{ g?dk eoBk j?.

**CO2:** Bktb J/j[ jwkok ihtDk (dbhg e"o fNtkDk)Bz{ f;b/p; ftu PkfwB eo e/ ftfdnkoEhnK nzdo BktbgVQD dh o[uh Bz{ g?dk eoBk j? ns/ fJ; ;kfjs o{g Bkb Bkb i'VDk j?.

**CO3:** g?oQk ouBk eoB Bkb ftfdnkoEh nkgDh rZb B{z efjD dh iku f;ZyDr/ ns/ fJj fdwkrh e;os ftu ;jkJh j't/rh.

**CO4:** ;ob nzro/lh g?oQ/ dk gzikph ftu nB[tkd dk wB'oE ftfdnkoEhnK dh p[ZXh B{z shyD eofdnK T[BK dh fbyD gqfsGk B{z T[iKro eoBk j?.

**CO5:** gzikph X[Bh ftTaa[As, tkekswe i[rsK L w/b s/ nfXeko,ekoe s/ ekoeh ;zpZX Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo GkPk dh nwhoh ns/ pkohehnK Bz{ ;wMD bJh tZyo/ - tZyo/ f;XKsK dk ftek; eoBk j?.

**Session 2020-21**  
**Course Title: PUNJABI (COMPULSORY)**  
**Course Code- BSML-6421**

**;wK L 3 xzN/**

**Maximum Marks: 50**

**Theory: 40**

**CA: 10**

**gkm eqw ns/ gkm g[;seK**

**:{fBN-I**

ekft r"ot (gfjb/ S/ eth)(;zgkH fpeow f;zx x[zwd, eowihs e"o),r{o{ BkBe d/t :{Bhtof;Nh, nfwqs;o, (P/y |ohd, Pkj j[;?B, r{o{ BkBe d/t  
ih, r{o{ noiB d/t ih,tkfo; Pkj, Pkj w[jzwd)  
(gq;ZR ;fjs ftnkfynk\$ft;ak t;s{\$;ko)

**8 nze**

**:{fBN-II**

XoshnK d/ rhs (;|oBkwk), pofizdo f;zx jwdod,BkBe f;zx g[;sewkbk, nzfwqs;o (;wki ;fGnkuko gfog/y\$;coBkw/ d/ s"o s/ goy)  
**8 nze**

**:{fBN-III**

(T) b/y ouBk (ftfrnkB, seBkb'ih ns/ ubzs w;fbnK ;pzXh)  
(n) ;zy/g ouBk

**8 nze**

**:{fBN-IV**

ftnkeoD L  
(T) ftnkeoBe ;aq/DhnK L fbzr, tuB,ekoe  
(n) fefonk tkezP L gfoGkPk, pDso s/ gqeko

**8 nze**

**nze tzv ns/ gohfyne bJh jdkfJsk**

1H gqPB gZso d/ uko ;?ePB j'Dr/.;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.

2H ftfdnkoEh B/ e[b gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzik gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ 08 nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nr'A tZX s'A tZX uko T[g gqPBK

ftu eo ;edk j?.

## **IN LIEU OF PUNJABI (COMPULSORY)**

**Course Code- BSML-6031**

### **COURSE OUTCOMES:**

**CO1:** 'kfjs d/ ozr' g[[[;se d/ tkose Gkr Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo tkose gqsh fdbu;gh, ;{M Bz{ g?dk eoBk j?.

**CO2:** fj; dk j'o wB'oE GkPD ebk s/ fbyD ebk dh fBg[zBsk g?dk eoBk j?.

**CO3:** 'kfjs d/ ozr' g[[[;se d/ o/yk fuZso Gkr B{z f;b/p; ftu PkfwB eo e/ ftfdnkoEhnK nzdo o/yk fuZso Bz{ gVQD dh o[uh Bz{ g?dk eoBk j? s/ fJJBK wjkB P\;hnsK dh ;| bsk fgZS/ xkbhnK xkbDktK s' tke| eotkT[AfdnK ihtB ;/X gqdkB eoBk j?.

**CO4:** nzro/lh s'A gzikph ftu nB[tkd wB'oE fbyD ebk dh fBg[zBsk g?dk eoBk j?.

**CO5:** GkPk ns/ T[gGkPk dh gfoGkPk s/ gzikph dh nK T[gGkPktK Bz{ gVQkT[D dk wB'oE ftfdnkoEhnK nzdo GkPk ns/ T[gGkPk gqsh fdbu;gh, ;{M Bz{ g?dk eoBk j?.

**IN LIEU OF PUNJABI (COMPULSORY)**

**Course Code- BSML-6031**

**;wK L 3 xzN/**

**Maximum Marks: 50**

**Theory: 40**

**CA: 10**

**gkm eqw**

**:{fBN-I**

;kfjs d/ ozr (;zgkHvk wfjb f;zx),Gkr d{ik (tkose ),oth ;kfjs gqekPB,nzfwqs;o.  
(rzkrdhB,wK,GkJh wodkBk ih b/y gkmeqw dk fjZ;k jB)  
(;ko)

**08 nze**

**:{fBN-II**

;kfjs d/ ozr (;zgkHvk wfjb f;zx), Gkr d{ik (o/yk fuZso),oth ;kfjs gqekPB,nzfwqs;o.  
(vkHrzvk f;zx ,fBZeh ejkDh dk pkdPkj,fwbyk f;zx o/yk fuZsogkmeqw dk fjZ;k jB)  
(;ko)

**08 nze**

**:{fBN-III**

nzro/lh s'A gzikph ftu nB[tkd

(T) g?o/Q ftu nB[tkd  
(n) tkeK ftu nB[tkd

**08 nze**

**:{fBN-IV**

(T) GkPk dh gfoGkPk s/ ftP/PsktK

(n) T[gGkPkL gfoGkPk s/ gzikph dhNk T[gGkPkK

**08 nze**

**nze tzv ns/ gohfyne bJh jdkfJsK**

1H gqPB gZso d/ uko ;?ePB j'Dr/.;?ePB A-D sZe d/ gqPB :{fBN I-IV ftu'A g[ZS/ ikDr/. jo ;?ePB ftu d' gqPB g[ZS/ ikDr/.

2H ftfdnkoEh B/ e[Zb gzi gqPB eoB/ jB. jo ;?ePB ftu'A fJe gqPB bklwh j?. gzikT gqPB fe;/ th ;?ePB ftu'A ehsk ik ;edk j?.

3H jo/e gqPB d/ 08 nze jB.

4H g/go ;?ZN eoB tkbk i/eo ukj/ sK gqPBK dh tzv nZr'A tZX s'A tZX uko T[g gqPBK ftu eo ;edk j?.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**Course Title: PUNJAB HISTORY AND CULTURE (1947-2000 A.D.)**

**(Special paper in lieu of Punjabi Compulsory)**

**(For those students who are not domicile of Punjab)**

**Course Code- BSML-6431**

**COURSE OUTCOMES:-**

**After completing this paper the students will be able to**

**CO 1:-**comprehend Punjab's contribution in the freedom struggle, the exodus and Rehabilitation

**CO 2:-** understand the history of Punjab from independence with special reference to partition and the formation of New Punjab in 1966

**CO 3:-** understand the objectives, planning and outcomes of Green Revolution in the Punjab

**CO 4:-** criticallyanalyze thegrowth of education, Punjabi literature and Drama in the Punjab after Independence

**CO 5:-**the drug abuse problem, management and prevention in the Punjab

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**Course Title: PUNJAB HISTORY AND CULTURE (1947-2000 A.D.)  
(Special paper in lieu of Punjabi Compulsory)**

**(For those students who are not domicile of Punjab)**  
**Course Code- BSML-6431**

**Examination 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 5<sup>th</sup> question may be attempted from any of the four Units.**
- 4. Each question will carry 8 marks**

**UNIT I**

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

**UNIT II**

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

**UNIT III**

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

**UNIT IV**

7. Development of Punjabi Literature and Drama.
8. Emerging Concerns: Drug Addiction and Female Foeticide

**Suggested Readings**

1. Chopra, P.N. & Das, M.N. (1974), *A Social, Cultural & Economic History of India*. Vol.III, Macmillan India, New Delhi, 1974.

2. Grewal, J.S., *Social and Cultural History of Punjab: Prehistoric, Ancient and Early Medieval*. Foundation Books Pvt Ltd Cambridge House, New Delhi, 2004.
3. Grewal, J.S., *The Sikhs of Punjab*. New Cambridge House, New Delhi, 2005
4. Rai Satya M. , *Heroic Tradition in Punjab(1900-1947)*. Publication Bureau, Punjabi University, Patiala, 1978.
5. Singh, Fauja., *Freedom Struggle in Punjab*. Publication Bureau, Punjabi University, Patiala, 1974.
6. Singh, Fauja, *History and Culture of the Punjab*. Part II, Publication Bureau, Punjabi University, Patiala, 1987.
7. Singh, Kushwant, *A History of the Sikhs*. Vol. II (1839-1998), Oxford University Press, Delhi, 1991.
8. Yadav, K.C., *Haryana Aitihasik Simhavalokan* (Hindi). Haryana Sahitya Akademy, Chandigarh, 1991.



**Course Title: ENGLISH (COMPULSORY)**  
**Course Code- BSML-6212**

**COURSE OUTCOMES:**

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

**CO 1:** Analyze and appreciate the dramatic technique, plot development and art of characterisation in the prescribed plays

**CO 2:** Comprehend, appreciate and critically analyse the novel *Train to Pakistan* by Khushwant Singh

**CO 3:** Enhance their reading and analysing power of texts through guided reading

**CO 4:** Develop skills for report writing and to write an essay on a given topic

**Course Title: ENGLISH (COMPULSORY)**  
**Course Code- BSML-6212**

**Examination Time: 3 Hrs**

**Max. Marks: 50**

**Theory: 40**

**CA: 10**

**Instructions for the Examiner:**

**Section A:** Three questions from the novel *Train to Pakistan* from Unit I and three questions from *Glimpses of Theatre* from Unit II requiring very short answers will be set. The students would be required to answer any five, each carrying 2 marks (50 words each). **(5x2=10)**

**Section B:** Four questions requiring brief descriptive answers based on character, plot and theme(s) in the novel *Train to Pakistan* from Unit I will be set and students would be required to attempt any two, each carrying 5 marks (250 words each). **(2x5=10)**

**Section C:** Four questions based on the central idea, theme, tone or style etc. of the prescribed plays from the textbook, *Glimpses of Theatre* from Unit II will be set for the students to attempt any two, each carrying 5 marks (250 words each). **(2x5=10)**

**Section D:** Two questions with internal choice will be set based on (a) Essay Writing, carrying six marks (word limit 300 words) (b) Report Writing, carrying four marks (word limit 200 words). **(1x6+1x4=10)**

**UNIT I**

*Train to Pakistan* by Khushwant Singh

**UNIT II**

*Glimpses of Theatre*

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

**UNIT III**

Essay Writing and Report Writing

**Texts Prescribed:**

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

**Course Code- BSMM-6483 (I)**  
**(THEORY)**

**COURSE OUTCOMES:**

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

- **CO-1.** To study and understand the scope and branches of Medical Zoology.
- **CO-2.** To aware the students for various parasites and diseases which spreads in human with the help of study of host-parasite relationship.
- **CO-3.** To increase awareness for the health in students.
- **CO-4.** Understand the various disease-causing vectors like Mosquitoes
- **CO-5.** To aware about the typhoid, cholera likes disease.
- **CO-6.** Provides basics knowledge about immune system and allows the student to create insight as how to improve their immune system and good health.
- **CO-7.** Types of immunity, antigens-antibodies and their properties
- **CO-8.** Complement system, MHC's and immune response.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: MEDICAL ZOOLOGY**  
**Course Code- BSMM-6483 (I)**  
**(THEORY)**

**Max. Time: 3 Hrs.**

**Max. Marks: 30**

**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**

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

**UNIT-II**

4. Life cycle and control measures of arthropod vectors of human disease: Malaria (*Anopheles stephensi*, *A. culicifacies*), Yellow fever, Dengue, Dengue haemorrhagic fever and Chikungunya. (*Aedes aegypti*, *A. albopictus*); Filariasis (*Culex pipiens fatigans*) *Mansonia* sp. Japanese Encephalitis (*C. tritaeniorhynchus*); Plague (*Yersinia pestis*) and Epidemic Typhus (*Pediculus spp.*).
5. Epidemic diseases, such as Typhoid, Cholera, Small pox; their occurrence and eradication programs.

**UNIT-III**

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

**UNIT-IV**

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

**Suggested Readings:**

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

**BACHELOR OF SCIENCE (Medical) (Semester VI)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: MEDICAL LABORATORY TECHNOLOGY**  
**Course Code- BSMM-6483 (II)**  
**(THEORY)**

**COURSE OUTCOMES:**

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

- **CO-1.** Apply knowledge and **technical** skills associated with **medical lab technology**.
- **CO-2.** Perform routine **clinical laboratory** procedures within acceptable quality control parameters in haematology, chemistry, immunohematology, and microbiology.
- **CO-3.** Perform basic laboratory techniques on biological specimens.
- **CO-4** Comply with safety regulations and universal precaution.
- **CO-5.** Apply basic scientific principles in learning new techniques and procedures.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: MEDICAL LABORATORY TECHNOLOGY**  
**Course Code- BSMM-6483 (II)**  
**(THEORY)**

**Max. Time: 3 Hrs.**

**Max. Marks: 30**

**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**

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

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

**UNIT-II**

Collection, transportation and preservation of different clinical samples.

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

**UNIT-III**

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

**UNIT-IV**

Histopathology: Common fixatives and staining techniques.

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

**Suggested Readings:**

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



**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**ZOOLOGY**

**Course Title: PRACTICAL-VI- MEDICAL ZOOLOGY AND MEDICAL LABORATORY TECHNOLOGY**

**Course Code- BSMM-6483 (P)**

**(PRACTICAL)**

**COURSE OUTCOMES:**

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

**CO2:** Perform basic clinical laboratory procedures using appropriate laboratory techniques and instrumentation in accordance with current laboratory safety protocol

**CO3:** Recognize the role of medical laboratory technology in the context of providing quality patient health care.

**CO4:** Understanding of sterilization techniques

**CO5:** Students will learn about various histotechniques, handling and processing of tissue specimens as well as staining procedures.

**CO6:** Understanding of estimation of protein & sugar

**BACHELOR OF SCIENCE (Medical) (Semester VI)**  
**Session 2020-21**  
**ZOOLOGY**  
**Course Title: PRACTICAL-VI-MEDICAL ZOOLOGY AND MEDICAL LABORATORY**  
**TECHNOLOGY**  
**Course Code- BSMM-6483 (P)**  
**(PRACTICAL)**

**Time: 3 hrs.**

**Max.Marks20**

**Instructions for the Practical Examiners:**

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

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

**Guidelines for conduct of Practical Examination:**

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

**BACHELOR OF SCIENCE (Medical) (Semester VI)**  
**Session 2020-21**  
**MICROBIOLOGY**  
**Course Title: APPLIED MICROBIOLOGY-II**  
**Course Code- BSMM-6343 (T)**  
**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

**CO1:** Understand the processing and microbiology of different fermented foods.

**CO2:** Understand the role of yeast in fermentation process and the production of different industrial chemicals.

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

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

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**MICROBIOLOGY**

**Course Title: APPLIED MICROBIOLOGY-II**

**Course Code- BSMM-6343 (T)**

**(THEORY)**

**Time: 3 Hrs.**

**Max Marks:100**

**Theory Marks: 60**

**Practical Marks: 20**

**CA: 20**

**Instructions for the Paper Setters:**

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

**UNIT-I**

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

**UNIT-II**

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

**UNIT-III**

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

**UNIT-IV**

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

**Books Recommended:**

1. Read, G. 1982. Prescott and Dunn, *Industrial Microbiology*. CBS Publishers & Distributors, New Delhi.
2. Casida, L.E. 1991. *Industrial Microbiology*. Wiley Eastern Ltd., New Delhi.
3. Patel, A.H. 1984. *Industrial Microbiology*. Macmillan India Ltd., Delhi.
4. Trevan, M.D. Saffey, S., Goulding, K.H. and Stanberry, P. 1988. *Biotechnology: The Biological Principles*, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
5. Wiseman, A. 1995. *Handbook of Enzyme Biotechnology*. Ellis Harwood Ltd., London.
6. Wood, J.B.B., 1998. *Microbiology of Fermented Foods*, Volumes 1 and 2, Blackie Academic and Professional, London.
7. Power C.B. and Dagniwala, H.F.1992. *General Microbiology*. Volume-2. Himalaya Publishing House, New Delhi.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**  
**Session 2020-21**  
**MICROBIOLOGY**  
**Course Title: APPLIED MICROBIOLOGY-II**  
**Course Code- BSMM-6343 (P)**  
**(PRACTICAL)**

**Time: 3 hrs**

**Marks: 20**

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

**LIST OF PRACTICALS:**

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

**BACHELOR OF SCIENCE (Medical) (Semester VI)**  
**Session 2020-21**  
**CHEMISTRY**  
**Course Title: ORGANIC CHEMISTRY-(I)**  
**Course Code- BSMM-6084**  
**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to

**CO1:** learn about the Principle and applications of ultraviolet and Woodward Fisher Rule

**CO2:** understand the infra-red spectroscopy in organic structure determination

**CO3:** know about the Nuclear magnetic resonance spectroscopy, proton chemical shift, spin-spin coupling, coupling constants and applications to organic structures

**CO4:** learn about the different mechanisms involved in the polymer preparation

**CO5:** learn about the different polymerization techniques

**CO6:** Familiarize with structure, classification and the biological functioning of carbohydrates, amino acids and nucleic acids.

**CO7:** understand the types and reactions given by organosulphur compounds

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**CHEMISTRY**

**Course Title: ORGANIC CHEMISTRY-(I)**

**Course Code- BSMM-6084**

**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 30**

**Note: Instructions for the Paper Setter**

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**

**1. Spectroscopy  
(5Hrs)**

Nuclear Magnetic Resonance (NMR) spectroscopy, Proton Magnetic Resonance ( $^1\text{H}$  NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene and acetophenone.

**2. Electromagnetic Spectrum: Absorption Spectroscopy (5Hrs)**

Ultraviolet (U.V.) absorption spectroscopy introduction- (Beer-Lambert law), molar absorptivity, analysis of UV spectra, types of electronic transitions effect of conjugation. Concept of chromophores and auxochrome, Bathochrome, hypsochrome, hyperchrome, hypochromic shifts-UV spectra of conjugated compounds

**UNIT-II**

**Electromagnetic Spectrum: Absorption Spectroscopy (3 Hrs)**

Infrared (IR) Absorption spectroscopy-introduction, Hooke's law, Selection rules, intensity and IR bands, measurement of IR spectrum time characteristic absorption of various fundamental band interpretation of IR spectra of simple organic compounds.

**3. Problems based on spectroscopy (4 Hrs)**

Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques.

**4. Organosulphur Compounds (3 Hrs)**

Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine.

**UNIT-III**

**5. Synthetic Polymers (6 Hrs)**

Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.

#### **6. Organic Synthesis *via* Enolates**

**(6 Hrs)**

Acidity of  $\alpha$ -hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation of 1,3-dithianes. Alkylation and acylation of enamines.

### **UNIT-IV**

#### **7. Carbohydrates**

**(7 Hrs)**

Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threodiastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters. Determination of ring size of monosaccharides. Cyclic structure of D(+)-glucose. Mechanism of mutarotation.

##### **Structures of ribose and deoxyribose**

An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

#### **8. Amino Acids, Peptides, Proteins and Nucleic Acids**

**(6 Hrs)**

Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reactions of  $\alpha$ -amino acids. Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid-phase peptide synthesis. Structures of peptides and proteins. Levels of protein structure. Protein denaturation/renaturation. Nucleic acids : Introduction. Constituents of nucleic acids. Ribonucleosides and ribonucleotides. The double helical structure of DNA.

##### **Books Suggested :**

1. Spectrometric Identification of Organic Compounds by Robert M. Silverstein, Francis X. Webster, David J. Kiemle, David L. Bryce ; Publisher: Wiley, 1981
2. Morrison, R.T., Boyd, R.N., Organic Chemistry; 6th edition, Pubs: Prentice-Hall, 1992.
3. Wade Jr., L.G., Singh, M.S., Organic Chemistry; 6th edition, Pubs: Pearson Education, 2008.
4. Mukherji, S.M., Singh, S.P., Kapoor, R.P., Organic Chemistry; Pubs: New Age International, 1985, Vols. I, II, III.
5. Carey, F.A., Organic Chemistry; 4th edition, Pubs: McGraw-Hill, 2000.
6. Solomons, T.W., Fundamentals of Organic Chemistry; 5th edition, Pubs: John Wiley & Sons, 1997.
7. Streitwieser, A., Clayton, Jr., Heathcock, H., Introduction to Organic Chemistry; 3<sup>rd</sup> edition, Pubs: Macmillan Publishing Company, 1989.



**Session 2020-21**  
**CHEMISTRY**  
**Course Title: PHYSICAL CHEMISTRY-(II)**  
**Course Code- BSMM-6084**  
**(THEORY)**

**COURSE OUTCOMES:**

Students will be able to

**CO1:** understand wave mechanics in three dimensions;

**CO2:** describe the structure of the hydrogen atom and show an understanding of quantisation of angular momentum.

**CO3:** understand and explain the differences between classical and quantum mechanics

**CO4:** understand the idea of wave function

**CO5:** understand the uncertainty relations

**CO6:** solve Schroedinger equation for simple potentials

**CO7:** spot, identify and relate the eigen value problems for energy, momentum, angular momentum and central potentials explain the idea of spin

**CO8:** apply the knowledge about photochemical and photophysical processes

**CO9:** acquire knowledge about the unit cell, space lattice, miller indices, symmetry operations , Bragg equation etc.

**Session 2020-21**  
**CHEMISTRY**  
**Course Title: PHYSICAL CHEMISTRY-(II)**  
**Course Code- BSMM-6084**  
**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 30**

**Note: Instructions for the Paper Setter**

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**

**1. Quantum Mechanics-I** **(12 Hrs)**

Black-body radiation, Planck's radiation law, Photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect. de Broglie hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box, quantization of energy levels, extension to two and three dimensional boxes, degeneracy.

**UNIT-II**

**2. Quantum Mechanics-II** **(12 Hrs)**

Simple harmonic oscillator model of vibrational motion, setting up Schrodinger equation and discussion of solution and wave functions. Rigid rotator model of rotation of diatomic molecules transformation to spherical polar coordinates spherical harmonics and their discussion. Qualitative investigation H-atom, setting up Schrodinger equation, radial and angular part, radial distribution functions of 1s, 2s, 2p, 3s, 3p and 3d.

**UNIT-III**

**3. Solid State** **(10 Hrs)**

Definition of space lattice and unit cell, Law of crystallography- (i) Law of constancy of interfacial angles, (ii) Law of rationality of indices, (iii) Symmetry elements in crystals. X-ray diffraction by crystals. Derivation of Bragg's Law in Reciprocal space. Determination of crystal structure of NaCl, KCl by use of Powder method; Laue's method.

**UNIT-IV**

**4. Photochemistry** **(11Hrs)**

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples).

**Books Suggested :**

1. Atkins, P., Paula, J.de, Atkins, Physical Chemistry; 8th edition, Pubs: Oxford University Press, 2008.
2. Puri, B.R., Sharma, L.R., Pathania, M.S., Principles of Physical Chemistry; 43rd edition, Pubs: Vishal Publishing Co., 2008.
3. Barrow, G.M., Physical Chemistry; 6th edition, Pubs: McGraw Hill Company Inc., 1996.
4. Rao, C.N.R., University General Chemistry; Pubs: Macmillan of India, 1985.
5. Berry, R.S., Rice, S.A., Ross, J., Physical Chemistry; 2nd edition, Pubs: Oxford University Press, 2000.
6. Albert, R.A., Silbey, R.J., Physical Chemistry; I edition, Pubs: John Wiley & Sons Inc., 1992.
7. Dogra, S.K., Dogra, S., Physical Chemistry Through Problems, Pubs: Wiley Eastern Ltd., 1991.
8. Levine, I.N., Physical Chemistry; 5th edition, Pubs : Tata McGraw Hill Publishing Co. Ltd., 2002.
9. Moore, W.J., Basic Physical Chemistry; Pubs : Prentice Hall of India Pvt. Ltd., 1983.
10. Metz, C.R., Theory and Problems of Physical Chemistry; Schaum's outline series, 2nd edition, Pubs: McGraw-Hall Book Company, 1989.
11. Banwell, C.N., McCash, E.M., Fundamentals of Molecular Spectroscopy; 4th edition, Pubs: Tata McGraw Hill Publishing Co. Ltd., 1999.
12. Atkins, P. Friedman, R., Molecular Quantum Mechanics; 4th edition Pubs: Oxford University Press, 2007.
13. Levine, I.N., Quantum Chemistry; 5th edition, Pubs: Prentice Hall International Inc., 2000.
14. Inorganic Chemistry, W.W. Porterfield Addison-Wesley.
15. Inorganic Chemistry, A.G. Sharpe, ELBS.

**CHEMISTRY**  
**Course Title: CHEMISTRY (PRACTICAL)**  
**Course Code- BSMM-6084 (P)**  
**(PRACTICAL)**

**COURSE OUTCOMES:**

Students will be able to

**CO1:** Separate the various mixtures by Column Chromatography technique

**CO2:** Synthesize different Organic Compounds

**CO3:** Synthesise the different compounds by Green Approach

**CO4:** Prepare the different dyes

**Session 2020-21**  
**CHEMISTRY**  
**Course Title: CHEMISTRY (PRACTICAL)**  
**Course Code- BSMM-6084 (P)**  
**(PRACTICAL)**

**Duration: 3½ hrs.**

**Max. Marks: 20**

**Instruction for practical examiner:**

Question paper is to be set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE office, KanyaMahaVidyalaya, Jalandhar.

**(I) Organic Chemistry Laboratory Techniques**

**(a) Column Chromatography**

Separation of o & p nitrophenol

Separation of Leaf pigments from Spinnach leaves

Separation of o & p nitro aniline

Separation of dyes.

**(b) Synthesis of Organic Compounds**

Preparation of p-nitroacetanilide

Preparation of p-bromoacetanilide

Green Chemistry Experiment: Preparation of benzoic acid from Benzyl-using green approach.

Preparation of Methyl Orange, Methyl Red

Preparation of benzoic acid from benzyl-using green approach

**Practical Examination**

1) Column Chromatography= 07

2) Organic Synthesis =16

3) Viva-Voce =04

4) Note Book= 03

**Books suggested:**

1. Experimental Organic Chemistry, Vol. I & II, P.R. Singh, D.S. Gupta and K.S. Bajpai,

Tata McGraw Hill.

2. Laboratory Manual in Organic Chemistry, R.K. Bansal, Wiley Eastern.

3. Vogel's Textbook of Practical Organic Chemistry, B.S. Furniss, A.J. Hannaford, V.

Rogers, P.W.G. Smith and A.R. Tatchell, ELBS.

4. Experiments in General Chemistry, C.N.R. Rao and U.C. Aggarwal, East-West Press.

**Course Code- BSMM-6075 (I)**  
**(THEORY)**

**COURSE OUTCOMES: -**

After passing this course the student will be able to:

**CO1:** Demonstrate practical fieldwork skills.

**CO2:** Demonstrate an understanding of key ecological interactions and processes.

**CO3:** Explain scales and patterns in ecology and biodiversity.

**CO4:** Appreciate the relationships between ecology and society.

**Course Title: ECOLOGY**  
**Course Code- BSMM-6075 (I)**  
**(THEORY)**

**Examination Time: 3Hrs**

**Max. Marks: 30**

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

**UNIT-I**

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

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

**UNIT-II**

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

**UNIT-III**

**Population Ecology:** Growth curves, ecotypes, ecads.

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

**UNIT-IV**

**Biogeographical Regions of India**

**Vegetation types of India:** Forests and grasslands

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

**Suggested Readings**

1. De, Debapriya and De, Debasish (2014). Fundamentals of Environment and Ecology. S. Chand Publishing, New Delhi
2. Kumar, H.D. (2018). Modern Concepts of Ecology 8<sup>th</sup> edition. Vikas Publishing House, New Delhi.
3. Mackenzie, A., Ball, A. and Virdee, S. (2001). Instant Notes in Ecology. Taylor & Francis, London, United Kingdom
4. Odum, E.P. and Barrett, G.W. (2012). Fundamentals of Ecology. Cengage Learning India Pvt.Ltd., New Delhi.
5. Saini, A. (2019). Plant Ecology. Trueman Book Company. New Delhi.
6. Sharma, P.D. (2017). Environmental Biology and Toxicology. 3<sup>rd</sup> edition. Rastogi Publications, Meerut.
7. Srivastava, H. N. (2020). Botany Vol VI, Ecology and Utilization of Plants. Pradeep publications, Jalandhar.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**BOTANY**

**Course Title: ECONOMIC BOTANY**



**Course Code- BSMM-6075 (II)**  
**(THEORY)**

**COURSE OUTCOMES:**

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

**CO1:** Understand core concepts of Economic Botany and relate with environment, populations, communities, and ecosystems.

**CO2:** Develop critical understanding on the evolution of concept of organization of apex new crops/varieties, importance of germplasm diversity, issues related to access and ownership.

**CO3:** Develop a basic knowledge of taxonomic diversity and important families of useful plants.

**CO4:** Increase the awareness and appreciation of plants & plant products encountered in everyday life.

**Course Code- BSMM-6075 (II)**  
**(THEORY)**

**Examination Time: 3Hrs**

**Max. Marks: 30**

**Instructions for the Paper Setters:**

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

**UNIT-I**

**Food Plants:** *Oryza sativa* (Rice), *Triticum aestivum* (Wheat), *Zeamays* (Maize), *Solanumtuberosum* (Potato), *Saccharum officinarum* (Sugarcane).

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

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

**UNIT-II**

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

**UNIT-III**

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

**UNIT-IV**

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

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

**Suggested Readings:**

1. Verma, V. (2016). Textbook of Economic Botany, ANE Books, New Delhi.
2. Das, K. (2014). Medicinal plants- Their importance in Pharmaceutical Sciences, Kalyani Publishers, New Delhi.
3. Kochhar, S.L. (2016). Economic Botany of the Tropics, Macmillan India Pvt. Ltd., New Delhi.
4. Prinintel, D. and Hall, C.W. (Eds.) (2001). Food and Natural Resources. Academic Press, London, New York.
5. Reddy, K. et al. (2015). Advances in Medicinal plants, Universities Press, Hyderabad.
6. Sharma, O.P. (1996). Hill's Economic Botany. Tata McGraw Hill Co. Ltd., New Delhi.
7. Swaminathan, M.S. and Kochhar, S.L. (Eds) (2009). Plants and Society. Macmillan Publications Ltd., London.
8. Council of Scientific & Industrial Research (1986). The Useful Plants of India. Publications and Information Directorate. CSIR, New Delhi.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**BOTANY**

**Course Title: PRACTICAL-VI- ECOLOGY AND ECONOMIC BOTANY**

**Course Code- BSMM-6075 (P)**

**(PRACTICAL)**

**COURSE OUTCOMES:**

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

**CO1:** Determine abundance and frequency of species by quadrat method.

**CO2:** Measure the dissolved oxygen content in polluted and unpolluted water samples.

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

**CO4:** Prepare different stains, solutions and reagents as per theory paper.

**CO5:** Understand the economic importance of plants.

**CO6:** Acquire knowledge in the preparation of herbarium techniques, Submission of field report and practical records.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**BOTANY**

**Course Title: PRACTICAL-VI- ECOLOGY AND ECONOMIC BOTANY**

**Course Code- BSMM-6075 (P)**

## (PRACTICAL)

TIME: 3Hours

Practical: 20

### Instructions for the paper setter:

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

### Suggested Laboratory Exercises

1. To determine minimum number of quadrats required for reliable estimate of biomass in grasslands through species area curves.
2. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkiaer's Standard Frequency Diagram.
3. To estimate Importance Value Index for grassland species on the basis of relative frequency, relative density and relative dominance in protected and grazed grassland.
4. To measure the vegetation cover of grassland through point frame method.
5. To measure the above ground plant biomass in a grassland.
6. To study the morphological anatomical features of hydrophytes (*Hydrilla*, *Eichhornia*)
7. Xerophytes (*Nerium*, *Calotropis*).
8. To determine diversity indices (richness, Simpson, Shannon-Weaver) in grazed and protected grassland.
9. To estimate bulk density and porosity of grassland and woodland soils.
10. To determine moisture content and water holding capacity of grassland and woodland soil.
11. To study the vegetation structure through profile diagram.
12. To estimate transparency, pH and temperature of different water bodies.
13. To measure dissolved oxygen content in polluted and unpolluted water samples.
14. To estimate salinity of different water samples.
15. To determine the percent leaf area injury of different leaf samples collected around polluted sites.
16. To estimate dust-holding capacity of the leaves of different plant species.
17. **Food Plants:** Study of the morphology, structure and simple microchemical tests of the food storing tissues rice, wheat, maize, potato and sugarcane. Microscopic examination of starch in these plants (excepting sugarcane).
18. **Fibers:** Study of cotton flowers, sectioning of the cotton ovules/developing seeds to trace the origin and development of cotton fibers. Microscopic study of cotton and test for cellulose.
19. Sectioning and staining of jute stem to show the location and development of fibers. Microscopic structure. Tests for lignocelluloses.
20. **Vegetable Oils:** Study of hand sections of groundnut, mustard and coconut and staining of oil droplets by Sudan III and Sudan Black.
21. **Field Visits:** To study sources of firewood (10 plants)/timber yielding trees (10 trees)/bamboos, list to be prepared mentioning special features, collection of plant-based articles of common use.
22. **Spices:** Examine black pepper, cloves, cinnamon (hand sections) and opened of cardamom and describe them briefly.
23. Preparations of an illustrated inventory of 10 medicinal plants used in indigenous systems of medicine or allopathy: Write their botanical and common names parts used and diseases/disorders for which they are prescribed.
24. **Beverages:** Section boiled coffee beans and tea leaves to study the characteristic structural features.
25. Visit to *in situ* conservation site/Botanical Garden.

### Suggested Readings (for laboratory exercises)

1. Council of Scientific & Industrial Research. (1986). The Useful Plants of India. Publications and Information Directorate. CSIR, New Delhi.
2. Kochhar, S.L. (2016). Economic Botany of the Tropics, Macmillan India Pvt. Ltd., New Delhi.
3. De, Debapriya and De, Debasish (2014). Fundamentals of Environment and Ecology. S. Chand Publishing, New Delhi
4. Kumar, H.D. (2018). Modern Concepts of Ecology 8<sup>th</sup> edition. Vikas Publishing House, New Delhi.
5. Mackenzie, A., Ball, A. and Virdee, S. (2001). Instant Notes in Ecology. Taylor & Francis, London, United Kingdom

6. Prinotel, D. and Hall, C.W. (Eds.) (2001). Food and Natural Resources. Academic Press, London, New York.
7. Sharma, O.P. (1996). Hill's Economic Botany. Tata McGraw Hill Co. Ltd., New Delhi.
8. Swaminathan, M.S. and Kochhar, S.L. (Eds.) (2009). Plants and Society. Macmillan Publications Ltd., London.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**  
**Session 2020-21**  
**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**  
**Course Title: FOOD PLANT LAYOUT AND MANAGEMENT**  
**Course Code- BSMM-6255 (T)**

**(THEORY)**

**COURSE OUTCOMES:**

After passing this course the student will be able to:

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

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

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

**CO4:** Learn about different types of food products and study the different steps involved in the product development.

## **(THEORY)**

**Examination Time: 3 Hrs.**

**Max. Marks: 100**

**Theory Marks:60**

**Practical Marks: 20**

**CA:20**

**Instructions for the Paper Setter:** Eight questions of equal marks(12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

### **UNIT-I**

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

### **UNIT-II**

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

### **UNIT-III**

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

### **UNIT –III**

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

### **Recommended Books:**

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

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**FOOD SCIENCE AND QUALITY CONTROL (VOCATIONAL)**

**Course Title: FOOD PLANT LAYOUT AND MANAGEMENT**

**Course Code- BSMM-6255 (P)**

**(PRACTICAL)**

**Time:3 hrs**

**Max. Marks: 20**

**Instructions for the practical examiner:**

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

**List of Practicals:**

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

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**BIOINFORMATICS (VOCATIONAL)**

**Course Title: STRUCTURAL BIOLOGY AND MOLECULAR MODELLING**

**Course Code- BSMM-6046 (T)**



**(THEORY)**

**COURSE OUTCOMES:**

On completion of this course students will be able to

**CO1:** Understand the concept of protein sequencing.

**CO2:** Use different protein structure prediction tools

**CO3:** Understand the concept of drug designing.

**CO4:** Use different simulation techniques.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**BIOINFORMATICS (VOCATIONAL)**

**Course Title: STRUCTURAL BIOLOGY AND MOLECULAR MODELLING**

**Course Code- BSMM-6046 (T)**  
**(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 100**  
**Theory Marks: 60**  
**Practical Marks: 20**  
**CA:20**

**Instructions for the Paper Setters and Candidates:**

Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

Isolation and purification of proteins, Protein sequence determination: Edman degradation, Mass Spectroscopy, Determination of protein structure: X-ray diffraction, NMR spectroscopy, Electron Microscopy.

**UNIT-II**

Protein Architecture: Motifs, Domains, classification of three dimensional structures in Brook haven protein databank (Pfam, SCOP, CATH). Secondary structure prediction: Chou Fasman, GOR. Protein Motifs and Domain Prediction (using Multiple sequence alignment, Regular expressions and statistical modelling), Prediction of three dimensional structure of proteins (Homology Modelling).

**UNIT-III**

Drug Design process, Computer aided drug design (Structure based drug design, Ligand based drug design), Quantitative structure activity relationship: QSAR Descriptors, Development of Hansch Equation, ADMET Prediction.

**UNIT-IV**

Empirical force fields for trimolecular simulations, Molecular Dynamics simulations techniques, Simulated Annealing, Conformational Analysis, Calculation of relative free energy using simulation techniques.

**Recommended Books:**

1. Broune P.E. and Weissig H. (Eds) Structural Biology. John Willey and Sons. N.J. USA (2002).
2. Creighton T.E. Protein Structure and Molecular Properties. W.H. Freeman and Company. (2001).
3. Martin R.B. Introduction to Biophysical Chemistry. McGraw Hill New York. 154

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**BIOINFORMATICS (VOCATIONAL)**

**Course Title: LAB IN STRUCTURAL BIOLOGY AND MOLECULAR MODELLING**

**Course Code- BSMM-6046 (P)**

**(PRACTICAL)**

**COURSE OUTCOMES:**

On completion of this course students will be able to

**CO1:** use different softwares for DNA and protein sequencing.

**CO2:** use GOR, CHOUFASMAN for protein structure prediction

**CO3:** use Autodock and Hex for drug designing.

**BACHELOR OF SCIENCE (Medical) (Semester VI)**

**Session 2020-21**

**BIOINFORMATICS (VOCATIONAL)**

**Course Title: LAB IN STRUCTURAL BIOLOGY AND MOLECULAR MODELLING**

**Course Code- BSMM-6046 (P)**

**(PRACTICAL)**

**Time: 3 Hrs.**

**Marks: 20**

- ☐ Discovering motifs from DNA or Protein Sequences using MEME.
- ☐ Homology Modelling using SWISS-MODEL
- ☐ To analyze protein sequence using Secondary Structure prediction methods: GOR, CHOUFASMAN
- ☐ To retrieve various structures of proteins from RCSB, their classification system using CATH/ SCOP.
- ☐ To carry out molecular dynamics simulation on a protein using GROMACS.
- ☐ To carry out rigid body docking between a protein and ligand Using Autodock and Hex.