

**FACULTY OF SCIENCES**

**SYLLABUS**

**Of**

**Bachelor of Science (Non-Medical & Computer Science)  
(Semester I to II)**

**(Under Credit Based Continuous Evaluation Grading System)**

**(12+3 System of Education)**

**Session: 2023-24**



**The Heritage Institution**

**KANYA MAHA VIDYALAYA  
JALANDHAR  
(AUTONOMOUS)**

# Kanya Maha Vidyalaya, Jalandhar

(Autonomous)

## SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

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

Session-2023-24

<b>B.Sc. (Non-Medical) Semester-I</b>								
Course Code	Course Name	Course Type	Credits	Total	Ext.		CA	Examination time (in Hours)
					L	P		
BSNL-1421 BSNL-1031 BSNL-1431	Punjabi(Compulsory) <sup>1</sup> Basic Punjabi <sup>2</sup> Punjab History and Culture	C	4	100	80	-	20	3
BSNL-1212	English (Compulsory)	C	4	100	80		20	3
BSNM-1333	(I) Mathematics (Algebra)	E	4	175	80		20	3
	(II) Mathematics(Calculus and Trigonometry)		3		60		15	3
BSNM-1084	(I) Chemistry (Inorganic Chemistry)	E	2	175	40		10	3
	(II) Chemistry (Organic Chemistry)		3		60		15	3
	(P) Chemistry(Practical)		2			40	10	3
BCSM-3134	Computer Science (Computer Fundamentals and PC Software)	E	3		50	30	20	3
	(P) Computer Science (Computer Fundamentals and PC Software) (Practical)		1					3
BSNM-1395	(I) Physics (Mechanics)	E	3	175	60		15	3
	(II) Physics(Electricity and Magnetism)		2		40		10	3
	(P) Physics (Practical)		2			40	10	3
*AECD-1161	Drug Abuse: Problem, Management and Prevention (Compulsory)	AC						
*SECF-1492	Foundation Course	AC						

**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.

# Kanya Maha Vidyalaya, Jalandhar

(Autonomous)

## SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

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

Session-2023-24

#### B.Sc. (Non-Medical) Semester-II

Course Code	Course Name	Course Type	Credits	Total	Ext.		CA	Examination time (in Hours)
					L	P		
BSNL-2421 BSNL-2031 BSNL-2431	Punjabi(Compulsory) <sup>1</sup> Basic Punjabi <sup>2</sup> Punjab History and Culture	C	4	100	80	-	20	3
BSNL-2212	English (Compulsory)	C	4	100	80		20	3
BSNM-2333	(I) Mathematics (Calculus and Differential Equations)	E	4	175	80		20	3
	(II) Mathematics (Calculus)		3		60		15	3
BSNM-2084	(I) Chemistry (Inorganic Chemistry)	E	2	175	40		10	3
	(II) Chemistry (Physical Chemistry)		3		60		15	3
	(P) Chemistry(Practical)		2			40	10	3
BCSM-2134	Computer Science (Programming in C)	E	3	100	50	30	20	3
	(P) Computer Science (Programming in C) (Practical)		1					3
BSNM-2395	(I) Physics (Relativity and electromagnetism)	E	3	175	60		15	3
	(II) Physics(Vibration and Waves)		2		40		10	3
	(P) Physics (Practical)		2			40	10	3
*SECM-2502	Moral Education	AC	2	50	40		10	1

**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.

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code: BSNM-1421**for Bachelor of Science (Non-Medical)

**BCSM-1421**for Bachelor of Science (Computer Science)

**COURSE TITLE: PUNJABI (COMPULSORY)**

**COURSE OUTCOMES**

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

**CO2:** 'ਸੰਸਾਰ ਦੀਆਂ ਪ੍ਰਸਿਧ ਹਸਤੀਆਂ' ਜੀਵਨੀ ਦੀ ਵਿਧਾ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਜੀਵਨੀ ਨੂੰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਜੀਵਨੀ ਜਗਤ ਨਾਲ ਜੋੜਣਾ ਹੈ।

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

**CO4:** ਧੁਨੀ ਵਿਉਂਤ ਪੜ੍ਹਣ ਨਾਲ ਵਿਦਿਆਰਥੀ ਧੁਨੀਆਂ ਦੀ ਉਚਾਰਨ ਪ੍ਰਣਾਲੀ ਤੋਂ ਵਾਕਫ਼ ਹੋਣਗੇ।

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

**SEMESTER-I**

(Session-2023-24)

Course code: BSNM-1421 for Bachelor of Science (Non-Medical)

BCSM-1421 for Bachelor of Science (Computer Science)

**COURSE TITLE: PUNJABI (COMPULSORY)**

ਸਮਾਂ : 3 ਘੰਟੇ

**Maximum Marks: 100**

Theory : 80

CA : 20

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਦੋ ਰੰਗ (ਕਵਿਤਾ ਭਾਗ) (ਸੰਪਾ.ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿਲੋਂ ਅਤੇ ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

(ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ ਕਵਿਤਾ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂਸਾਰ)

16 ਅੰਕ

ਯੂਨਿਟ-II

ਸੰਸਾਰ ਦੀਆਂ ਪ੍ਰਸਿੱਧ ਹਸਤੀਆਂ (ਜੀਵਨੀ ਨੰ: 1 ਤੋਂ 9 ਤੱਕ)

(ਸੰਪਾ.ਪ੍ਰਿੰ. ਤੇਜਾ ਸਿੰਘ, ਹਰਨਾਮ ਸਿੰਘ ਸ਼ਾਨ), ਪੰਜਾਬੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

(ਵਿਸ਼ਾ-ਵਸਤੂ/ ਨਾਇਕ ਬਿੰਬ )

16 ਅੰਕ

ਯੂਨਿਟ-III

(ੳ) ਪੈਰਾ ਰਚਨਾ (ਤਿੰਨ ਵਿੱਚੋਂ ਇੱਕ)

(ਅ) ਪੈਰਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ।

16 ਅੰਕ

ਯੂਨਿਟ-IV

(ੳ) ਪੰਜਾਬੀ ਧੁਨੀ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ ਤੇ ਉਚਾਰਨ ਅੰਗ

(ਅ) ਸਵਰ, ਵਿਅੰਜਨ

16 ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ। ਸੈਕਸ਼ਨ ਨੰ 1 ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟ ਜੁੜੇ ਵਿੱਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿੱਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿੱਚੋਂ ਇੱਕ ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿੱਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 16 ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿੱਚ ਕਰ ਸਕਦਾ ਹੈ।

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1212 for Bachelor of Science (Non-Medical)

BCSM-1212 for Bachelor of Science (Computer Science)

**COURSE TITLE: ENGLISH (COMPULSORY)**

## **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:** write paragraphs on any given topic and translate any passage from Hindi/Punjabi to English

**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 text “Tales of Life”.

**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 text “Prose for Young Learners”

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

**SEMESTER-I**  
**(Session-2023-24)**

**Course code:** BSNM-1212 for Bachelor of Science (Non-Medical)

BCSM-1212 for Bachelor of Science (Computer Science)

**COURSE TITLE: ENGLISH (COMPULSORY)**

**Examination Time: 3 Hrs**

**Theory: 80**

**CA: 20**

**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 two marks. **(10x2=20)**

**Section B:** Two questions will be set from unit II of the syllabus. (I) paragraph (with internal choice) and (II) One translation passage, which has to be translated into English from the given Hindi/Punjabi passage. The student will attempt (I) any one paragraph and (II) the translation). Both the paragraph and the translation passage will carry 10 marks each. **(2x10=20)**

**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 10 marks (word limit 400 words). The students would be required to attempt any one. Part two will have three questions. The students would be required to attempt any two (word limit 150 words each). Each question in part two will carry five marks. **(10+5+5=20)**

**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 10 marks (word limit 400 words). The students would be required to attempt any one. Part two will have three questions. The students would be required to attempt any two (word limit 150 words each). Each question will carry five marks. **(10+5+5=20)**

**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)
- Prose for Young Learners* (Guru Nanak Dev University, Amritsar)

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code: BSNM-1333 (I)** for Bachelor of Science (Non-Medical)

**BCSM-1333 (I)** for Bachelor of Science (Computer Science)

**COURSE TITLE: MATHEMATICS (ALGEBRA)**

**COURSE OUTCOMES**

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

CO 1: Understand the concept of matrix congruence of skew symmetric matrices and its reduction in real field. Solve system of linear equations.

CO 2: Obtain Eigen values, Eigen vectors, minimal and characteristic equation of a matrix and to apply it in advanced dynamics and electric current.

CO 3: Classify real quadratic form in variables, definite, semi- definite and indefinite real quadratic form.

CO 4: To find the relations between the roots and coefficients of general polynomial equation in one variable, distinguish between solution of cubic equations and Bi-quadratic equations.



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

**SEMESTER-I**

**(Session-2023-24)**

**Course code: BSNM-1333 (I)** for Bachelor of Science (Non-Medical)

**BCSM-1333 (I)** for Bachelor of Science (Computer Science)

**COURSE TITLE: MATHEMATICS (ALGEBRA)**

Examination Time: 3 Hrs

Max. Marks: 100

**L T P: 4 0 0**

**Theory: 80**

**CA: 20**

**Instructions for the Paper Setter:** Eight questions of equal marks (16 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**

Linear independence of row and column vectors. Row rank, Column rank of a matrix, Equivalence of column and row ranks, Nullity of matrix, Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations. Theorems on consistency of a system of linear equations.

**Unit-II**

Eigen values, Eigen vectors, minimal and the characteristic equation of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix. Quadratic Forms, quadratic form as a product of matrices. The set of quadratic forms over a field.

**Unit-III**

Congruence of quadratic forms and matrices. Congruent transformations of matrices. Elementary congruent transformations. Congruent reduction of a symmetric matrix. Matrix Congruence of skew-symmetric matrices. Reduction in the real field. Classification of real quadratic forms in variables. Definite, semi-definite and indefinite real quadratic forms. Characteristic properties of definite, semi-definite and indefinite forms.

**Unit-IV**

Relations between the roots and coefficients of general polynomial equation in one variable. Transformation of equations and symmetric function of roots, Descarte's rule of signs, Newton's Method of divisors, Solution of cubic equations by Cardon method, Solution of biquadratic equations by Descarte's and Ferrari's Methods.

**Reference Books:**

1. K.B. Datta: Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi (2003).
2. S. Narayan and P.K. Mittal : Text Book of Matrices, Sultan Chand & Co. Ltd., New Delhi, 11<sup>th</sup> edition, 2005.
3. S. Hall and S.R. Knight: Higher Algebra, ArihantPrakashan, Merrut.
4. C.Prasad, Text Book on Algebra and Theory of Equations, PothishalaPvt. Ltd.

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code: BSNM-1333 (II)** for Bachelor of Science (Non-Medical)

**BCSM-1333 (II)** for Bachelor of Science (Computer Science)

**COURSE TITLE: MATHEMATICS (CALCULUS AND TRIGONOMETRY)**

**COURSE OUTCOMES**

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

CO 1: Understand real number system, lub&glb of set of real numbers, limit of a function, basic properties of limit & to apply it in real world problem. Analyse continuous and discontinuous function, Apply concept of continuity in uniform continuity.

CO 2: Manage to solve problems related to successive differentiation, Leibnitz theorem, Taylor's & Maclaurin's theorem with various forms of remainders and to use these expansion to compute values of Sine, Cosine, tangent or log function.

CO 3: Understand the concept of De Moivre's theorem & its applications. Identify circular, hyperbolic function and their inverses.

CO 4: Demonstrate exponential and logarithmic function of complex numbers, and to solve Gregory's series and summation of series.

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

**SEMESTER-I**

(Session-2023-24)

**Course code:** BSNM-1333 (II) for Bachelor of Science (Non-Medical)

BCSM-1333 (II) for Bachelor of Science (Computer Science)

**COURSE TITLE: MATHEMATICS (CALCULUS AND TRIGONOMETRY)**

Examination Time: 3 Hours

Max. Marks: 75

**L-T-P 3 0 0**

**Theory: 60**

**CA:15**

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

**Unit-I**

Real number system and its properties, lub, glb of sets of real numbers, limit of a function, Basic properties of limits, Continuous functions and classification of discontinuities, Uniform continuities.

**Unit-II**

Differentiation of hyperbolic functions, Successive differentiation, Leibnitz theorem, Taylor's and Maclaurin's theorem with various forms of remainders, Indeterminate forms.

**Unit-III**

De-Moivre's Theorem and its applications, circular and hyperbolic functions and their inverses.

**Unit-IV**

Exponential and Logarithmic function of a complex numbers, Expansion of trigonometric functions, Gregory's series, Summation of series.

**Text Book:**

1. G. B. Thomas and R .L. Finney, Calculus and Analytic Geometry, Pearson, Ninth edition, 2016.

**Reference Books:**

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, New Delhi, Eighth edition, 2010.
2. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow, 1969.
3. G. Prasad, Differential Calculus, Pothishala Pvt. Ltd., Allahabad, 1950.
4. S. L. Loney, Plane trigonometry part –II, Cambridge university press, 1948.

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1084(I) for Bachelor of Science (Non-Medical)

**COURSE TITLE: CHEMISTRY (INORGANIC CHEMISTRY)**

**COURSE OUTCOMES**

Students will be able to

**CO1:** Predict electronic properties of atoms using current models and theories in chemistry, sketch the probability density curves, boundary surface diagrams and shapes of orbitals and write the electronic configuration of atoms.

**CO2:** identify the periodic trends in physical and chemical properties of elements, describe the arrangement of the elements in the Periodic Table & change from metallic to nonmetallic character.

**CO3:** describe VBT, VSEPR theory and predicts the geometry of simple molecules & molecular orbital theory of homonuclear diatomic molecules

**CO4:** explain, predict & draw structures of simple ionic compounds.

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code: BSNM-1084(I) for Bachelor of Science (Non-Medical)**

**COURSE TITLE: CHEMISTRY (INORGANIC CHEMISTRY)**

**Exam Time: 3Hrs.**

**Max. Marks: 50**

**Credit( L-T-P): 2-0-0**

**(Theory: 40, CA: 10)**

**Instructions for the Paper Setter**

Eight questions of equal marks (eight 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**

**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. McDamiel, 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 (Semester System) (12+3 System of Education)

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1084(II) for Bachelor of Science (Non-Medical)

**COURSE TITLE: CHEMISTRY (ORGANIC CHEMISTRY)**

**Course outcomes:**

Students will be able to

CO1: interpret the bonding, hybridization between different organic compounds, explain the various reaction mechanisms and different electron displacement effects

CO2: interpret the reactions and properties of alkanes, alkenes & alkynes, derive the electrophilic, nucleophilic addition reactions, free radical mechanisms of halogenation of alkanes.

CO3: compare the reactivities of various alkyl and aryl halide, stability of various cycloalkanes

CO4: differentiate between aromatic, anti-aromatic and non-aromatic compounds, explain the effect of various substituents on the reactivity of aromatic compounds

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

**SEMESTER-I**

(Session-2023-24)

Course code: BSNM-1084(II) for Bachelor of Science (Non-Medical)

**COURSE TITLE: CHEMISTRY (ORGANIC CHEMISTRY)**

**Exam Time:3Hrs.**

**Max.Marks:75 Credit**

**L-T-P): 3-0-0**

**(Theory: 60, CA: 15)**

**Instructions for the Paper Setter**

Eight questions of equal marks (twelve 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**

**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, arennes 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,  $\text{SN}_2$  and  $\text{SN}_1$  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, mercuriation 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 (Semester System) (12+3 System of Education)  
**SEMESTER-I**  
**(Session-2023-24)**  
**Course code: BSNM-1084(P) for Bachelor of Science (Non-Medical)**  
**COURSE TITLE: CHEMISTRY (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 point of organic compounds

CO3: accurately note down the boiling point of organic compounds.

CO4: Differentiate between pure & impure compounds.

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1084(P) for Bachelor of Science (Non-Medical)

**COURSE TITLE: CHEMISTRY (PRACTICAL)**

**Exam Time: 3.5 Hrs**

**Max. Marks: 50**

**Credit (L-T-P): 0-0-2**

**(Practical: 40, CA: 10)**

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

**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

Cinnamic acid 132.5–133°C

Benzoic acid 121.5–122°C

Salicylic acid 157.5–158°C

Urea 132.5–133°C

Acetanilide 113.5–114°C

Succinic Acid 184.5–185°C

m-dinitro benzene 90°C

P-dichlorobenzene 52°C

Aspirin 135°C

**Determination of Boiling Point**

Ethanol 78°C

Cyclo Hexane 81.4°C,

Benzene–80°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 (Semester System) (12+3 System of Education)

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BCSM-1134 for Bachelor of Science (Computer Science)

**COURSE TITLE: Computer Science (Computer Fundamentals and PC Software)**

**COURSE OUTCOMES**

After passing this course the student will be able to:

CO1: comprehend about computer hardware, operating system concepts and various system software.

CO2: Identify various input, output and memory devices.

CO3: Apply office automation software to create professional and academic documents.

CO4: Apply skills to make effective presentations using associated application software.

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

**SEMESTER-I**  
**(Session-2023-24)**

**Course code:** BCSM-1134 for Bachelor of Science (Computer Science)  
**COURSE TITLE: Computer Science (Computer Fundamentals and PC Software)**

Examination Time: 3 Hrs.

L-T-P: 3-0-1

Credits: 4

Max. Marks: 100

Theory: 50

CA: 20

**Instructions for Paper Setter**

Eight questions of equal marks (10 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be 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.

**UNIT I**

Fundamentals of Computer: Introduction to computer, Applications of computer, Components of computers (Input unit, Output Unit, Memory Unit & CPU), type of Software, Translators (compiler, interpreter, assembler), Booting a System.

**UNIT II**

Input and Output Devices: Keyboards, Mouse, Joystick, Track Ball, Light Pen and Data Scanning devices (scanner, OCR, OMR, MICR, Bar Code Reader, Card Reader), Monitor, Printers (laser printer, dot matrix printer, ink jet printer). Memories: Primary Memory-RAM and ROM. Secondary Memory-Hard Disk. Introduction to Windows based operating system and Desktop icons.

**UNIT III**

Word Processing: Introduction to word, Parts of window of word (Title bar, menu bar, status bar, and ruler), understanding the Ribbon, Use of Office Button and Quick Access Toolbar, Creation of new documents, opening document. Page setup, margins, gutters, font properties, Alignment, page breaks, header & footer, deleting, moving, replace, editing text in document, saving a document, spell checker, printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height, width of row/column. Editing, deleting Rows, columns in table. Adding picture, page colors and Watermarks, Borders and shading, Templates, Mail Merge.

**UNIT IV**

PowerPoint Presentation: Introduction to PowerPoint, starting a new slide, saving presentation, moving/rearranging slides, printing slides. Applying theme to presentation, Views (slide View, slide sorter, notes view, outline view), Formatting & enhancing text formatting. Creating a graph, displaying slide show, adding multimedia. Slide transitions, applying Animation, Timing slide display, adding movies & sounds.

**References:**

1. Anshuman Sharma, A book of Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.
2. Prof. Satish Jain, M. Geetha, Kratika, BPB's Office 2010 Course Complete Book, BPB Publications, 2017.
3. Joyce Cox, Joan Lambert and Curtis Frye, Microsoft office Professional 2010 Step by Step, Microsoft Press, 2010.
4. V. Rajaraman, Neeharika Adabala, Fundamentals of Computers, PHI Learning, 2015.
5. P.K. Sinha, Computer Fundamentals, BPB Publications, 2004.

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

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1134 for Bachelor of Science (Non-Medical)

BCSM-1134 for Bachelor of Science (Computer Science)

**COURSE TITLE: Computer Science (Computer Fundamentals and PC Software)**

(PRACTICAL)

Examination Time: 3 Hrs.

Credits: 4

Max. Practical: 30

Practical based on PC Software – Office

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1395 (I) for Bachelor of Science (Non-Medical)

BCSM-1395 (I) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (MECHANICS)**

**COURSE OUTCOMES:**

After passing this course, students will be able to:

CO1: Understand the various coordinate systems and its applications. Students will be able to know the conservations laws and the symmetries of space & time.

CO2: Know the fundamental forces of nature, concept of centre mass, central forces and the motion of particle under central force and to determine the turning points of orbit. They will be able to understand the planetary motion by solving differential equation of orbits and studying Kepler's laws.

CO3: They will understand the origin of fictitious forces and their consequences on acceleration due to gravity, motion of a particle on earth, and Foucault's pendulum.

CO4: They will understand the elastic scattering in lab and centre of mass systems. They will learn the rotational motion of a body in general by studying the Euler's equations and Moment of inertia tensor.

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1395 (I) for Bachelor of Science (Non-Medical)

BCSM-1395 (I) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (MECHANICS)**

**Credits: 3-0-0**

**Marks: 60**

**Pass Marks: 21**

**Time: 3 Hours**

**Instructions for the Paper Setters:**

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carries **12 marks**. There should be 20% numerical in each paper.

**Note:** There should be 20% numerical in each paper. Students can use Non-Scientific calculators or logarithmic tables.

**UNIT-I**

Cartesian and spherical polar co-ordinate systems, area, volume, velocity and acceleration in these systems, Solid angle, Relationship of conservation laws and symmetries of space and time.

**UNIT-II**

Various forces in Nature (Brief introduction) centre of mass, equivalent one body problem, central forces, equation of motion under central force, equation of orbit and turning points. Kepler Laws. Concept of Ether and Michelson-Morley experiment.

**UNIT-III**

Inertial frame of reference. Galilean transformation and Invariance. Non Inertial frames, Coriolis force and its applications. Variation of acceleration due to gravity with latitude. Foucault pendulum.

**UNIT-IV**

Elastic collision in Lab and C.M. system, velocities, angles and energies, cross section of elastic scattering, Rutherford scattering. Rigid Body motion; Rotational motion, principal moments and Axes. Euler's equations, precession and elementary gyroscope.

**Books Suggested:**

1. Mechanics-Berkeley Physics Course, by C. Kittel, W. D. Knight, M. A. Ruderman, C. A. Helmholtz and R. J. Moyer-Tata Mc Graw Hill Publishing Company Ltd., New Delhi. Vol-I (second edition)
2. Fundamentals of Physics by D. Halliday, R. Resnick and J. Walker (sixth edition)-Wiley India Pvt. Ltd., New Delhi, 2004.
3. Analytical Mechanics by S. K. Gupta, Modern Publishers.



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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1395 (II) for Bachelor of Science (Non-Medical)

BCSM-1395 (II) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (ELECTRICITY AND MAGNETISM)**

**Course Outcomes:**

After passing this course the students will be able to:

CO1: understand the vector calculus and vector algebra and its applications in electricity and magnetism. The students will be able to solve the electrostatic problems with the help of Gauss law and Coulomb's law.

CO2: understand the applications of scalar potential for the calculation of electric field and electric potential due to an arbitrary charge distribution.

CO3: They will be able to find the electric potential and electric field of various charge distributions with the help of method of images. Students will understand the conduction of electric current in conductors by studying Ohm's law and equation of continuity.

CO4: They will be able to find the relationship between electric field from two different inertial frames of reference. They will be learn the origin of magnetism and properties of various kinds of magnetic materials.

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1395 (II) for Bachelor of Science (Non-Medical)

BCSM-1395 (II) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (ELECTRICITY AND MAGNETISM)**

**Time: 3 Hours**

**Marks: 40**

**Pass Marks: 14**

**Credits: 2-0-0**

**Instructions for the Paper Setters:**

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carries **8 marks**.

**Note:** There should be 20% numerical in each paper. Students can use Non-Scientific calculators or logarithmic tables.

**UNIT-I**

Basic ideas of Vector Calculus Gradient, Divergence, curl and their physical significance. Laplacian in rectangular, cylindrical and spherical coordinates. Coulomb's Law for point charges and continuous distribution of charges. Electric field due to dipole, line charge and sheet of charge. Electric flux, Gauss's Law and its applications. Gauss's divergence theorem and differential form of Gauss's Law. Green's theorem.

**UNIT-II**

Work and potential difference. Potential difference as line integral of field. Electric potential due to a point charge a group of point charges, dipole and quadruple moments, long uniformly charged wire, charged disc. Stoke's theorem and its applications in Electrostatic field,  $\text{curl } E=0$ . Electric fields as gradient of scalar potential. Calculation of E due to a point charge and dipole from potential. Potential due to arbitrary charge distribution and multipole moments.

**UNIT-III**

Poisson and Laplace's equation and their solutions in Cartesian and spherical coordinates. Concept of electrical images. Calculation of electric potential and field due to a point charge placed near an infinitely conducting sheet. Current and current density, equation of continuity. Microscopic form of Ohm's Law ( $J=\sigma E$ ) and conductivity, Failure of Ohm's Law.

**UNIT-IV**

Interaction between moving charges and force between parallel currents. Behaviour of various substances in magnetic field. Definition of M and H and their relation to free and bound currents. Permeability and susceptibility and their interrelationship. Orbital motion of electrons and Diamagnetism. Properties of Paramagnetic and Ferromagnetic materials

**Books Suggested:**

1. Fundamentals of Electricity and Magnetism by Arthur F. Kipp.
2. Electricity and Magnetism, Berkeley Physics Course, Vol. II by E.M. Purcell.
3. Introduction to Classical Electrodynamics by David Griffith.
4. EM Waves and Radiating System by Edward C. Jordan and K.G. Balmain.
5. Fields and Waves Electromagnetic by David K. Cheng.

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1395 (P) for Bachelor of Science (Non-Medical)

BCSM-1395 (P) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (PRACTICAL)**

**Course Outcomes : Physics Lab Sem I**

CO1: Students will be able to find the value of acceleration due to gravity using pendulums.

CO2 : It will give understanding of collisions In 1-Dimension.

CO3: It helps to study the moment of inertia of a body & on what factors its depends.

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-1395 (P) for Bachelor of Science (Non-Medical)

BCSM-1395 (P) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (PRACTICAL)**

**Credits: 0-0-2 (4 Hrs./week)**

**Maximum Marks: 40**

**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, KanyaMahaVidyalaya, Jalandhar

**General Guidelines for Practical Examination**

I. The distribution of marks is as follows: **Marks: 40**

i) One experiment **20Marks**

ii) Brief Theory **5 Marks**

iii) Viva–Voce **10Marks**

iv) Record (Practical file) **5 Marks**

II. There will be one sessions of 3 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. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment is to be allotted to more than three examinees in any group.

**LIST OF EXPERIMENTS**

1. To study the dependence of moment of inertia on distribution of mass (by noting time periods of oscillations using objects of various geometrical shapes but of same mass).
2. To establish relationship between torque and angular acceleration using fly wheel.
3. To find the moment of inertia of a flywheel.
4. Study of bending of beams and determination of Young's modulus.
5. Determination of Poisson's ratio for rubber.
6. To determine energy transfer, coefficient of restitution and verify laws of conservation of linear momentum and kinetic energy in elastic collisions using one dimensional collisions of hanging spheres.
7. To verify the laws of vibrating string by Melde's experiment.
8. Measure time period as a function of distance of centre of suspension (oscillation) from centre of mass, plot relevant graphs, determine radius of gyration and acceleration due to gravity.
9. Find the value of 'g' by Kater's pendulum.
10. Measure time period of oscillation of a Maxwell needle and determine modulus of rigidity of the material of a given wire.
11. To measure logarithmic decrement, coefficient of damping, relaxation time, and quality factor of a damped simple pendulum.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code: BSNM-2421** for Bachelor of Science (Non-Medical)

**BCSM-2421** for Bachelor of Science (Computer Science)

**COURSE TITLE: PUNJABI (COMPULSORY)**

**COURSE OUTCOMES**

**CO1:** 'ਦੇ ਰੰਗ' (ਕਹਾਣੀ ਭਾਗ) ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਕਹਾਣੀ ਪ੍ਰਤੀ ਦਿਲਚਸਪੀ, ਸੂਝ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ। ਇਸ ਦਾ ਹੋਰ ਮਨੋਰਥ ਕਹਾਣੀ ਦੀ ਵਿਸ਼ਲੇਸ਼ਣ ਤੇ ਮੁਲੰਕਣ ਦੀ ਪ੍ਰਕਿਰਿਆ ਤੋਂ ਜਾਣੂ ਕਰਾਉਣਾ ਵੀ ਹੈ ਤਾਂ ਕਿ ਉਹ ਸਮਕਾਲੀ ਸਮਾਜ ਦੀਆਂ ਸਮੱਸਿਆਵਾਂ ਨੂੰ ਸਮਝ ਸਕਣ ਅਤੇ ਆਲੋਚਨਾਤਮਕ ਦ੍ਰਿਸ਼ਟੀ ਬਣਾ ਸਕਣ।

**CO2:** 'ਸੰਸਾਰ ਦੀਆਂ ਪ੍ਰਸਿਧ ਹਸਤੀਆਂ' ਜੀਵਨੀ ਦੀ ਵਿਧਾ ਨੂੰ ਸਿਲੇਬਸ ਵਿਚ ਸ਼ਾਮਿਲ ਕਰ ਕੇ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਜੀਵਨੀ ਨੂੰ ਪੜ੍ਹਣ ਦੀ ਰੁਚੀ ਨੂੰ ਪੈਦਾ ਕਰਨਾ ਹੈ ਅਤੇ ਜੀਵਨੀ ਜਗਤ ਨਾਲ ਜੋੜਣਾ ਹੈ।

**CO3:** ਸ਼ਬਦ ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ ਪੜ੍ਹਣ ਨਾਲ ਵਿਦਿਆਰਥੀ ਇਸਦੇ ਮੁੱਢਲੇ ਸੰਕਲਪਾਂ ਨੂੰ ਆਧਾਰ ਬਣਾ ਕੇ ਇਹਨਾਂ ਸੰਕਲਪਾਂ ਤੋਂ ਜਾਣੂ ਹੋਣਗੇ। ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ ਨੂੰ ਪੜ੍ਹਾਉਣ ਦਾ ਮਨੋਰਥ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਅਮੀਰੀ ਦਾ ਅਤੇ ਬਾਰੀਕੀਆਂ ਨੂੰ ਸਮਝਣ ਲਈ ਵੱਖਰੇ-ਵੱਖਰੇ ਸਿਧਾਂਤਾਂ ਦਾ ਵਿਕਾਸ ਕਰਨਾ ਹੈ।

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

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

**SEMESTER-II**

(Session-2023-24)

**Course code: BSNM-2421** for Bachelor of Science (Non-Medical)

**BCSM-2421** for Bachelor of Science (Computer Science)

**COURSE TITLE: PUNJABI (COMPULSORY)**

ਸਮਾਂ: 3 ਘੰਟੇ

**Maximum Marks: 100**

**Theory: 80**

**CA: 20**

ਪਾਠਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਯੂਨਿਟ-I

ਦੋ ਰੰਗ (ਕਹਾਣੀ ਭਾਗ) (ਸੰਪਾ.ਹਰਜਿੰਦਰ ਸਿੰਘ ਢਿਲੋਂ ਅਤੇ ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਰਗੋਧੀਆ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

(ਵਿਸ਼ਾ-ਵਸਤੂ/ ਪਾਤਰ ਚਿਤਰਨ)

16 ਅੰਕ

ਯੂਨਿਟ-II

ਸੰਸਾਰ ਦੀਆਂ ਪ੍ਰਸਿੱਧ ਹਸਤੀਆਂ (ਜੀਵਨੀ ਨੰ: 10 ਤੋਂ 18 ਤਕ) (ਸੰਪਾ.ਪ੍ਰਿੰ. ਤੇਜਾ ਸਿੰਘ, ਹਰਨਾਮ ਸਿੰਘ ਸ਼ਾਮ), ਪੰਜਾਬੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

(ਵਿਸ਼ਾ-ਵਸਤੂ/ ਨਾਇਕ ਬਿੰਬ)

16ਅੰਕ

ਯੂਨਿਟ-III

(ੳ) ਸ਼ਬਦ ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ : ਪਰਿਭਾਸ਼ਾ, ਮੁੱਢਲੇ ਸੰਕਲਪ।

(ਅ) ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ

16 ਅੰਕ

ਯੂਨਿਟ-IV

(ੳ) ਦਫ਼ਤਰੀ ਚਿੱਠੀ ਪੱਤਰ

(ਅ) ਮੁਹਾਵਰੇਅਖਾਣ

16ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਸੈਕਸ਼ਨ ਹੋਣਗੇ। ਸੈਕਸ਼ਨ ਨੰ 1 ਤੱਕ ਦੇ ਪ੍ਰਸ਼ਨ ਯੂਨਿਟ ਜੁੜੇ ਵਿਚੋਂ ਪੁੱਛੇ ਜਾਣਗੇ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਕਰਨਾ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਸੈਕਸ਼ਨ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 16 ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

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

**SEMESTER-I**

**(Session-2023-24)**

**Course code:** BSNM-2212 for Bachelor of Science (Non-Medical)

BCSM-2212 for Bachelor of Science (Computer Science)

**COURSE TITLE: ENGLISH (COMPULSORY)**

**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:** Write personal letters and increase their knowledge of vocabulary by studying the synonyms and antonyms in the prescribed text *The Students’ Companion* by Wilfred D. Best

**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 text “Tales of Life”.

**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 text “Prose for Young Learners”

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

**SEMESTER-I**  
**(Session-2023-24)**

**Course code:** BSNM-2212 for Bachelor of Science (Non-Medical)

BCSM-2212 for Bachelor of Science (Computer Science)

**COURSE TITLE: ENGLISH (COMPULSORY)**

**Examination Time: 3 Hrs**

**Theory: 80**

**CA: 20**

**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 two marks.

**(10x2=20)**

**Section B:** Two questions will be set from unit II of the syllabus. (I) Personal Letter (with internal choice). The student will write a personal letter on any of the given two topics. This question will carry 10 marks. (II) Vocabulary (Antonyms/Synonyms). 10 words will be given. The students will give the Antonyms/Synonyms of any five words. This question will carry 10 marks. **(2x10=20)**

**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 10 marks (word limit 400 words). The students would be required to attempt any one. Part two will have three questions. The students would be required to attempt any two (word limit 150 words each). Each question in part two will carry five marks. **(10+5+5=20)**

**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 10 marks (word limit 400 words). The students would be required to attempt any one. Part two will have three questions. The students would be required to attempt any two (word limit 150 words each). Each question will carry five marks. **(10+5+5=20)**

**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 (Semester System) (12+3 System of Education)

**SEMESTER-II**

**(Session-2023-24)**

**Course code: BSNM-2333 (II)** for Bachelor of Science (Non-Medical)

**BCSM-2333 (II)** for Bachelor of Science (Computer Science)

**COURSE TITLE: MATHEMATICS (CALCULUS AND DIFFERENTIAL EQUATIONS)**

**COURSE OUTCOMES**

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

CO 1: Demonstrate Asymptotes, points of inflexion, multiple points, concavity and convexity of a curve and apply these concepts in curve tracing.

CO 2: Find arc length of a curve and able to establish reduction formulae for various functions.

CO 3: Understand concept of Exact Differential Equations and demonstrate the geometrical meaning of a differential equation & orthogonal trajectories.

CO 4: Understand the concept of linear differential equation with constant and variable coefficients and to apply in a wide variety of disciplines like Bio, Eco, Physics and Engineering. Manage to solve the problem related to series solution of differential equations like Bessel and Legendre equation by Power series method.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code: BSNM-2333 (II)** for Bachelor of Science (Non-Medical)

**BCSM-2333 (II)** for Bachelor of Science (Computer Science)

**COURSE TITLE: MATHEMATICS (CALCULUS AND DIFFERENTIAL EQUATIONS)**

Examination Time: 3 Hours

Max. Marks: 100

L-T-P 4 0 0

Theory: 80

CA:20

**Instructions for the Paper Setter:** Eight questions of equal marks (16 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**

Asymptotes, Tests for concavity and convexity, Points of inflexion, Multiple Points, Curvature, Tracing of Curves (Cartesian and Parametric coordinates only).

**Unit-II**

Integration of hyperbolic functions. Reduction formulae. Definite integrals. Fundamental theorem of integral calculus. Quadrature, rectification.

**Unit- III**

Exact differential equations. First order and higher degree equations solvable for  $x, y, p$ . Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories.

**Unit-IV**

Linear differential equations with constant and variable coefficients. Variation of Parameters method, reduction method, series solutions of differential equations. Power series method, Bessel and Legendre equations (only series solution).

**Text Book:**

O.P.Chug, P. Gupta and R.S.Dahiya, Topics in Mathematics: Calculus and Differential Equations, Laxmi Publications Private Ltd.

**Reference Books:**

1. D.A.Murray, Introductory Course in Differential Equations, Orient Longman Private Limited, Hyderabad, 11<sup>th</sup> edition, 2003.
2. G.F.Simmons, Differential Equations, McGraw Hill Education, 2<sup>nd</sup> edition, 2017.
3. G. Prasad: Integral Calculus, Pothishala Pvt. Ltd., Allahabad, 2015.
4. E. Kreyszig: Advanced Engineering Mathematics, John Wiley and Sons, 8<sup>th</sup> edition, 2010.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code: BSNM-2333 (II)** for Bachelor of Science (Non-Medical)

**BCSM-2333 (II)** for Bachelor of Science (Computer Science)

**COURSE TITLE: MATHEMATICS (CALCULUS)**

**COURSE OUTCOMES**

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

CO 1: Differentiate between limit and continuity of function of two variables and apply this concept in partial derivatives & differentiability of real valued function of two variables. Application of inverse & implicit function theorems.

CO 2: Manage to solve problems related to Maxima, Minima & Saddle points of functions of two variables. Classify Envelopes & Evolutes.

CO 3: Understand the concept of Double and Triple integrals.

CO 4: Apply double and triple integral to evaluation of areas, volumes, surfaces of solid of revolution and to find out area and volume of plane and solid figure.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code: BSNM-2333 (II)** for Bachelor of Science (Non-Medical)

**BCSM-2333 (II)** for Bachelor of Science (Computer Science)

**COURSE TITLE: MATHEMATICS (CALCULUS)**

Examination Time: 3 Hours

Max. Marks: 75

L-T-P 3 0 0

Theory: 60

CA:15

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

**Unit-I**

Limit and Continuity of functions of two variables, Partial differentiation, Change of variables, Partial derivatives and differentiability of real-valued functions of two variables, Schwartz's and Young's Theorem, Statements of Inverse and implicit function theorems and applications.

**Unit-II**

Euler's theorem on homogeneous functions, Taylor's theorem for functions of two variables, Jacobians, Envelopes. Evolutes, Maxima, Minima and saddle points of functions of two variables.

**Unit-III**

Lagrange's undetermined multiplier method, Double and Triple Integrals, Change of variables, Change of order of integration in double integrals.

**Unit-IV**

Application to evaluation of area, volume, surface of solids of revolutions.

**Text Book:**

G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Addison Wesley, 1998

**Reference Books:**

1. S. Narayan and P.K. Mittal, Integral Calculus, Sultan Chand & Sons, New Delhi, 1983.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, New Delhi, eighth edition, 2010
3. S. Narayan and P.K. Mittal, Differential Calculus, Sultan Chand & Sons, Jalandhar, 1956.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2084(I) for Bachelor of Science (Non-Medical)

**COURSE TITLE: CHEMISTRY (INORGANIC CHEMISTRY)**

**Course outcomes:**

Students will be able to

CO1: explains & compares the trends in atomic and physical properties of group 13, 14, 15, 16, 17 elements

CO2: explain the atomic, physical and chemical properties of alkali metals and alkaline earth metals.

CO3: Interpret the properties of carbides, silicates, interhalogen compounds.

CO4: Exhaustive understanding of d-block elements belonging to 4th, 5th and 6th period.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2084(I) for Bachelor of Science (Non-Medical)

**COURSE TITLE: CHEMISTRY (INORGANIC CHEMISTRY)**

**Exam Time:3Hrs.**

**Max.Marks:75 Credit(**

**L-T-P): 3-0-0**

**(Theory: 60, CA: 15)**

**Instructions for the Paper Setter**

Eight questions of equal marks (twelve 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**

**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 and 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. Porterfeld, 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.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2084(II) for Bachelor of Science (Non-Medical)

**COURSE TITLE: CHEMISTRY (PHYSICAL CHEMISTRY)**

**Course outcomes:**

Students will be able to

CO1: explain various gaseous laws and their applications.

CO2: acquire the knowledge of structure and intermolecular forces present between solids, liquids and gases, Discuss liquid crystals& its types.

CO3: understand& apply the basic concepts of colloidal state of matter and applications of colloids.

CO4: demonstrate an understanding of basic principles of colligative properties of dilute solutions.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2084(II) for Bachelor of Science (Non-Medical)

**COURSE TITLE: CHEMISTRY (PHYSICAL CHEMISTRY)**

**Exam Time: 3Hrs.**

**Max.Marks: 50**

**Credit( L-T-P): 2-0-0**

**(Theory: 40, CA: 10)**

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

**Instructions for the Paper Setter**

Eight questions of equal marks (eight 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**

**I. Gaseous States**

**(10 Hrs)**

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**

**(10 Hrs)**

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**

**(13Hrs)**

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 and 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.



Bachelor of Science (Semester System) (12+3 System of Education)  
**SEMESTER-II**  
**(Session-2023-24)**  
**Course code: BSNM-2084(II) for Bachelor of Science (Non-Medical)**  
**COURSE TITLE: CHEMISTRY (PRACTICAL)**

**COURSE OUTCOMES:**

Students will be able to

CO1: understand & apply the technique of crystallization.

CO2: determine the rate of the reactions

CO3: compare& analyze the viscosity and surface tension of different liquids and solutions

CO4: application of calorimeter in various thermochemistry experiments.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2084(II) for Bachelor of Science (Non-Medical)

**COURSE TITLE: CHEMISTRY (PRACTICAL)**

**Exam Time: 3.5 Hrs**

**Max. Marks: 50**

**Credit (L-T-P): 0-0-2**

**(Practical: 40, CA: 10)**

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

**Crystallisation:**

Concept of indication of crystallisation. Phthalic acid from hot water (using fluted filter paper and 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 and 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 and Co.
8. Selected Experiments in Physical Chemistry, N.G. Mukherjee, J.N. Ghosh and Sons.
9. Experiments Physical Chemistry, J.C. Ghosh, Bharati Bhavan.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BCSM-2134 for Bachelor of Science (Computer Science)

**COURSE TITLE:** COMPUTER SCIENCE (PROGRAMMING IN C)

**COURSE OUTCOMES:**

After passing this course the student will be able to:

CO1: Comprehend the working of various programming constructs involved in C Programming.

CO2: Apply various operators and control sequence of program using various control statements.

CO3: Apply programming concepts such as arrays, functions and strings to provide solution in different problem domains.

CO4: Work with pointers, structures and union.

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

**SEMESTER-II**  
**(Session-2023-24)**

**Course code:** BCSM-2134 for Bachelor of Science (Computer Science)

**COURSE TITLE:** COMPUTER SCIENCE (PROGRAMMING IN C)

Examination Time: 3 Hrs.

L-T-P: 3-0-1

Credits: 4

Max. Marks: 100

Theory: 50

CA: 20

**Instructions for Paper Setter**

Eight questions of equal marks (10 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be 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.

**UNIT-I**

Data Representation, Introduction to Number Systems and Character Set, Decision tables, Decision Trees, Flow Charts, pseudo codes and, algorithms. Programming Using C: Introduction to C, Applications and Advantages of C, Tokens, Types of Errors Data Types: Basic & Derived Data Types, User Defined Data Types, Declaring and initializing variables.

**UNIT-II**

Operators and Expressions: Types of operators (Unary, Binary, Ternary), Precedence and Associativity. Data I/O Functions: Types of I/O function, Formatted & Unformatted console I/O Functions. Control Statements: Jumping, Branching and Looping–Entry controlled and exit controlled, difference between for, while and do–while.

**UNIT-III**

Arrays: Types of Arrays, One Dimensional and Two-Dimensional Arrays. Strings: Introduction to Strings and String functions, array of strings. Functions: User Defined & Library Function, Function (Prototype, Declaration, Definition), Methods of passing arguments, local and global functions, Recursion.

**UNIT-IV**

Storage Classes: Introduction to various storage classes, scope and lifetime of a variable, advantages and disadvantages. Pointers: Introduction, Uses of pointers, Limitations of pointers, Difference between void pointer and Null pointer, Pointer arithmetic, operators not allowed on pointers, Types of Pointer, Passing Pointers to function, concept of pointer to pointer. Structure and Union: Introduction to structure and union, pointers with structure.

**References:**

1. E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill (2002), 5th edition.
2. Stephen G. Kochan, Programming in C, Pearson Education (2015), 4th edition.
3. Rachhpal Singh K.S. Kahlon, Gurvinder Singh, Programming in C, Kalyani Publishers (2011).
4. YashwantKanetkar, Let us C, BPB Publications (2020), 17th edition.
5. R.S. Salari, Application Programming in C, Khanna Book Publishing (2012), 4th edition.
6. Anshuman Sharma, Learn programming in C, Lakhanpal Publishers (2016), 7th edition.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BCSM-2134 for Bachelor of Science (Computer Science)

**COURSE TITLE:** COMPUTER SCIENCE (PROGRAMMING IN C)  
(PRACTICAL)

Examination Time: 3 Hrs

Credits: 4

Practical:30

Lab based on Programming in C.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2395 (I) for Bachelor of Science (Non-Medical)

BCSM-2395 (I) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (RELATIVITY AND ELECTROMAGNETISM)**

**COURSE OUTCOMES**

After passing this course, students will be able to:

- CO1: understand special theory of relativity and related basic concepts and applications.
- CO2: derive Maxwell equations and their applications in propagation of e.m. waves in conductors and insulators.
- CO3: apply the BiotSavart's Law and Ampere's circuital law in different situations and frames.
- CO4: understand the Faraday's Law of electromagnetic induction and LCR circuits.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2395 (I) for Bachelor of Science (Non-Medical)

BCSM-2395 (I) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (RELATIVITY AND ELECTROMAGNETISM)**

**Time: 3 Hours**

**Marks: 60**

**Pass Marks: 21**

**Credits: 3-0-0(3 Hrs./week)**

**Instructions for the Paper Setters:**

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

**Note:** There should be 20% numerical in each paper. Students can use Non-Scientific calculators or logarithmic tables.

**UNIT-I**

Postulates of special theory of relativity. Lorentz transformations, observer and viewer in relativity. Relativity of simultaneity, Length, Time, velocities. Relativistic Doppler effect. Variation of mass with velocity, mass-energy equivalence, rest mass in an inelastic collision, relativistic momentum & energy, their transformation, concepts of Minkowski space, four vector formulation.

**UNIT-II**

Invariance of charge, E in different frames of references. Fields of a point charge moving with constant velocity, Lorentz's force, Definition of B. Biot Savart's Law and its application to long straight wire, circular current loop and solenoid. Ampere's Circuital law and its application. Divergence and curl of B. Hall effect, expression and coefficient. Vector potential, Definition and derivation, current-density-definition, its use in calculation of charge in magnetic field at a current sheet. Transformation equation of E and B from one frame to another.

**UNIT-III**

Faraday's Law of EM induction, Displacement current, Mutual inductance and reciprocity theorem. Self inductance, L for solenoid, Coupling of Electrical circuits. Analysis of LCR series and parallel resonant, circuits Q-factor, Power consumed, power factor.

**UNIT-IV**

Maxwell's equations their derivation and characterizations, E.M. waves and wave equation in a medium having finite permeability and permittivity but with conductivity  $\sigma = 0$ ). Poynting vector, impedance of a dielectric to EM waves. EM waves in a conducting medium and Skin depth. EM wave velocity in a conductor and anomalous dispersion. Response of a conducting medium to EM waves. Reflection and transmission of EM waves at a boundary of two dielectric media for normal incident.

**Recommended Books:**

1. Introduction to Electrodynamics by D.J. Griffiths-Pearson Education Ltd., New Delhi, 1991
2. Physics of Vibrations and Waves by H.J. Pain.
3. EM Waves and Radiating Systems by Edward C. Jordan and K.G. Balmain.
4. Fields and Waves Electromagnetic by David K. Cheng.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2395 (II) for Bachelor of Science (Non-Medical)

BCSM-2395 (II) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (VIBRATION AND WAVES)**

**COURSE OUTCOMES**

After passing this course the student will be able to:

CO1: demonstrate Lissajous figures by mechanical and analytical method with different cases.

CO2: understand Free, damped and resonance oscillations, both mechanical and electric using differential equations.

CO3: solve differential equation of forced oscillations & to obtain related quantities.

CO4: understand concept of coupled oscillators and wavemotion. Student will also be able to apply the concept of waves and oscillations to any type of waves like e. m. waves, mechanical waves.



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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2395 (II) for Bachelor of Science (Non-Medical)

BCSM-2395 (II) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (VIBRATION AND WAVES)**

**Time: 3 Hours**

**Marks: 40**

**Pass Marks: 14**

**Credits: 2-0-0**

**Instructions for the Paper Setters:**

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carries **8marks**.

**Note:** There should be 20% numerical in each paper. Students can use Non-Scientific calculators or logarithmic tables.

**UNIT-I**

Simply harmonic motion, energy of a SHO. Compound pendulum. Torsional pendulum Electrical Oscillations Transverse Vibrations of a mass on string, composition of two Perpendicular SHM of same period and of period in ratio 1:2.

**UNIT-II**

Decay of free Vibrations due to damping. Differential equation of motion, types of motion, types of damping. Determination of damping co-efficient– Logarithmic decrement, relaxation time and Q–Factor. Electromagnetic damping (Electrical oscillator).

**UNIT-III**

Differential equation for forced mechanical and electrical oscillators. Transient and steady state behaviour. Displacement and velocity variation with driving force frequency, variation of phase with frequency, resonance. Power supplied to an oscillator and its variation with frequency. Q–value and band width. Q–value as an amplification factor. Stiffness coupled oscillators, Normal co–ordinates and normal modes of vibration. Inductance coupling of electrical oscillators.

**UNIT-IV**

Types of waves, wave equation (transverse) and its solution characteristic impedance of a string. Impedance matching. Reflection and Transmission of waves at boundary. Reflection and transmission of energy. Reflected and transmitted energy coefficients. Standing waves on a string of fixed length. Energy of vibration string. Wave and group velocity.

**Recommended Books:**

1. Fundamentals of Vibrations and Waves by S.P. Puri.
2. Physics of Vibrations and Waves by H.J. Pain.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2395 (P) for Bachelor of Science (Non-Medical)

BCSM-2395 (P) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (PRACTICAL)**

**COURSE OUTCOMES**

CO1: Students will be able to study resonance in series & parallel LCR circuit.

CO2: At the end of this course, students will be able to find the value of capacitor, coefficient of self inductance, permeability & permittivity of air.

CO3: Students will be able to study the variation of magnetic field on the axis of coil & can find the value of horizontal component of magnetic field.

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

**SEMESTER-II**

**(Session-2023-24)**

**Course code:** BSNM-2395 (P) for Bachelor of Science (Non-Medical)

BCSM-2395 (P) for Bachelor of Science (Computer Science)

**COURSE TITLE: PHYSICS (PRACTICAL)**

**Credits: 0-0-2 (4Hrs. /week)**

**Maximum Marks: 50**

**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, KanyaMahaVidyalaya, Jalandhar

**General Guidelines for Practical Examination:**

I. The distribution of marks is as follows: **Marks: 50**

i) One experiment **20 Marks**

ii) Brief Theory **10 Marks**

iii) Viva-Voce **10 Marks**

iv) Record (Practical file) **10Marks**

II. There will be one sessions of 3 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. Number of candidates in a group for practical examination should not exceed 12.

IV. In a single group no experiment is to be allotted to more than three examinees in any group.

**LIST OF EXPERIMENTS**

1. To determine low resistance with Carey-Foster's Bridge.

2. To study the magnetic field produced by a current carrying solenoid using a search coil and calculate permeability of air.

3. To study the induced e.m.f. as a function of the velocity of the magnet.

4. Study of phase relationships using impedance triangle for LCR circuit and calculate impedance.

5. Resonance in a series LCR circuits for different R-value and calculate Q-value.

6. Resonance in a parallel LCR circuits for different R-value and calculate Q-value.

7. Capacitance by flashing and quenching of a neon lamp.

8. Measurement of capacitance, determination of permittivity of a medium air and relative permittivity by de-Sauty's bridge.

9. To determine L using Anderson Bridge.

10. To find the value of BH the horizontal component of earth's magnetic field in the lab using a deflection & vibration magnetometer.

11. To study the variation of magnetic field with distance along the axis of coil carrying current by plotting a graph.