FACULTY OF SCIENCES

SYLLABUS FOR

for the award of the Degree in

Bachelor of Science (Non-Medical & Computer Science)/ Honours

(Semester III to IV)

(Offered under 4-year UG Honours Degree Programme)

under NEP 2020 Batch: 2025–29

(Under Credit Based Continuous Evaluation Grading System)

The Heritage Institution

KANYA MAHA VIDYALAYA

JALANDHAR

(AUTONOMOUS)

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULLUM OF EXAMINATIONS OF FOUR-YEAR DEGREE PROGRAM

Bachelor of Science (Non-Medical/Computer Science)/Honours

Session 2025-2026

Bachelor of Science (Medical) Semester III									
Course Code	**Course Name**	**Course Type**	**Credits**	**Total Marks**	**Ext.**		**CA**	**Examination Time (in Hours)**
					L	**P**		
BSNL/ BCSL - 3421 BSNL/ BCSL - 3031 BSNL/ BCSL - 3431	**Punjabi (Compulsory)** **[1]Basic Punjabi** **[2]Punjab History and Culture**	C	4-0-0	100	70	-	30	3
BSNL/ BCSL - 3212	**English Language Skills-II**	AEC	4-0-0	100	70		30	3
BSNL/BCSL-3333	**Mathematics (Differential Equations)**	DSC	4-0-0	100	70		30	3
BSNP/BCSP-3333	**Differential equations Laboratory**		0-0-1	50	--	35	15	3
BSNL-3084	**Chemistry (Physical Chemistry-I: States of Matter and Electrochemistry)**	DSC	4-0-0	100	70		30	3
BSNP-3084	**Physical Chemistry-I Lab**		0-0-2	50	--	35	15	3
BCSM-3134	**Computer Science (Computer Oriented Numerical and Statistical Methods)**	DSC	3-0-1	100	40	30	30	3+3
(P)	**Computer Science (Computer Oriented Numerical and Statistical Methods)(Practical)**							
BSNL/BCSL-3395	**Physics (Statistical Physics and Thermodynamics)**	DSC	4-0-0	100	70	--	30	3
BSNP/BCSP-3395	**Optics Lab**		0-0-2	50	--	35	15	3
*VACE- 3221	*** Environmental Studies (Compulsory)**	**VAC**	2-0-0	50	35	--	15	3
*VACG-3531	**Gender Sensitization**	VAC	2-0-0	50	35	--	15	2

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

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

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

C-Compulsory

AEC- Ability Enhancement Compulsory Course, DSC- Discipline Specific Course, VAC- Value Added Courses

Kanya Maha Vidyalaya, Jalandhar (*Autonomous*)

SCHEME AND CURRICULLUM OF EXAMINATIONS OF FOUR YEAR DEGREE PROGRAM

Bachelor of Science (Non-Medical/Computer Science)/Honours

Session 2025-2026

Bachelor of Science (Medical) Semester IV								
Course Code	**Course Name**	**Course Type**	**Credits**	**Total Marks**	**Ext.**		**CA**	**Examination Time (in Hours)**
					L	**P**		
BSNL/BCSL-4421 BSNL/BCSL-4031 BSNL/BCSL-4431	**Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History and Culture**	C	4-0-0	100	70	-	30	3
BSNL/BCSL-4212	**Appreciating English Literature -II**	MDC	4-0-0	100	70	-	30	3
BSNL/BCSL-4333	**Mathematics (Analysis)**	DSC	4-0-0	100	70		30	3
BSNP/BCSP-4333	**Analysis Laboratory**		0-0-1	50		35	15	3
BSNL-4084	**Chemistry (Inorganic Chemistry-II: Periodic Table and Coordination Chemistry)**	DSC	4-0-0	100	70	-	30	3
BSNP-4084	**Chemistry (Inorganic Chemistry-II Lab: Volumetric/Gravimetric Analysis and Preparations)**		0-0-2	50	-	35	15	3
BCSM-4134	**Computer Science (Data Structures)**	DSC	3-0-1	100	40	30	30	3+3
BSNL/BCSL-4395	**Physics (Quantum Physics)**	DSC	4-0-0	100	70		30	3
BSNP/BCSP-4395	**Thermal and Modern Physics Lab**		0-0-2	50		35	15	3
**BSNM/BCSM-4390	**Applied Optics**	SEC	3-0-0	100	70		30	3
*VACM-4502	**Moral Education**	VAC	2-0-0	50	35	-	15	2

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

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

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

****** Student can opt any one of the given courses.**

C-Compulsory

MDC- Multidisciplinary Course

DSC- Discipline Specific Course

SEC- Skill Enhancement Course, VAC- Value Added Course

Bachelor of Arts / Bachelor of Science (Medical) / Bachelor of Science (Non-Medical) / Bachelor of Science (Computer Science) / Bachelor of Science (Economics)/ Bachelor of Commerce/ Bachelor of Business Administration (Three Year Degree Programme)

&

Bachelor of Arts (Honours) / Bachelor of Science (Medical) (Honours) / Bachelor of Science (Non-Medical) (Honours) / Bachelor of Science (Computer Science) (Honours) / Bachelor of Science (Economics) (Honours)/ Bachelor of Commerce (Honours) / Bachelor of Business Administration (Honours) (Four Year Degree Programme)

(Semester III)

Session 2025-26

ENGLISH LANGUAGE SKILLS-II

Course Code: BARL/BSML/BSNL/BCSL/BECL/BCRL/BBRL -3212

(NEP-2020)

COURSE OUTCOMES

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

CO 1: understand fundamental grammatical rules governing tenses, the use of modal verbs and make correct usage in their language through the study of "English Grammar in Use" by Raymond Murphy

CO 2: to develop the art of creative expression by writing a paragraph on any given topic

CO 3: comprehend the meaning of texts and answer questions related to situations, episodes, and characters depicted in them through the study of the essays in the text "Prose for Young Learners"

CO 4: appreciate the writings of various Indian and foreign story and prose writers and relate them to their socio-cultural milieu through the study of the essays in the text "Prose for Young Learners"

Bachelor of Arts / Bachelor of Science (Medical) / Bachelor of Science (Non-Medical) / Bachelor of Science (Computer Science) / Bachelor of Science (Economics)/ Bachelor of Commerce/ Bachelor of Business Administration (Three Year Degree Programme)

&

Bachelor of Arts (Honours) / Bachelor of Science (Medical) (Honours) / Bachelor of Science (Non-Medical) (Honours) / Bachelor of Science (Computer Science) (Honours) / Bachelor of Science (Economics) (Honours)/ Bachelor of Commerce (Honours) / Bachelor of Business Administration (Honours) (Four Year Degree Programme)

(Semester III) Session 2025-26

ENGLISH LANGUAGE SKILLS-II

Course Code: BARL/BSML/BSNL/BCSL/BECL/BCRL/BBRL -3212

(NEP-2020)

Max. Marks: 100

Examination Time: 3 Hrs. **Theory: 70**

CA: 30

Instructions for the Paper Setters:-

Eight questions are to be set, two from each of the four Units (I-IV). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section. Each question will carry 14 marks. (14x5=70)

UNIT-I

English Grammar in Use, 5th Edition by Raymond Murphy, CUP (Units: 98-130)

UNIT-II

Essay Writing and English Grammar in Use (Units: 131-145)

UNIT-III

Making Connections by Kenneth J. Pakenham, 3rd Edn. CUP: Unit-I (Global Health) and Unit II (Multicultural Societies)

UNIT-IV

Making Connections by Kenneth J. Pakenham, 3rd Edn. CUP: Section III (Aspects of Language) and Section IV (Sustaining Planet Earth)

Texts Prescribed:

1.English Grammar in Use (Fifth Edition) by Raymond Murphy, CUP

2.Making Connections by Kenneth J. Pakenham, 3rd Edn. CUP

Session 2025-26

BACHELOR OF ARTS / BACHELOR OF SCIENCE (MEDICAL) / BACHELOR OF SCIENCE (NON MEDICAL) / BACHELOR OF SCIENCE (COMPUTER SCIENCE) / BACHELOR OF SCIENCE (ECONOMICS) / BACHELOR OF COMMERCE / BACHELOR OF BUSINESS ADMINISTRATION Semester III

PUNJABI (COMPULSORY)

COURSE CODE- BARL/BSML/BSNL/BCSL/BECL/BCRL /BBRL-3421

COURSE OUTCOMES

CO1: 'ਚੋਣਵੇ ਪੰਜਾਬੀ ਨਿਬੰਧ' ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਵਾਰਤਕ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ।

CO2: ' ਆਧੁਨਿਕ ਇਕਾਂਗੀ' ਇਕਾਂਗੀ ਸੰਗ੍ਰਹਿ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਇਕਾਂਗੀ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਇਸ ਸਾਹਿਤ ਰੂਪ ਨਾਲ ਜੋੜਣਾ ਹੈ।

CO3: ਸੰਖੇਪ ਰਚਨਾ ਕਰਨ ਨਾਲ ਵਿਦਿਆਰਥੀ ਆਪਣੀ ਗੱਲ ਨੂੰ ਸੰਖੇਪ ਵਿਚ ਕਹਿਣ ਦੀ ਜਾਚ ਸਿੱਖਣਗੇ ਅਤੇ ਇਹ ਦਿਮਾਗੀ ਕਸਰਤ ਵਿਚ ਸਹਾਈ ਹੋਵੇਗੀ। ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦ ਜੋੜਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ।

CO4: ਮੂਲ ਵਿਆਕਰਣਕ ਇਕਾਈਆਂ : ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵੰਨਗੀਆਂ (ਭਾਵੰਸ਼, ਸ਼ਬਦ, ਵਾਕੰਸ਼, ਉਪਵਾਕ ਅਤੇ ਵਾਕ)ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ -ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

Session 2025-26

BACHELOR OF ARTS / BACHELOR OF SCIENCE (MEDICAL) / BACHELOR OF SCIENCE (NON MEDICAL) / BACHELOR OF SCIENCE (COMPUTER SCIENCE) / BACHELOR OF SCIENCE (ECONOMICS) / BACHELOR OF COMMERCE / BACHELOR OF BUSINESS ADMINISTRATION Semester III

PUNJABI (COMPULSORY)

COURSE CODE- BARL/BSML/BSNL/BCSL/BECL/BCRL /BBRL-3421

ਸਮਾਂ : 3 ਘੰਟੇ	**Maximum Marks: 100**
L-T-P	**Theory : 70**
4-0-0	**CA :30**

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

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

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

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 14 ਅੰਕ ਹਨ।

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

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਚੋਣਵੇ ਪੰਜਾਬੀ ਨਿਬੰਧ (ਜੋਗਿੰਦਰ ਸਿੰਘ ਪੁਆਰ,ਪਰਮਜੀਤ ਸਿੰਘ ਸਿੱਧੂ), ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ,ਪਟਿਆਲਾ।

ਘਰ ਦਾ ਪਿਆਰ, ਉਮਰ ਲੰਮੀ ਹੋ ਸਕਦੀ ਹੈ,ਅੱਥਰੂ, ਪੁਰਾਣਾ ਪੰਜਾਬ, ਇੰਗਲੈਂਡ ਦਾ ਸੋਗੀ ਸੋਮਵਾਰ,ਖਿਡਾਰੀਆਂ ਦੇ ਵਹਿਮ।

(ਪਾਠ ਕ੍ਰਮ ਦਾ ਹਿੱਸਾ ਹਨ)

(ਵਿਸ਼ਾ ਵਸਤੂ/ਸਾਰ /ਕਲਾ ਪੱਖ)

ਯੂਨਿਟ-II

ਆਧੁਨਿਕ ਇਕਾਂਗੀ

(ਸੰਪਾ. ਰੌਸ਼ਨ ਲਾਲ ਆਹੂਜਾ, ਮਨਜੀਤ ਪਾਲ ਕੌਰ)

ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

ਵਿਬਾ ਵਸਤੂ/ਪਾਤਰ ਚਿਤਰਨ/ਰੰਗਮੰਚੀ ਪੱਖ/ ਸਾਰ

ਯੂਨਿਟ-III

(ੳ) ਸੰਖੇਪ ਰਚਨਾ (ਪ੍ਰੈਸੀ)

(ਅ) ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦ ਜੋੜਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨਾ

ਯੂਨਿਟ-IV

ਮੂਲ ਵਿਆਕਰਣਕ ਇਕਾਈਆਂ : ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵੰਨਗੀਆਂ (ਭਾਵੰਸ਼, ਸ਼ਬਦ, ਵਾਕੰਸ਼, ਉਪਵਾਕ ਅਤੇ ਵਾਕ)

Session 2025-26

BACHELOR OF ARTS / BACHELOR OF SCIENCE (MEDICAL) / BACHELOR OF SCIENCE (NON MEDICAL) / BACHELOR OF SCIENCE (COMPUTER SCIENCE) / BACHELOR OF SCIENCE (ECONOMICS) / BACHELOR OF COMMERCE / BACHELOR OF BUSINESS ADMINISTRATION SEMESTER–III

Basic Punjabi (In lieu of Punjabi Compulsory)

COURSE CODE- BARL/BSML/BSNL/BCSL /BECL/BCRL /BBRL-3031

Course outcomes

CO1: ਸੰਖੇਪ ਰਚਨਾ ਕਰਨ ਨਾਲ ਵਿਦਿਆਰਥੀ ਆਪਣੀ ਗੱਲ ਨੂੰ ਸੰਖੇਪ ਵਿਚ ਕਹਿਣ ਦੀ ਜਾਚ ਸਿੱਖਣਗੇ ਅਤੇ ਇਹ ਦਿਮਾਗੀ ਕਸਰਤ ਵਿਚ ਸਹਾਈ ਹੋਵੇਗੀ। ਸਰਲ ਅੰਗਰੇਜ਼ੀ ਪੈਰ੍ਹੇ ਦਾ ਪੰਜਾਬੀ ਅਨੁਵਾਦ ਦੇਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ।

CO2: ਕਵਿਤਾ ਭਾਗ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਵਿਤਾ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਤਾਂ ਕਿ ਉਹ ਆਧੁਨਿਕ ਦੌਰ ਵਿਚ ਚੱਲ ਰਹੀਆਂ ਕਾਵਿ ਧਾਰਾਵਾਂ ਅਤੇ ਕਵੀਆਂ ਬਾਰੇ ਗਿਆਨ ਹਾਸਿਲ ਕਰ ਸਕਣ।

CO3: ਕਹਾਣੀ ਭਾਗ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਹਾਣੀ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਤਾਂ ਕਿ ਉਹ ਆਧੁਨਿਕ ਦੌਰ ਵਿਚ ਚੱਲ ਰਹੀਆਂ ਕਾਵਿ ਧਾਰਾਵਾਂ ਅਤੇ ਕਵੀਆਂ ਬਾਰੇ ਗਿਆਨ ਹਾਸਿਲ ਕਰ ਸਕਣ।

CO4: ਨਿਬੰਧ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਮੁੱਲਵਾਨ ਇਤਿਹਾਸ ਤੋਂ ਜਾਣੂ ਕਰਵਾਉਣਾ ਹੈ।

Session 2025-26

BACHELOR OF ARTS / BACHELOR OF SCIENCE (MEDICAL) / BACHELOR OF SCIENCE (NON MEDICAL) / BACHELOR OF SCIENCE (COMPUTER SCIENCE) / BACHELOR OF SCIENCE (ECONOMICS) / BACHELOR OF COMMERCE / BACHELOR OF BUSINESS ADMINISTRATION SEMESTER–III

Basic Punjabi (In lieu of Punjabi Compulsory)

COURSE CODE- BARL/BSML/BSNL/BCSL /BECL/BCRL /BBRL-3031

ਸਮਾਂ : 3 ਘੰਟੇ **Maximum Marks: 100**

L-T-P **Theory : 70**
4-0-0 **CA : 30**

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

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

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

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 14 ਅੰਕ ਹਨ।

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

ਪਾਠਕ੍ਰਮ

ਯੂਨਿਟ-I

ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉਤਰ

ਸਰਲ ਅੰਗਰੇਜ਼ੀ ਪੈਰ੍ਹੇ ਦਾ ਪੰਜਾਬੀ ਅਨੁਵਾਦ

ਯੂਨਿਟ-II

ਕਵਿਤਾਵਾਂ

(ੳ) ਸਮਾਂ (ਭਾਈ ਵੀਰ ਸਿੰਘ)

(ਅ) ਸ਼ੇਰ ਪੰਜਾਬੀ ਦੀ (ਫ਼ੀਰੋਜ਼ਦੀਨ ਸ਼ਰਫ਼)

(ੲ) ਅੰਬੀ ਦਾ ਬੂਟਾ (ਪ੍ਰੋ. ਮੋਹਨ ਸਿੰਘ)

(ਸ) ਬਿਰਹੋਂ ਦੀ ਰੜਕ (ਸ਼ਿਵ ਕੁਮਾਰ)

(ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ,ਸਾਰ)

ਯੂਨਿਟ-III

ਕਹਾਣੀਆਂ

(ੳ) ਭੂਆ (ਨਾਨਕ ਸਿੰਘ)

(ਅ) ਦੁੱਧ ਦਾ ਛੱਪੜ (ਕੁਲਵੰਤ ਸਿੰਘ ਵਿਰਕ)

(ਇ) ਸਾਂਝੀ ਕੰਧ (ਸੰਤੋਖ ਸਿੰਘ ਧੀਰ)

(ਸ) ਉਹ ਸੋਚਦੀ (ਦਲੀਪ ਕੌਰ ਟਿਵਾਣਾ)

(ਵਿਸ਼ਾ ਵਸਤੂ,ਸਾਰ)

ਯੂਨਿਟ-IV

ਨਿਬੰਧ

(ੳ) ਘਰ ਦਾ ਪਿਆਰ (ਤੇਜਾ ਸਿੰਘ)

(ਅ) ਖ਼ੁਸ਼ਾਮਦੀ ਨਾਲ (ਹਰਿੰਦਰ ਸਿੰਘ ਰੂਪ)

(ਇ) ਆਓ, ਗੱਲਾਂ ਕਰੀਏ (ਨਰਿੰਦਰ ਸਿੰਘ ਕਪੂਰ)

(ਸ) ਮਨੁੱਖ ਕੁਦਰਤ ਦੀ ਨੇਕ ਔਲਾਦ ਨਹੀਂ (ਸੁਰਿੰਦਰ ਮੰਡ)

(ਵਿਸ਼ਾ ਵਸਤੂ,ਸਾਰ)

Bachelor of Arts (Honours) / Bachelor of Science (Medical) (Honours) / Bachelor of Science (Non- Medical) (Honours) / Bachelor of Science (Computer Science) (Honours) / Bachelor of Science (Economics) (Honours) / Bachelor of Commerce (Honours) / Bachelor of Business Administration (Honours)

(Semester III)
Session: 2025-26

COURSE TITLE: PUNJAB HISTORY AND CULTURE

(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

COURSE CODE: BARL-3431/BSML-3431/BSNL-3431/BCSL-3431/BECL-3431BCRL-3431/BBRL-3431

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

CO 1: Understand the society and culture of Medieval Punjab.

CO 2: Understand the growth of various sects during the Bhakti Movement in Punjab.

CO 3: Comprehend and analyse the teachings of Guru Nanak Dev and its relevance today

CO 4:Make a comparison between the philosophy and teachings of first five Sikh Gurus and their relevance in the present scenario and also to understand and analyse the institutions started by Sikh Gurus and their implications till date

Bachelor of Arts (Honours) / Bachelor of Science (Medical) (Honours) / Bachelor of Science (Non- Medical) (Honours) / Bachelor of Science (Computer Science) (Honours) / Bachelor of Science (Economics) (Honours) / Bachelor of Commerce (Honours) / Bachelor of Business Administration (Honours)

(Semester III)
Session: 2025-26

COURSE TITLE: PUNJAB HISTORY AND CULTURE
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

COURSE CODE:BARL-3431/BSML-3431/BSNL-3431/BCSL-3431/BECL-3431/BCRL-3431/BBRL-3431

Examination Time: 3 Hours
Credits L-T-P: 4-0-0
Contact Hours: 4 Hrs/Week

Max. Marks: 100
Theory: 70
CA: 30

Instructions for the Paper Setter:

1.Question paper shall consist of four Units

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

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

4.Each question will carry 14 marks

Unit -1

1. Society and Culture of Punjab during Turko-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 andPangat

Unit-IV

7. Contribution of Guru Angad Dev, Guru Amar Das and Guru Ram Das

8. Guru Arjun Dev and Compilation of Adi Granth

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 Sikhsof the Punjab, Cambridge University Press, New Delhi.
- Singh, Fauja (1972), A History of the Sikhs, Vol. II,I. Patiala: Punjabi University.
- Singh, Khushwant (2011). A History of Sikhs- Vol. I (1469-1839), New Delhi, Oxford University Press.

Bachelor of Science (Honours)
Semester–III
Session: 2025-26
Course Title: Mathematics (Differential Equations)
Course Code: BCSL/ BSNL-3333

Course Outcomes

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

CO1: Identify differential equation, its order and degree, exact differential equations and special rules to find integrating factors.

CO2: Demonstrate the concept of linear differential equations with constant coefficients, complete solution of the differential equations, orthogonal trajectories of Cartesian and polar curves.

CO 3: Demonstrate the concept of linear differential equations with variable coefficients and its solution.

CO 4: Analyze System of ordinary simultaneous equations, Power Series, convergence of power series, Radius of convergence.

Bachelor of Science (Honours)
Semester–III
Session: 2025-26
Course Title: Mathematics (Differential Equations)
Course Code: BCSL/ BSNL-3333

Examination Time: 3 Hours **Max. Marks: 100**
L T P **Theory: 70**

4 0 0 **CA: 30**

Instructions for the Paper Setter: Eight questions of equal marks (14 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

Differential equation of first order and first degree, Linear differential equation reducible to Linear Bernoulli's equation, Ordinary differential equation of first order. Exact differential equations. Necessary and sufficient conditions for Mdx + Ndy to be Exact, integrating factors by inspections, special rules to find integrating factors with proof.

Unit II

Geometrical meaning of a complete solution of the differential equations, General solution of homogeneous equation of second order, Orthogonal trajectories of cartesian and polar curve, Homogeneous differential equations, Linear differential equations with constant coefficients.

Unit III

Singular solution, p-discriminant, c- discriminant, illustrations of singular solutions Variation of Parameters method, Reduction of order. Linear differential equations with variable coefficients, Define Cauchy's linear equations, Legendre's Linear equation.

Unit IV

First order and higher degree equations, equations solvable for y, x, p, equations not containing x, equations not containing y, Clairaut's equation and equations reducible to Clairaut's form.

System of ordinary simultaneous equations, Power Series, convergence of power series, Radius of convergence, Power Series solution about an ordinary point, solutions about singular points, Frobenius method when roots of indicial equations differ by non-integers, and when roots are equal.

Text Book:-

M.D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand, (20th edition)

Reference Book:-

Tom M. Apostol: Calculus: An Indian Adaptation, Wiley India, 2022

Bachelor of Science (Honours)
Semester–III
Session: 2025-26
Course Title: Differential Equations Laboratory
Course Code: BCSP/ BSNP-3333

Examination Time: 3 Hours **Max. Marks: 50**
Practical: 35
L T P **CA: 15**
0 0 1

List of Practicals (using any package)

1. Plotting solution of first order differential equation.
2. Solve the first-order differential equation $\frac{dy}{dx}$ = ay, numerically using Runge-Kutta method.
3. Solve the second-order differential equation $\frac{d^2y}{dx^2}$ = ay, numerically using Runge-Kutta method.
4. Plotting of solution of family of second order differential equation.
5. Solution of system of ordinary differential equations, numerically using Runge-Kuttamethod.
6. Numerical solution of the nonlinear simple pendulum equation.

Text Books:-

1. S.S. Sastry, Engineering Mathematics - Volume I (4th Edition), PHI, 2008.
2. S.S. Sastry, Engineering Mathematics - Volume II (4th Edition), PHI

Bachelor of Science/Honours
Credit Based Continuous Evaluation Grading System (CBCEGS)
(Under NEP 2020)
(Session: 2025-26)
(Semester III)
COURSE CODE: BSNL -3084
COURSE TITLE: Chemistry (Physical Chemistry-I: States of Matter and Electrochemistry)

Course Outcomes:

Students will be able to

CO1: Explain the fundamental principles governing the gaseous and liquid states, including kinetic theory, van der Waals equation, critical phenomena, and molecular velocity distributions.

CO2: Describe the properties and classification of colloids and crystals, analyze colloidal stability, and interpret crystal structures using X-ray diffraction techniques.

CO3: Apply the concepts of ideal and non-ideal solutions to determine colligative properties, calculate molecular weights, and explain deviations using thermodynamic and experimental methods.

CO4: Analyze electrochemical systems using concepts like conductivity, electrode potentials, Nernst equation, and concentration cells, and evaluate electrochemical parameters such as EMF, ΔG, ΔH, and equilibrium constants.

Bachelor of Science/Honours
Credit Based Continuous Evaluation Grading System (CBCEGS)
(Under NEP 2020)
(Session: 2025-26)
(Semester III)
COURSE CODE: BSNL/BSML-3084
COURSE TITLE: Chemistry (Physical Chemistry-I: States of Matter and Electrochemistry)

Exam Time: 3Hrs. **Max. Marks: 100**
Credit(L-T-P): 4-0-0 **(Theory: 70, CA: 30)**

Instructions for the Paper Setters: Eight questions of equal marks (fourteen 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 (15 Hrs.)

Gaseous States: Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals 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.
Liquid State: Intermolecular forces, surface tension and viscosity of liquids and its determination. Structure of liquids (a qualitative description). Structural differences between solids, liquids and gases.

UNIT II (15 Hrs.)

Colloidal State: 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.
Solid State: 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. Liquid crystals, Classification, structure of nematic and cholestric phases.

UNIT III (15 Hrs.)

Solutions, Dilute Solutions and Colligative Properties: Ideal and non–ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution, colligative properties, Raoult's law, non-ideal system, azeotropes-HCl-H2O and ethanol-water system. 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.

Electrochemistry–I: Specific conductance and equivalent conductance, measurement of equivalent conductance, Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations.

UNIT IV (15 Hrs.)

Electrochemistry–I: Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Migration of ions, Transport number, Applications of conductivity measurements, Electrolytic and Galvanic cells-reversible and irreversible cells, conventional representation of electrochemical cells. Standard electrode potential, standard hydrogen electrode, reference electrodes, sign conventions, electrochemical series and its significance. Nernst equation, derivation of cell E.M.F. and single electrode potential. EMF of a cell and its measurements. Calculation of thermodynamic quantities of cell reactions (ΔG, ΔH and K). Types of reversible electrodes: gas- metal ion, metal ion, metal insoluble salt-anion and redox electrodes. Electrode reactions. EMF of reversible electrodes.

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

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.
11. Metz, C.R., Theory and problems of Physical Chemistry; Schaum's outline series, 2nd edition, Pubs: McGraw-Hall Book Company, 1989.

Bachelor of Science/Honours
Credit Based Continuous Evaluation Grading System (CBCEGS)
(Under NEP 2020)
(Session: 2025-26)
(Semester III)
COURSE CODE: BSNP/BSMP-1084
COURSE TITLE : Chemistry (Physical Chemistry – I: Lab)

Course outcomes

Students will be able

CO1: Perform acid-catalyzed hydrolysis of esters and evaluate the specific reaction rate and effect of acid strength, applying principles of chemical kinetics.

CO2: Determine physical properties of liquids such as viscosity, surface tension, and refractive index using standard laboratory techniques and calculate related molecular parameters.

CO3: Analyze and interpret crystallographic data from X-ray powder diffraction patterns for crystal system identification and indexing.

CO4: Prepare buffer solutions and perform pH metric titrations to determine dissociation constants, enhancing understanding of acid-base equilibria and solution chemistry.

Bachelor of Science/Honours
Credit Based Continuous Evaluation Grading System (CBCEGS)
(Under NEP 2020)
(Session: 2025-2026)
(Semester III)
COURSE CODE: BSNP/BSMP-3084
COURSE TITLE : Chemistry (Physical Chemistry – I: Lab)

Time: 3 Hrs **Marks: 50**
Credits: 0-0-2 **(Practical: 35, CA: 15)**

1. To determine the specific reaction rate of hydrolysis of ethyl acetate catalysed by acid at room temperature.
2. To study the effect of acid strength on hydrolysis of an ester.
3. To find the relative and absolute viscosity of given liquid at room temperature. (n-butyl alcohol, sucrose, and glycerine solution in water)
4. To study the surface tension of liquids by drop number and drop weight methods.
5. To determine the Refractive indices of given liquids (water, acetone, methanol, ethyl acetate, cyclohexane) by Abbe's refractometer & calculate their molecular refractivity.
6. To determine the composition of unknown mixture of two liquids by refractive index measurements.
7. Indexing of a given powder diffraction pattern of a cubic crystalline system.
8. Preparation of buffer solutions of different pH (a) Sodium acetate-acetic acid (b) Ammonium chloride-ammonium hydroxide
9. pH metric titration of (a) strong acid vs. strong base, (b) weak acid vs. strong base.
10. Determination of dissociation constant of a weak acid.

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.
10. Findlay's Practical Physical Chemistry, Author: Alexander Findlay, Publisher: Wiley, 1972, ISBN-10:0470258853.
11. Advanced Practical Physical Chemistry, Author: J. B. Yadav, Publisher: Krishna Prakashan Media (P) Ltd (2015), ISBN-10:8182835925.

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER-III

(Session-2025-26)

PHYSICS (STATISTICAL PHYSICS AND THERMODYNAMICS)

Course code: BSNM-3395 (I) for Bachelor of Science (Non Medical)
BCSM-3395 (I) for Bachelor of Science (Computer Science)

COURSE OUTCOMES:

After passing this course, students will be able to:

CO1: Understand and explain the foundational concepts of statistical physics, including microstates, macrostates, thermodynamic probability, and equilibrium in systems of distinguishable particles.

CO2: Apply the principles of classical and quantum statistics, including Maxwell-Boltzmann (MB), Bose-Einstein (BE), and Fermi-Dirac (FD) statistics, to analyze the behavior of ideal gases and radiation.

CO3: Evaluate the concept of entropy from a statistical viewpoint and describe its implications for reversible and irreversible processes, including applications to thermodynamic systems such as the Carnot cycle.

CO4: Analyze and derive Maxwell's thermodynamic relations, explain the Joule-Thomson effect, and understand thermodynamic processes like adiabatic expansion and compression.

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER-III

(Session-2025-26)

PHYSICS (STATISTICAL PHYSICS AND THERMODYNAMICS)

Course code: BSNL-3395 for Bachelor of Science (Non Medical)
BCSL-3395 for Bachelor of Science (Computer Science)

Credits: 4-0-0 **Max Marks: 100 (ESE Marks: 70, CA: 30)**
Examination Time: 3 Hours **Pass Mark: 25**

Instructions for the Paper Setters:

Eight questions of equal marks are to be set, two in each of the four sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section. Each question carries 14 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Basic ideas of Statistical Physics, Scope of Statistical Physics, Basic ideas about probability, Distribution of four distinguishable particles into compartments of equal size. Concept of macro states, microstates, Thermodynamic Probability, Effects of constraints on the system. Distribution of particles in two compartments, Deviation from the state of maximum probability. Equilibrium state of dynamic system, Distribution of distinguishable n particles in k compartments of unequal sizes.

UNIT–II

Phase space and division into elementary cells. Three kinds of statistics. The basic approach in three statistics. Maxwell Boltzmann (MB) statistics applied to an ideal gas in equilibrium. Experimental verification of the law of distribution of molecular speeds. Need for Quantum Statistics – B.E. Statement of Planck's law of Radiation Wien's Displacement and Stefan's law. Fermi Dirac (FD) statistics. Comparison of M.B, B.E and F.D statistics.

UNIT–III

Statistical definition of entropy, Change of entropy of system, additive nature of entropy, Law of increase of entropy, Reversible and irreversible processes, and their examples, work done in reversible process, examples of increase in entropy in natural processes, entropy and disorder, Brief review of Terms, Laws of Thermodynamics, Carnot Cycle, Entropy changes in Carnot cycle, , Applications of thermodynamics to thermoelectric effect, change of entropy along reversible path in P-V diagram. Heat death of universe.

UNIT–IV

Derivation of Maxwell Thermodynamics relations, Cooling produced by adiabatic stretching, A diabetic Compression, change of internal energy with volume, Specific heat and constant pressure and constant volume. , Joule-Thomson effect, Expression for C_P-C_V, Change of state and Clapeyron equation.

Text Reference Books:

1. Statistical Mechanics: B.B. Laud, (Macmillan India Ltd.) 1981.
2. Statistical Physics: J. K. Bhattacharjee, (Allied Pub., Delhi) 2000.
3. Statistical Physics and Thermodynamics: V.S. Bhatia
4. A Treatise on Heat: M.N. Saha & B.N. Srivastava (The Indian Press Pvt. Ltd., Allahabad), 1965.
5. Heat and Thermodynamics, Mark Zemansky and Richard Dittman McGraw Hill and Co.
6. Thermal and Statistical Physics-Concepts and Applications : S. Sharma, (Ane Books Pvt. Ltd. 2021)

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER-III

(Session-2025-26)

Course code: BSNP-3395 for Bachelor of Science (Non Medical)

BCSP-3395 for Bachelor of Science (Computer Science)

OPTICS LAB

COURSE OUTCOMES:

After passing this course, students will be able to:

CO1: Demonstrate the ability to set up and conduct optical experiments such as determining the refractive index, Cauchy's constants, and wavelength of light using instruments like the spectrometer, Newton's rings, and diffraction gratings.

CO2: Analyze and interpret interference and diffraction patterns to determine key physical parameters such as wavelength, dispersive power, and resolving power of optical instruments.

CO3: Apply geometrical optics principles to measure accessible and inaccessible heights using a sextant, reinforcing practical understanding of angular measurement techniques.

CO4: Understand and verify statistical principles through experiments like the coin toss, and apply Young's double-slit experiment to study wave nature of light and laser wavelength determination.

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER-III

OPTICS LAB

(PRACTICAL)

(Session-2025-26)

Course code: BSNP-3395 for Bachelor of Science (Non Medical)
BCSP-3395 for Bachelor of Science (Computer Science)

Credits: 0-0-2 **Max Marks: 50 (ESE Marks: 35, CA: 15)**
Examination Time: 3 Hours **Pass Mark: 13**

Instructions to Practical Examiner

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

General Guidelines for Practical Examination

The distribution of marks is as follows :

i) One experiment 15 Marks
ii) Brief Theory 7 Marks
iii) Viva–Voce 7 Marks
iv) Record (Practical file) 6 Marks

II. There will be one session of 2 hours duration. The paper will have one session. Paper will consist of 8 experiments, out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. The number of candidates in a group for practical examination should not exceed 12.

IV. In a single group, no experiment should be allotted to more than three examinees.

List of Experiments

1. To determine the refractive index of glass/ liquid using a spectrometer.
2. To determine the Cauchy's constants.
3. To study the refractive index of a doubly refracting prism.
4. To set up Newton's rings to determine wavelength of sodium light.
5. To determine the wavelength by using plane diffraction grating (Use Hg source)
6. To determine dispersive power of plane diffraction grating.
7. To determine resolving power of a telescope.
8. To determine resolving power of a grating.
9. To measure an accessible (Horizontal and vertical) height using sextant.
10. To measure inaccessible height by using sextant.
11. Verify laws of probability distribution by throwing similar coins.
12. To determine the wavelength of given laser source using Young's double slit experiment

Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/ Bachelor of Science (Economics) (Honours) Semester- III

Session 2025-26

Course Code: BARM-3134

BCSM-3134

BECM-3134

COMPUTER SCIENCE

(COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS)

Course Outcomes:

After passing this course the student will be able to:

CO1: Solve non-linear and linear equations using different methods.

CO2: comprehend interpolation and numerical integration.

CO3: Calculate different means and deviations using statistical techniques.

CO4: Comprehend correlation, curve fitting and regression for finding solutions to various statistical problems.

Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/ Bachelor of Science (Economics) (Honours) Semester- III

Session 2025-26

Course Code: BARM-3134

BCSM-3134

BECM-3134

COMPUTER SCIENCE

(COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS)

(THEORY)

Examination Time: 3 Hrs.	**Max. Marks: 100**
	Theory: 40
L-T-P: 3-0-1	**Practical: 30**
Credits: 4	**CA: 30**

Instructions for 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 divided 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. The students can use Non–programmable/ scientific & Non–storage type calculator.

Unit –I

Introduction: Numerical methods, Numerical methods versus numerical analysis, Errors and Measures of Errors. Bisection method, false position method and Newton Raphson method.

Simultaneous Solution of Equations: Gauss Elimination Method, Gauss Jordan method

Unit -II

Interpolation: Interpolation and Curve Fitting, Newtons Methods: Forward Difference Method, Backward Difference Method and Divided Difference Method.

Numerical Integration: Trapezoidal Rule, Simpson's 1/3 Rule Simpson's 3/8 Rule.

Unit -III

Measure of Central Tendency: Mean Arithmetic, Mean Geometric, Mean Harmonic, Mean, Median and Mode.

Measure of dispersion: Range, Mean deviation, Standard deviation, co-efficient of variation.

Unit –IV

Correlation: Meaning, Karl Pearson method, Rank correlation.

Regression: Meaning, Linear Regression and its coefficients.

References/ Textbooks:

1. B.S. Grewal, Numerical Methods in Engineering & Science: With Programs in C, C++ & MATLAB, Khanna Publisher, 2014.
2. V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall of India Private Ltd., 2009.

Note: The latest editions of the books should be followed.

Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/ Bachelor of Science (Economics) (Honours) Semester- III

Session 2025-26

Course Code: BARM-3134

BCSM-3134

BECM-3134

COMPUTER SCIENCE

(COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS)

PRACTICAL

Examination Time: 3 Hrs.	**Max. Marks: 100**
	Theory: 40
L-T-P: 3-0-1	**Practical: 30**
Credits: 4	**CA: 30**

Lab exercises using a spread sheet tool for:

1. Iterative Solutions
2. Simultaneous Solution of Equations
3. Interpolation
4. Measure of Central Tendency
5. Measure of dispersion
6. Correlation
7. Regression

Course Code: VACE-3221

Course Title: Environmental Studies

COURSE OUTCOMES:

After passing this course, students will be able to:

- CO1. Understand the concept and need of environmental education and role of an individual in conservation of natural resources.
- CO2. Learn about role of major Eco system and their conservation and Develop desirable attitude, value and respect for protection of Biodiversity.
- CO3. Learn about the control measure of pollution and solid waste management and climate change and global warming.
- CO4. Knowledge regarding welfare programmes and Human rights and understand the role of different agencies in the protection of environment

Course Code: VACE-3221

Course Title: Environmental Studies

(Theory)

Time: 3 Hrs. **Max. Marks: 50**

Credit: 2-0-0 **Theory: 35**

CA: 15

Instructions for the Paper Setter:

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

Unit I

1. **The multidisciplinary nature of environmental studies**
   - Definition, scope and importance, Need for public awareness

2. **Natural resources and associated problems.**

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

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

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

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

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

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

erosion and desertification.

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

Unit II

3. Ecosystems

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

4. Biodiversity and its conservation

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

Unit III

5. Environmental Pollution

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

6. Social Issues and the Environment

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

Unit IV

7. Human Population and the Environment

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

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

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

References:

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

GENDER SENSITIZATION PROGRAMME

2025-26

Course Title: GENDER SENSITIZATION PROGRAMME

Nature of Course: Audit Course (Value Added)

Course Duration: 30 hours

Course intended for: Semester III students of the undergraduate degree program.

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

Objectives of the Course:

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

Learning Outcomes:

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

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

CURRICULUM

Course Code: VACG 3531 **Total contact hours: 30**

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

Bachelor of Arts / Bachelor of Science (Medical) / Bachelor of Science (Non-Medical) / Bachelor of Science (Computer Science) / Bachelor of Science (Economics)/ Bachelor of Commerce/ Bachelor of Business Administration (Three Year Degree Programme)

&

Bachelor of Arts (Honours) / Bachelor of Science (Medical) (Honours) / Bachelor of Science (Non-Medical) (Honours) / Bachelor of Science (Computer Science) (Honours) / Bachelor of Science (Economics) (Honours)/ Bachelor of Commerce (Honours) / Bachelor of Business Administration (Honours) (Four Year Degree Programme)

(Semester IV)

Session 2025-26

APPRECIATING ENGLISH LITERATURE-II

Course Code: BARL/BSML/BSNL/BCSL/BECL/BCRL/BBRL -4212

(NEP-2020)

COURSE OUTCOMES

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

CO 1: change the narration and voice of sentences after understanding fundamental grammatical rules governing them through the study of "English Grammar in Use" by Raymond Murphy

CO 2: to learn to write personal letters and enhance the writing skills

CO 3: comprehend the meaning of texts and answer questions related to situations, episodes, themes and characters depicted in them through the study of the stories in the text "Tales of Life".

CO 4: appreciate the writings of various Indian and foreign story and Short - Story writers and relate them to their socio-cultural milieu through the study of the stories in the text "Tales of Life".

Bachelor of Arts / Bachelor of Science (Medical) / Bachelor of Science (Non-Medical) / Bachelor of Science (Computer Science) / Bachelor of Science (Economics)/ Bachelor of Commerce/ Bachelor of Business Administration (Three Year Degree Programme)

&

Bachelor of Arts (Honours) / Bachelor of Science (Medical) (Honours) / Bachelor of Science (Non-Medical) (Honours) / Bachelor of Science (Computer Science) (Honours) / Bachelor of Science (Economics) (Honours)/ Bachelor of Commerce (Honours) / Bachelor of Business Administration (Honours) (Four Year Degree Programme)

(Semester IV)

Session 2025-26

APPRECIATING ENGLISH LITERATURE-II

Course Code: BARL/BSML/BSNL/BCSL/BECL/BCRL/BBRL -4212

Max. Marks: 100

Examination Time: 3 Hrs. **Theory: 70**

CA: 30

Instructions for the Paper Setters:-
Eight questions are to be set, two from each of the four Units (I-IV). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section. Each question will carry 14 marks. (14x5=70)

UNIT-I

English Grammar in Use, 5th Edition by Raymond Murphy, CUP (Revision of Units: 26-37, 42-48, 92-97,113-120)

UNIT-II

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

UNIT-III

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

UNIT-IV

Paragraph writing, Business Letters, Writing Emails

Texts Prescribed:

1.English Grammar in Use (Fourth Edition) by Raymond Murphy, CUP
2.*Moments in Time*
3. *Making Connections*

Session 2025-26

BACHELOR OF ARTS / BACHELOR OF SCIENCE (MEDICAL) / BACHELOR OF SCIENCE (NON MEDICAL) / BACHELOR OF SCIENCE (COMPUTER SCIENCE) / BACHELOR OF SCIENCE (ECONOMICS) / BACHELOR OF COMMERCE / BACHELOR OF BUSINESS ADMINISTRATION (Semester IV)

Punjabi (Compulsory)

COURSE CODE- BARL/BSML/BSNL/BCSL/BECL/BCRL /BBRL-4421

COURSE OUTCOMES

CO1: 'ਗਲੀਏ ਚਿਕੜੁ ਦੂਰਿ ਘਰੁ' (ਸਵੈ ਜੀਵਨੀ) ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਸਵੈ ਜੀਵਨੀ ਸਾਹਿਤ ਰੂਪ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ।

CO2: 'ਫ਼ਾਸਲੇ' (ਨਾਟਕ) ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਨਾਟਕ ਨੂੰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਨਾਟਕ ਜਗਤ ਨਾਲ ਜੋੜਣਾ ਹੈ।

CO3: ਲੇਖ ਰਚਨਾ ਅਤੇ ਅਖ਼ਬਾਰ ਵਿਚ ਇਸ਼ਤਿਹਾਰ ਲਿਖਣਾ ਸਿਖਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਇਸ ਕਲਾ ਵਿਚ ਨਿਪੁੰਨ ਕਰਨਾ ਹੈ।

CO4: ਸ਼ਬਦ ਜੋੜਾਂ ਦੇ ਨਿਯਮ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰਨ ਦਾ ਮਕਸਦ ਵਿਦਿਆਰਥੀਆਂ ਦੁਆਰਾ ਲਿਖ਼ਤ ਵਿਚ ਕੀਤੀਆਂ ਜਾਣ ਵਾਲੀਆਂ ਗਲਤੀਆਂ ਨੂੰ ਸੁਧਾਰਨਾ ਹੈ। ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ -ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

Session 2025-26

BACHELOR OF ARTS / BACHELOR OF SCIENCE (MEDICAL) / BACHELOR OF SCIENCE (NON MEDICAL) / BACHELOR OF SCIENCE (COMPUTER SCIENCE) / BACHELOR OF SCIENCE (ECONOMICS) / BACHELOR OF COMMERCE / BACHELOR OF BUSINESS ADMINISTRATION (Semester IV)

Punjabi (Compulsory)

COURSE CODE- BARL/BSML/BSNL/BCSL/BECL/BCRL /BBRL-4421

ਸਮਾਂ : 3 ਘੰਟੇ	**Maximum Marks: 100**
L-T-P	**Theory : 70**
4-0-0	**CA :30**

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

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

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

3. **ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 14 ਅੰਕ ਹਨ।**

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

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਗਲੀਏ ਚਿਕੜੁ ਦੂਰਿ ਘਰੁ (ਸਵੈ ਜੀਵਨੀ): ਸ.ਸ.ਵਣਜਾਰਾ ਬੇਦੀ, ਕਸਤੂਰੀ ਲਾਲ ਐਂਡ ਸੰਨਜ਼, ਅੰਮ੍ਰਿਤਸਰ

(ਨਾਇਕ ਬਿੰਬ/ਸਵੈ ਜੀਵਨੀ ਦੇ ਤੌਰ ਤੇ ਪਰਖੋ/ਵਾਰਤਕ ਸ਼ੈਲੀ)

ਯੂਨਿਟ-II

ਫ਼ਾਸਲੇ (ਨਾਟਕ) :ਜਤਿੰਦਰ ਬਰਾੜ,

(ਵਿਸ਼ਾ ਵਸਤੂ/ਸਾਰ)ਨਾਟਕ ਕਲਾ)

ਯੂਨਿਟ-III

(ੳ) ਲੇਖ ਰਚਨਾ (ਸਮਾਜਕ, ਸਭਿਆਚਾਰਕ, ਇਤਿਹਾਸਕ ਅਤੇ ਵਿਦਿਅਕ ਸਰੋਕਾਰਾਂ ਸੰਬੰਧੀ)

(ਅ) ਅਖ਼ਬਾਰ ਵਿਚ ਇਸ਼ਤਿਹਾਰ

ਯੂਨਿਟ-IV

ਵਿਆਕਰਣ

(ੳ) ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦ ਜੋੜਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨਾ

(ਅ) ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ

Session 2025-26

BACHELOR OF ARTS / BACHELOR OF SCIENCE (MEDICAL) / BACHELOR OF SCIENCE (NON MEDICAL) / BACHELOR OF SCIENCE (COMPUTER SCIENCE) / BACHELOR OF SCIENCE (ECONOMICS) / BACHELOR OF COMMERCE / BACHELOR OF BUSINESS ADMINISTRATION SEMESTER–IV

Basic Punjabi (In lieu of Punjabi Compulsory)

COURSE CODE- BARL/BSML/BSNL/BCSL /BECL/BCRL /BBRL-4031

Course outcomes

CO1: ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਦੇ ਵਿਦਿਆਰਥੀ 'ਆਤਮ ਅਨਾਤਮ' (ਕਵਿਤਾ ਭਾਗ) ਦੇ ਨਾਮਵਰ ਕਵੀਆਂ ਮੋਹਨ ਸਿੰਘ,ਜਗਤਾਰ,ਸੁਰਜੀਤ ਪਾਤਰ,ਪਾਸ਼ ਦੀਆਂ ਰਚਨਾਵਾਂ ਦੀ ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ ਤੋਂ ਜਾਣੂ ਹੋਣਗੇ।

CO2: ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਦੇ ਵਿਦਿਆਰਥੀ 'ਆਤਮ ਅਨਾਤਮ' (ਕਵਿਤਾ ਭਾਗ) ਦੇ ਵੱਖੋ ਵੱਖਰੀਆਂ ਧਾਰਾਵਾਂ ਨਾਲ ਸਬੰਧਤ ਮੋਹਨ ਸਿੰਘ,ਜਗਤਾਰ,ਸੁਰਜੀਤ ਪਾਤਰ,ਪਾਸ਼ ਦੀਆਂ ਰਚਨਾਵਾਂ ਦੇ ਸਾਰ ਤੋਂ ਜਾਣੂ ਹੋਣਗੇ।

CO3: ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਦੇ ਵਿਦਿਆਰਥੀ 'ਆਤਮ ਅਨਾਤਮ' (ਕਵਿਤਾ ਭਾਗ) ਦੇ ਵੱਖੋ ਵੱਖਰੀਆਂ ਧਾਰਾਵਾਂ ਨਾਲ ਸਬੰਧਤ ਮੋਹਨ ਸਿੰਘ,ਜਗਤਾਰ,ਸੁਰਜੀਤ ਪਾਤਰ,ਪਾਸ਼ ਕਵੀਆਂ ਦੇ ਜੀਵਨ ਅਤੇ ਰਚਨਾ ਤੋਂ ਜਾਣੂ ਹੋਣਗੇ।

CO4: ਲੇਖ ਰਚਨਾ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਬੁੱਧੀ ਨੂੰ ਤੀਖਣ ਕਰਦਿਆਂ ਉਨਾਂ ਦੀ ਲਿਖਣ ਪ੍ਰਤਿਭਾ ਨੂੰ ਉਜਾਗਰ ਕਰਨਾ ਹੈ।ਸ਼ਬਦ ਜੋੜਾਂ ਦੇ ਨਿਯਮ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰਨ ਦਾ ਮਕਸਦ ਵਿਦਿਆਰਥੀਆਂ ਦੁਆਰਾ ਲਿਖਤ ਵਿਚ ਕੀਤੀਆਂ ਜਾਣ ਵਾਲੀਆਂ ਗਲਤੀਆਂ ਨੂੰ ਸੁਧਾਰਨਾ ਹੈ।

Session 2025-26

BACHELOR OF ARTS / BACHELOR OF SCIENCE (MEDICAL) / BACHELOR OF SCIENCE (NON MEDICAL) / BACHELOR OF SCIENCE (COMPUTER SCIENCE) / BACHELOR OF SCIENCE (ECONOMICS) / BACHELOR OF COMMERCE / BACHELOR OF BUSINESS ADMINISTRATION SEMESTER–IV

Basic Punjabi (In lieu of Punjabi Compulsory)

COURSE CODE- BARL/BSML/BSNL/BCSL /BECL/BCRL /BBRL-4031

ਸਮਾਂ : 3 ਘੰਟੇ **Maximum Marks: 100**

L-T-P
4-0-0

Theory : 70
CA : 30

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

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

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

3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 14 ਅੰਕ ਹਨ।

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

ਪਾਠਕ੍ਰਮ

ਯੂਨਿਟ-I

ਆਤਮ ਅਨਾਤਮ (ਕਵਿਤਾ ਭਾਗ)(ਸੰਪਾਦਕ ਡਾ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਡਾ.ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ)

ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ

ਯੂਨਿਟ-II

ਆਤਮ ਅਨਾਤਮ (ਕਵਿਤਾ ਭਾਗ)(ਸੰਪਾਦਕ ਡਾ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਡਾ.ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ)

ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

(ਸਾਰ /ਵਿਸ਼ਾ ਵਸਤੂ)

ਯੂਨਿਟ-III

ਆਤਮ ਅਨਾਤਮ (ਕਵਿਤਾ ਭਾਗ)(ਸੰਪਾਦਕ ਡਾ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਡਾ.ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ

ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

(ਕਵੀਆਂ ਦੇ ਜੀਵਨ ਅਤੇ ਰਚਨਾ ਬਾਰੇ ਮੁੱਢਲੀ ਜਾਣਕਾਰੀ)

ਯੂਨਿਟ-IV

ਲੇਖ ਰਚਨਾ

ਅਸ਼ੁੱਧ ਸ਼ਬਦ ਜੋੜਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਕੇ ਲਿਖਣਾ

Bachelor of Arts (Honours) / Bachelor of Science (Medical) (Honours) / Bachelor of Science (Non- Medical) (Honours) / Bachelor of Science (Computer Science)(Honours) / Bachelor of Science (Economics) (Honours) / Bachelor of Commerce (Honours) / Bachelor of Business Administration (Honours)

(Semester IV)
Session: 2025-26
COURSE TITLE: PUNJAB HISTORY AND CULTURE
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

COURSE CODE: BARL-4431/BSML-4431/BSNL-4431/BCSL-4431/BECL-4431BCRL-4431/BBRL-4431

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:understand the adoption of new policy by Guru Hargobind and martyrdom of Guru Tegh Bahadur

CO 2: To understand the factors leading to the establishment of Khalsa Panthand its impact

CO 3: Have deep insight into the conflict with Mughals and the rise of Banda Singh Bahadur and aftermath.

CO 4: Understand the administration under Maharaja Ranjit Singh, also the fairs, festivals and folk music of Punjab.

Bachelor of Arts (Honours) / Bachelor of Science (Medical) (Honours) / Bachelor of Science (Non- Medical) (Honours) / Bachelor of Science (Computer Science) (Honours) / Bachelor of Science (Economics) (Honours) / Bachelor of Commerce (Honours) / Bachelor of Business Administration (Honours)

(Semester IV)
Session: 2025-26

COURSE TITLE: PUNJAB HISTORY AND CULTURE

(Special paper in lieu of Punjabi Compulsory)

(For those students who are not domicile of Punjab)

COURSE CODE: BARL-4431/BSML-4431/BSNL-4431/BCSL-4431/BECL-4431/BCRL-4431/BBRL-4431

Examination Time: 3 Hours — Max. Marks: 100
Credits L-T-P: 4-0-0 — Theory: 70
Contact Hours: 4 Hrs/Week — CA: 30

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 800 words, by at least selecting One Question from each Unit and the 5th question may be attempted from any of the four Units.
4. Each question will carry 14 marks

UNIT I

1. Transformation of Sikhism under Guru Hargobind.
2. Martydom 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

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

Bachelor of Science (Honours)
Semester–IV
Session: 2025-26
Course Title: Mathematics (Analysis)
Course Code: BCSL/ BSNL-4333

Course Outcomes

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

CO 1: Demonstrate an understanding of limits and how they are used in sequences.

CO 2: Understanding how limits are used in series and apply various test on series.

CO 3: To understand the concepts of Riemann sum, partitions, upper and lower sums, Riemann Inerrability of continuous functions and of monotone functions. Distinguish between the absolute convergence and conditional convergence.

CO 4: To know Conditions for existence of improper integrals, Tests for the convergence of the improper integrals of different kinds, Absolute convergence.

Bachelor of Science (Honours)

Semester–IV
Session: 2025-26
Course Title: Mathematics (Analysis)
Course Code: BCSL/ BSNL-4333

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

L T P **Theory: 70**

4 0 0 **CA: 30**

Instructions for the Paper Setter: Eight questions of equal marks (14 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, Subsequence, Limit point of a sequence, Theorems on limits of sequences, Convergence and divergence of a sequence, Bounded and monotonic sequences and their behavior, Squeeze Theorem on sequences, Bolzano-Weierstrass theorem (statement only), Definition of Cauchy sequence, Cauchy's convergence Criterion, Cauchy's first theorem on limits with its applications, Cauchy's second theorem on limits with its applications.

Unit II

Series of non-negative terms, Convergence and divergence of infinite series, Cauchy convergence criterion for series, Comparison tests for convergence. Cauchy's condensation test, Cauchy's integral test, Cauchy's root test, D'Alembert's ratio test, Comparison between Cauchy's root test and D'Alembert's ratio test, Logarithmic test, Gauss test, Alternating series, Leibnitz's test.

Unit III

Partition of an interval, Riemann upper and lower sums, Riemann upper and lower integrals, Riemann integrability, Necessary and sufficient conditions for a bounded function to be Riemann integrable, Riemann integrability of continuous functions, monotone functions, and composition of functions, Darboux theorem, Fundamental Theorem of calculus.

Unit IV

Improper integrals, Conditions for existence of improper integrals, Tests for the convergence of the improper integrals of different kinds, Absolute convergence.

Bachelor of Science (Honours)
Semester–IV
Session: 2025-26
Course Title: Analysis Laboratory
Course Code: BCSP/ BSNP-3333

Examination Time: 3 Hours **Max. Marks: 50**
Practical: 35
L T P **CA: 15**
0 0 1

List of Practicals (using any package)

1. Generate bounded sequences.
2. Visualize bounded sequences using plots.
3. Study the convergence of sequences through plotting.
4. Visualize monotonic sequences using plots.
5. Investigate convergence of series.
6. Visualization of convergence tests: Cauchy Root test and D' Alembert Ratio test.
7. Approximating radius of convergence of a power series.

Text Books:-

1. S.S. Sastry, Engineering Mathematics - Volume I (4th Edition), PHI, 2008.
2. S.S. Sastry, Engineering Mathematics - Volume II (4th Edition), PHI, 2008.

Bachelor of Science/Honours
Credit Based Continuous Evaluation Grading System (CBCEGS)
(Under NEP 2020)
(Session: 2025-26)
(Semester IV)
COURSE CODE: BSNL/BSML-4084
COURSE TITLE: Chemistry (Inorganic Chemistry-II: Periodic Table and Coordination Chemistry)

Course outcomes:

Students will be able to

CO1 : Explain the periodic trends, chemical properties, and structures of p-block elements and their compounds, including sulphur and halogen oxoacids, interhalogens, and industrial processes like the Contact Process for sulphuric acid.

CO2 : Compare and contrast the electronic structure, oxidation states, and magnetic properties of d- and f-block elements, including the effects of lanthanide and actinide contraction and their analytical applications.

CO3 : Analyze the structure, bonding, stability, and stereochemistry of coordination compounds using Werner's theory, valence bond theory, and ligand field considerations.

CO4: Interpret electronic spectra of transition metal complexes using Orgel diagrams and selection rules, and describe the structure, bonding, and reactivity of organometallic compounds including their role in catalysis

Bachelor of Science/Honours
Credit Based Continuous Evaluation Grading System (CBCEGS)
(Under NEP 2020)
(Session: 2025-26)
(Semester IV)
COURSE CODE: BSNL/BSML-4084
COURSE TITLE: Chemistry (Inorganic Chemistry-II: Periodic Table and Coordination Chemistry)

Exam Time: 3Hrs. **Max. Marks: 100**
Credit(L-T-P): 4-0-0 **(Theory: 70, CA: 30)**

Instructions for the Paper Setters: Eight questions of equal marks (fourteen 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 subdividedinto 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 (15 Hrs.)

p–Block Elements: Group 16: General characteristics: atomic radii, Ionisation energies, Melting and boiling point, Electron affinity, Oxidation state, Catenation, Elemental state, Allotropy, Hydrides of group 16, Chemical properties of SO_2, structure of SO_2 & SO_3, Oxoacid of sulphur: structure and basicity. Preparation of sulphuric acid by contacts process and its chemical properties

Group 17: General characteristics: atomic radii, Ionisation energies, melting and boiling point, Electron affinity, Electronegativity, Non-metallic character, colour, Oxidation state and reactivity**,** Hydrides of group 17, Relative acidic strength of hydro acids and Oxoacids of group 17, structure of interhalogen compounds and polyhalides.

Important compounds of p-block: Carbides, fluorocarbons, Silicones and phosphazenes, triphosphazenes.

UNIT -II (15 Hrs.)

Chemistry of Transition Elements: General characteristics of Transition Elements. Properties of the elements of the first transition series, Relative stability of their oxidation state. Coordination number and geometry. General characteristics of elements of Second and Third Transition Series. Difference in the properties of first transition elements with second and third transition series elements in respect of ionic radii, oxidation states, magnetic behaviour.

***f*-block elements**: Lanthanoids: Electronic configurations, oxidation states, ionic radii, lanthanide contraction, colour, spectral and magnetic properties, lanthanum compounds. Actinoids: electronic configurations, oxidation states, ionic radii, actinide contraction, colour, spectral and magnetic properties. Comparison of lanthanoids and actinoids and their analytical applications.

UNIT-III (15 Hrs.)

Coordination Compounds: Nomenclature of coordination compounds, Werner's coordination theory, effective atomic number, polydentate, chelating ligands and chelation, factors affecting stability of chelates, structural and stereoisomerism in coordination compounds with co-ordination number 4 and 6, resolution of racemic mixture, Valence bond theory of transition metal complexes, hybridization and geometry of complexes of Cr, Fe, Co, Cu and its ions, Magnetic properties and colour of coordination compounds.

Transition Metal complexes: an elementary idea of crystal field theory, Jahn-Teller effects. methods of determining magnetic susceptibility by Gouy's and Faraday method. L-S coupling, correlation of μs and μeff values, Nucleophilic Substitution reactions in square planar complexes

UNIT-IV (15 Hrs.)

Electronic Spectra of Transition Metal Complexes: Types of electronic transitions, selection rules and relaxations, splitting of Russel-Saunder states in octahedral and tetrahedral, spectrochemical series, Orgel diagram of one electron-one hole system and two electron-two hole system in octahedral and tetrahedral complexes. Limitation of Orgel diagram.

Organometallic Compounds: Definition, nomenclature and classification of organometallic compounds. σ and π complexes, types of organoligands, EAN rule, bonding in organometals, Preparation, properties, bonding and applications of alkyl lithium and organoaluminium compounds (AlR_3). Metal olefin complexes, bonding in metal-ethylenic complexes, Mechanism of homogeneous hydrogenation reactions of alkene. Metal carbonyls: examples and bonding.

Books suggested

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

Bachelor of Science/Honours
Credit Based Continuous Evaluation Grading System (CBCEGS)
(Under NEP 2020)
(Session: 2025-26)
(Semester IV)
COURSE CODE: BSNP/BSMP-4084
COURSE TITLE: Chemistry (Inorganic Chemistry-II Lab: Volumetric/Gravimetric Analysis and Preparations)

Course outcomes:

Students will be able to analyze the given organic compound through

CO1: Perform volumetric titrations for the quantitative analysis of substances such as acetic acid, antacids, and water hardness using appropriate indicators and standard solutions.

CO2: Apply redox titration techniques (e.g., permanganometry, dichromate method, iodometry) to estimate metal ions like calcium, iron, and copper with accuracy and precision.

CO3: Execute gravimetric analysis procedures for the estimation of metal ions like copper, nickel, and silver through selective precipitation and weighing of pure compounds.

CO4: Synthesize and characterize simple inorganic compounds such as Prussian Blue, potash alum, and copper acetylacetonate, demonstrating understanding of coordination chemistry and crystallization techniques

Bachelor of Science/Honours
Credit Based Continuous Evaluation Grading System (CBCEGS)
(Under NEP 2020)
(Session: 2025-26)
(Semester IV)
COURSE CODE: BSNP/BSMP-4084
COURSE TITLE: Chemistry (Inorganic Chemistry-II Lab: Volumetric/Gravimetric Analysis and Preparations)

Time: 3 Hrs **Marks: 50**
Credits: 0-0-2 **(Practical: 35, CA: 15)**

Volumetric Analysis

1. Determination of acetic acid in commercial vinegar using NaOH.
2. Determination of alkali content-antacid tablet using HCl.
3. Estimation of calcium content in chalk as calcium oxalate by permanganometry.
4. Standardisation of EDTA with $Pb(NO_3)_2$ / $ZnSO_4 \cdot 7H_2O$ and Estimation of hardness of water by EDTA.
5. Estimation of ferrous and ferric by dichromate method.
6. Estimation of copper using sodium thiosulphate.

Gravimetric Analysis

Analysis of Cu as CuSCN; Ni as Ni (dimethylgloxime) and Determination of silver(I) as its chloride

Inorganic Preparations

Synthesis of Iron(III) Hexacyanoferrate(II) $Fe_4[Fe(CN)_6]_3$ (Prussian Blue). Preparation of Potassium Aluminum Sulfate $KAl(SO_4)\cdot 12\ H_2O$ (Potash Alum) Preparation of bis Acetylacetonate Copper(II) $Cu(O_2C_5H_7)_2$.

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.
8. Marr, G. and Rockett, B.W. Practical Inorganic Chemistry, 1972.

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER-IV

PHYSICS (QUANTUM PHYSICS)

(Session-2025-26)

Course code: BSNL-4395 for Bachelor of Science (Non Medical)
BCSL-4395 for Bachelor of Science (Computer Science)

COURSE OUTCOMES:

After passing this course, students will be able to:

CO1: Understand and explain the fundamental principles leading to the development of quantum mechanics, including wave-particle duality, the De Broglie hypothesis, uncertainty principle, and the photoelectric and Compton effects.

CO2: Apply the operator formalism in quantum mechanics to calculate expectation values, understand the Ehrenfest theorem, and work with Hermitian operators, eigenfunctions, and eigenvalues.

CO3: Solve one-dimensional quantum mechanical problems using the Schrödinger equation, such as step potentials, potential barriers, and particle in a box, and explain phenomena like quantum tunneling.

CO4: Analyze three-dimensional quantum systems, including the particle in a 3D box, the 3D harmonic oscillator, and the hydrogen atom, using Cartesian and spherical coordinate solutions of the Schrödinger equation.

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER–IV

(Session-2025-26)

PHYSICS (QUANTUM PHYSICS)

Course code: BSNL-4395 for Bachelor of Science (Non Medical)
BCSL-4395 for Bachelor of Science (Computer Science)

Credits: 4-0-0 **Max Marks: 100 (ESE Marks: 70, CA: 30)**
Examination Time: 3 Hours **Pass Mark: 25**
Instructions for the Paper Setters:

Eight questions of equal marks (specified in the syllabus) are to be set, two in each of the four sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section. Each question carries 14 marks.
Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I
Formalism of Wave Mechanics:
Brief introduction to need and development of quantum mechanics, photoelectric effect, Compton effect, Wave particle duality, De broglie hypothesis, Uncertainty principle, Gaussian wave packet, Operator correspondence, Normalization and probability interpretation of wave function, Superposition principle.

UNIT–II
Expectation value, Probability current and conservation of probability, Admissibility conditions of wave function, Ehrenfest theorem, Eigen function and Eigen value, Operator formalism, orthogonal system, expansion in eigen functions, Hermitian operator, simultaneous eigen function, equation of motion.

UNIT–III
Application of Schrodinger wave equation to one dimensional problems:
Application of Schrodinger Equation for solving one dimensional problems: Fundamental postulates of wave mechanics, Schrodinger's wave equation for a free particle and equation of a particle subject to forces. One dimensional step potential for $E>V_0$, one dimensional step potential for $0<E<V_0$, one dimensional potential barrier of finite height and width, Quantum mechanical tunnelling effect, particle in one dimensional box with infinitely hard walls, one dimensional square well of finite depth

UNIT–IV
Application of Schrodinger equation to three dimensional problems:
Free particle in three dimensional rectangular box, Eigen wave function, Eigenvalues of momentum, energy and degeneracy, three dimensional harmonic oscillator (Cartesian coordinates) wave function, energy levels, degeneracy, Schrodinger's wave equation in spherical polar coordinates, Schrodinger wave equation for spherically symmetric potential for hydrogen atom, wave function of H atom, solution of R(r),∪(),√() equations.

Text Reference Books:

1. A Text book of Quantum Mechanics by P.M. Mathews and K. Venkatesan,(Tata McGraw Hill Pub. Co. Delhi) 2002.
2. Quantum Mechanics by J.L. Powell and B. Craseman (Narosa Pub. House, New Delhi) 1997.
3. Concepts of Modern Physics by Arthur Beiser (McGraw Hill Pub. Co., New Delhi, 9th Ed.) 1995.
4. Elements of Modern Physics by S.H. Patil (McGraw Hill), 1998.

5. Quantum Mechanics by E. Merzbacher (John Wiley, 2nd Edition)
6. Fundamentals of Molecular Spectroscopy by C.N. Banwell (Tata McGraw Hill Pub. Co.Delhi), 2001.
7. Atomic Spectra by H.G. Kuhn (Longmans), 2nd Ed., 1969.
8. Introduction to Quantum Mechanics by L. Pauling and E.B. Wilson (Tata McGraw Hill Pub. Co., Delhi), 2002.
9. Quantum Mechanics by W. Greiner (Springer Verlag), 1994.
10. Fundamentals of Molecular Spectroscopy by C.B. Banwell-Tata McGraw Hill, 1986.
11. Molecular Spectroscopy: Jeanne L McHale.

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER–IV

(Session-2025-26)

Course Title: THERMAL AND MODERN PHYSICS LAB (PRACTICAL)

Course code: BSNP-4395 for Bachelor of Science (Non Medical)

BCSP-4395 for Bachelor of Science (Computer Science)

COURSE OUTCOMES:

After passing this course, students will be able to:

CO1: Perform and analyze thermal experiments to determine physical properties such as thermal conductivity, adiabatic expansion, and heating efficiency, using methods like Lee's method and controlled electric heating.

CO2: Investigate thermoelectric and optical phenomena by plotting the calibration curve of a thermocouple, studying the absorption spectra of iodine vapors, and analyzing the inverse square law using a photovoltaic cell.

CO3: Explore the principles of quantum physics by conducting experiments related to the photoelectric effect, determining Planck's constant, and measuring the ionization potential of mercury.

CO4: Demonstrate understanding of polarization and optical activity by using a polarimeter to measure the rotation of the plane of polarization and determine the specific rotation of sugar.

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER–IV

(Session-2025-26)

THERMAL AND MODERN PHYSICS LAB (PRACTICAL)

Course code: BSNP-4395 for Bachelor of Science (Non Medical)
BCSP-4395 for Bachelor of Science (Computer Science)

Credits: 0-0-2 **Max Marks: 50 (ESE Marks: 35, CA: 15)**
Examination Time: 3 Hours **Pass Mark: 13**

Instructions to Practical Examiner

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

General Guidelines for Practical Examination

The distribution of marks is as follows :
i) One experiment 15 Marks
ii) Brief Theory 7 Marks
iii) Viva–Voce 7 Marks
iv) Record (Practical file) 6 Marks

II. There will be one session of 2 hours duration. The paper will have one session. Paper will consist of 8 experiments, out of which an examinee will mark 6 experiments and one of these is to be allotted by the external examiner.

III. The number of candidates in a group for practical examination should not exceed 12.

IV. In a single group, no experiment should be allotted to more than three examinees.

List of Experiments

1. To study adiabatic expansion of gas and hence to calculate the value of Volume.
2. To find the coefficient of Thermal Conductivity of a bad conductor by Lee's method.
3. To plot a calibration curve of a given thermocouple (copper constantan) using a potentiometer.
4. To study the photoelectric effect and determine the value of Planck's constant.
5. To determine the ionization potential of mercury.
6. Study of variation of light intensity with distance using photovoltaic cell (Inverse Square Law)
7. To determine the heating efficiency of an electric kettle with varying voltage.
8. To study the absorption spectra of iodine vapours.
9. To study the rotation of the plane of polarization by using a polarimeter.
10. To determine the specific rotation of sugar using Laurent's half shade polarimeter
11. To study the characterizations of Photovoltaic cells.

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER-IV

(Session-2025-26)

Course code: BSNM-4390 for Bachelor of Science (Non Medical)

BCSM-4390 for Bachelor of Science (Computer Science)

APPLIED OPTICS

PHYSICS SKILL ENHANCEMENT COURSE (SEC-1)

COURSE OUTCOMES:

After passing this course, students will be able to:

CO1: Understand and analyze the principles of interference of light, including the formation of interference patterns using Young's double slit, Fresnel biprism, thin films, Newton's rings, and interferometers such as Michelson, Fabry-Perot, and Mach-Zehnder.

CO2: Apply Fresnel and Fraunhofer diffraction theory to analyze diffraction patterns through rectangular and circular apertures, and evaluate the resolving power of optical instruments like telescopes, microscopes, and diffraction gratings.

CO3: Demonstrate understanding of light polarization through various phenomena including reflection, double refraction, and use of Nicol prisms and retardation plates, and analyze the production and analysis of polarized light using optical devices.

CO4: Explain the working principles of lasers by understanding stimulated emission, Einstein coefficients, population inversion, laser types (e.g., Ruby, Nd:YAG, He-Ne, CO_2), and their applications in holography and optical fiber communication.

Bachelor of Science (Semester System) (12+3 System of Education)

SEMESTER-IV

(Session-2025-26)

Course code: BSNM-4390 for Bachelor of Science (Non Medical)

BCSM-4390 for Bachelor of Science (Computer Science)

APPLIED OPTICS

PHYSICS SKILL ENHANCEMENT COURSE (SEC-1)

Credits: 3-0-0 **Max Marks: 100 (ESE Marks: 70, CA: 30)**

Examination Time: 3 Hours **Pass Mark: 25**

Instructions for the Paper Setters:

Eight questions of equal marks (specified in the syllabus) are to be set, two in each of the four sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section. Each question carries 14 marks.

Note: Students can use Non-Scientific calculators or logarithmic tables.

UNIT–I

Interference of Light:

Superposition of light waves and interference, Young's double slit experiment, Conditions for sustained interference pattern, Coherent sources of light, spatial and temporal coherence Interference pattern by division of wave front, Fresnel Biprism, Displacement of fringes, Change of phase on reflection, Interference in thin films due to reflected and transmitted light, Newton's Rings. Michelson Interferometer, Fabry Perot and Mach Zehnder Interferometer.

UNIT–II

Diffraction:

Fresnel theory of diffraction, half-period zones, Zone plate, Distinction between Fresnel and Fraunhoffer diffraction. Fraunhoffer diffraction at rectangular and circular apertures, Resolving power of telescope in diffraction grating, its use as a spectroscopic element and its resolving power, Resolving power of microscope

UNIT–III

Polarization:

Plane Polarized light, Elliptically polarized light, wire grid polarizer, Sheet polarizer, Mauls' Law, Brewester Law, Polarization by reflection and scattering, Double reflection, Nicol prism, Retardation plates, Production and Analysis of polarized light, Quarter and half wave plates.

UNIT–IV

Laser Fundamentals:

Derivation of Einstein relations, Concept of stimulated emission and population inversion, broadening of spectral lines, three level and four level laser schemes, elementary theory of optical cavity, longitudinal and transverse modes, Components of laser devices, condition for laser action, types of lasers, (Ruby and Nd:YAG lasers, He-Ne and CO2 lasers) construction, mode of creating population inversion and output characteristics, application of lasers –a general outline. Holography and its applications, Optical fibres, design, basic principle, numerical aperture, applications of fibres in optical communication.

Text Reference Books:

1.Fundamentals of Optics: F.A. Jenkins and Harvey E White, (Megraw Hill) 4th Edition, 2001.

2. Optics: Ajoy Ghatak, (McMillan India) 2nd Edition, 7th Reprint, 1997

3. Optics: Born and Wolf, (Pergamon Press) 3rd Edition, 1965.

4. Laser Fundamentals: W.T. Silfvast (Foundation Books), New Delhi, 1996.

5. Laser and Nonlinear Optics: B.B. Laud (New Age Pub.) 2002

6. Laser: Svelto, Plenum Press) 3rd Edition, New York.

7. Optical Electronics, K. Thyagrajan and Ajoy K. Ghatak, Cambridge University Press

Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/ Bachelor of Science (Economics) (Honours) Semester- IV

(Session 2025-26)

Course Code: BARM-4134

BCSM-4134

BECM-4134

COMPUTER SCIENCE

(DATA STRUCTURES)

Course Outcomes:

After passing course the student will be able to:

CO1: Analyze complexity of algorithms to determine their efficiency.

CO2: Comprehend various hashing method, sorting and searching algorithms.

CO3: Comprehend various operations of stack and queue along with different scenarios.

CO4: Comprehend advanced data structures such as tree and graph.

Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/ Bachelor of Science (Economics) (Honours) Semester- IV

(Session 2025-26)

Course Code: BARM-4134

BCSM-4134

BECM-4134

COMPUTER SCIENCE

(DATA STRUCTURES)

(THEORY)

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

Theory: 40

L-T-P: 3-0-1 **Practical:30**

Credits: 4 **CA: 30**

Instructions for 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 divided 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. The students can use Non–programmable/ scientific & Non–storage type calculator.

UNIT–I

Data Structures: Introduction to elementary data organization, Common Operation on Data Structures, Algorithm Complexity, Big O Notation, Time-Space Tradeoff between Algorithms.

Arrays: Array defining, representing arrays in memory, various operations on linear arrays, Multi-Dimensional arrays.

UNIT–II

Linked Lists: Types of Linked Lists, representing linked list in memory, advantages of using linked lists over arrays, various operations of linked lists.

Stacks: Description of stack structure, Implementation of stack, using arrays and linked lists, application of stack-converting, arithmetic expression from infix notation to polish notation and their subsequent evaluation, quicksort technique.

UNIT–III

Queues: Description of queue structure, Implementation of queue using arrays and linked lists, description or priorities of queues, deques.

Sorting and Searching: Sorting Algorithms, bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, searching Algorithms, linear search and binary search.

UNIT-IV

Trees: Description of Tree Structure and its Terminology, Binary Trees and Binary Search Trees and their representation in Memory, Heapsort.
Graphs: Description of Graph Structure, Implement Graphs in Memory using Adjacency Matrix, Path Matrix, graph traversal techniques - DFS, BFS.

References / Textbooks:

1. Seymour Lipschutz, Data Structures with C (Schaum's Outline Series), McGraw Hill Education (2017), 1st Edition
2. Reema Thareja, Data Structures Using C, Oxford Publication (2014), 2nd Edition
3. Sahni Horowitz, Fundamentals of Data Strucetures in C (2008), 2nd Edition
4. Narasimha Karumanchi, Data Structures and Algorithms made easy, Careermonk Publications (2016), 5th Edition
5. S.K. Srivastava and Deepali Srivastava, Data Structures through C, BPB Publications (2004)
6. Yedidyah Langsam, Augestein and Tanenbaum, Data Structures using C and C++, Pearson Education India (2015), 2nd Edition

Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/ Bachelor of Science (Economics) (Honours) Semester- IV

(Session 2025-26)

Course Code: BARM-4134

BCSM-4134

BECM-4134

COMPUTER SCIENCE

(DATA STRUCTURES)

(PRACTICAL)

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

Theory: 40

L-T-P: 3-0-1 **Practical:30**

Credits: 4 **CA: 30**

Lab Exercises based on Implementation of Data Structures using C:

- Searching (binary search, linear search)
- Sorting: Bubble Sort, selection sort, insertion sort, quick sort, merge sort, heap sort.
- Linked list
- Stacks (Using Arrays)
- Queues (Using Arrays)
- Trees – Traverse the BST
- Graphs-transversal, finding the shortest path